THREE ESSAYS IN CORPORATE FINANCE

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ABSTRACT

Three Essays in Corporate Finance

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This thesis examines two issues in corporate finance. The first two essays examine the influence of ownership structure on the relationship between ownership and firm value. The third essay examines the influence of an IPO on a firm's lending arrangements.

In the first essay, we examine the influence of the presence of multiple blockholders on ownership-firm value relationship. Additional blockholders can either form a coalition with or monitor the largest individual blockholder. We hypothesize that both of these alternatives will influence the shape of the observed ownership-firm value relationship and the choice will be influenced by blockholder identity. We find that while individual blockholders tend to form a coalition, corporate blockholders tend to monitor. We also find that the coalition formation effect is more pronounced in non-founder firms. Our results suggest that the relationship between the ownership of the largest individual blockholder and firm value critically depends on both the presence and identity of additional blockholders.

In the second essay, we examine the influence of ownership structure on the observed relationship between inside ownership and firm value. We document the predominant type of this relationship for different types of ownership structures. Samples of firms with predominately individual blockholders tend to generate a convex relationship, while those with corporate presence generate a concave one. Thus, we find a much wider spectrum of inside ownership-firm value relationships than reported in prior studies. We show that much of the disagreement regarding the aforementioned relationship can be attributed to differing ownership structures of sample firms.

In the third essay, we examine changes in covenants and yields of bank loans around IPO and link them to the changes in the extent of loan syndication. We document significant changes in lending arrangements around IPO and show there are significant reductions in both covenant intensity and yields around a firm's IPO. The decline in yields is driven primarily by firms that switch to syndicated loans after IPO. Our results suggest that, by allowing more firms to access the syndicated loan market, IPOs are influential in determining the covenants and yields on post-IPO bank loans.

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CHAPTER ONE – INTRODUCTION

This thesis examines two issues in corporate finance. The first and second essays examine the influence of ownership structure on the relationship between ownership and firm value. The third essay examines the influence of an IPO on a firm's lending arrangements.

In the second chapter (first essay), we examine the influence of the presence of multiple blockholders on ownership-firm value relationship. Despite the potential significance of the interactions among blockholders, there has been relatively little theoretical or empirical work focusing on this issue until a recent revival of interest in this topic. Additional blockholders can either form a coalition with or monitor the largest individual blockholder. We hypothesize that both of these alternatives will influence the shape of the observed ownership-firm value relationship. Further, the choice between these two alternatives will be influenced by the identity of the blockholder, whether individual or corporate. We argue that these two blockholder types differ in three main dimensions – the ability to extract private benefits, short- or long-term focus, and external pressures – and these differences will influence their choice regarding whether to form coalitions with or monitor the largest individual blockholder.

Overall, we find evidence consistent with our hypotheses. First, we find that the individual blockholders tend to form a coalition either to extract private benefits or to increase firm value. Corporate blockholders, on the other hand, tend to monitor. Second, the coalition formation effect is more pronounced in non-founder firms and when the second individual blockholder is not a founder. Overall, our results suggest that the relationship between the ownership of the largest individual blockholder and firm value critically depends on both the presence and identity of additional blockholders.

In the third chapter (second essay), we examine the influence of ownership structure on the observed relationship between inside ownership and firm value. We draw upon the evidence presented in the first essay of this dissertation and test if the various forms of the relationship

found in the literature can be explained by differing underlying ownership structures. First, we document the predominant type of inside ownership-firm value relationship for different types of ownership structures. In particular, samples of firms with predominately individual blockholders tend to generate a convex relationship, while those with corporate presence generate a concave one. Thus, we find a much wider spectrum of inside ownership-firm value relationships than reported in prior studies.

Second, we show that much of the disagreement in prior studies regarding the relationship between insider ownership and firm value can be attributed to differing ownership structures of the sample firms. In particular, we use the above findings and the sample selection criteria (and therefore the implied ownership structure) of prior studies to predict the observed inside ownership-firm value relationship. We are able to correctly predict a majority of the inside ownership-firm value relationships reported in prior studies. Overall, our findings suggest that ownership structure has a significant influence on the inside ownership-firm value relationship.

In the fourth chapter (third essay), we examine changes in covenants and yields of bank loans around IPO and link them to the changes in the extent of loan syndication. Our findings can be summarized as follows. First, we document significant changes in lending arrangements around IPO – the percentage of firms using syndicated loans increases from 42% to 71%. Second, we show that there are significant reductions in both covenant intensity and yields around a firm's IPO. Third, the decline in yields is driven primarily by firms that switch from non-syndicated pre-IPO loans to syndicated post-IPO loans. The decline in covenant intensity, on the other hand, is driven primarily by firms that continue to use non-syndicated loans even after their IPO. Further, we find evidence of a decrease in covenant intensity for firms switching lenders after IPO. Finally, venture capitalist backing also influences the changes in covenant intensity and yields. Overall, our results suggest that, by allowing more firms to access the syndicated loan market, IPOs are influential in determining the covenants and yields on post-IPO bank loans.

CHAPTER TWO – READING BETWEEN THE BLOCKS

2.1. Introduction

A question that has been the catalyst of a plethora of research in corporate finance is that of the relationship between ownership and firm value. Much of the existing literature has framed this relationship as a trade-off between two opposing effects – incentive alignment and entrenchment.[1] As noted by Fama (1980), both of these effects are likely to be influenced by the presence of (and interactions between) additional blockholders – either through monitoring or coalition formation. This, in turn, suggests that additional blockholders could influence firm value in two possible ways – directly through their actions and indirectly through their influence on the actions of the largest blockholder. Despite the potential significance of the interactions among blockholders, there has been relatively little theoretical or empirical work focusing on this issue until a recent revival of interest in this topic.[2] We fill this gap in the literature by examining the influence of additional blockholders on the relationship between the ownership of the largest individual blockholder and firm value.[3]

We hypothesize that the influence of additional blockholders on the observed ownership-firm value relationship will depend on whether the additional blockholder chooses to form a coalition with or monitor the largest individual blockholder. First, consider the situation in which the largest blockholder forms a coalition with another (smaller) blockholder. We define a coalition as an agreement between blockholders to act based on the combined level of their

[1] Jensen and Meckling (1976) argue that the greater is the size of the blockholder's stake, the greater is the focus on creating value over the long-term rather than private benefit extraction. Conversely, Morck, Shleifer, and Vishny (1988), Stulz (1988), and McConnell and Servaes (1990) each argue that higher levels of ownership increase blockholder power, leading to entrenchment and value-decreasing perquisite consumption at the expense of minority shareholders. The dominating effect still remains an empirical question.

[2] Several recent papers have suggested that individual blockholders can have two opposing influences on firm value. On one hand, Bennedsen and Wolfenzon (2000) argue that blockholders may attempt to form coalitions that can be used to extract private benefits from the remaining shareholders. Bloch and Hege (2001), on the other hand, argue that blockholders compete for control of the firm and thus the presence of multiple blockholders would act as a check on the rent extraction by the controlling blockholder.

[3] To allow the relative importance of incentive alignment and monitoring effects to vary over different levels of ownership, we employ a quadratic specification throughout the paper.

ownership (as opposed to their individual stakes). Thus, by forming a coalition, the largest blockholder will have a larger *effective* ownership stake in the firm, which can have either a positive (increased incentive alignment) or a negative (increased entrenchment) influence on firm value.[4] In other words, a coalition of two (or more) blockholders is more likely to achieve the level of ownership necessary either for entrenchment or incentive alignment as compared to the single blockholder case, *ceteris paribus*. This implies that a firm with multiple blockholders will have a significantly steeper relationship between ownership of the largest blockholder and firm value than a single blockholder firm.

Second, suppose the additional blockholder were to monitor the largest one (see, e.g., Bloch and Hege, 2001). The benefits from monitoring will depend upon the level of the largest blockholder's ownership. In particular, such benefits will be the largest at the level of ownership for which (in the absence of monitoring) the ownership-firm value relationship reaches its minimum.[5] If this is the case, then the influence of monitoring on firm value will also vary with the level of the largest blockholder's ownership. This suggests that the shape of the ownership-firm value relationship in the presence of a monitoring blockholder will be significantly different from that observed in the case of a single blockholder.

Further, we hypothesize that the propensity to engage in monitoring or coalition formation will depend upon the type of investor – individual or corporate.[6] The following three characteristics make corporate blockholders less likely to engage in the formation of a coalition. First, they are less likely to be firm insiders and therefore less likely to reap private benefits of control. Second, their relatively shorter investment horizon is likely to make any coalition

[4] Our definition of coalition formation allows for both positive and negative coalitions. Thus, a coalition which increases the combined ownership into the incentive alignment (entrenchment) range can be viewed as a positive (negative) coalition.

[5] This is conditional on the monitoring blockholder's ability to influence actions of the largest blockholder. By definition, additional blockholders will not be able to influence an entrenched largest blockholder. We will have more to say about this in Section 2.

[6] We define a corporate blockholder as a corporate entity not affiliated with any of the individual blockholders. These, among others, include institutional investors, such as mutual and pension funds, and various private and public non-financial corporations.

between them and the largest blockholder relatively short-lived. Therefore, the two parties may find it too costly to form a coalition. Third, corporate blockholders may have external pressures (e.g., fiduciary obligations) that make them more likely to monitor the largest blockholder. Therefore, we expect individual (corporate) blockholders to be more likely to form a coalition with (monitor) the largest blockholder. Finally, we hypothesize that the *identity* of the individual blockholders will also have a significant influence on the observed ownership-firm value relationship.[7] Specifically, we expect the influence of founders to be different from that of non-founders (we develop formal hypotheses in Section 2.2).

Our findings support the hypothesis that the presence of additional blockholders is associated with a significant variation in the relationship between the ownership of the largest individual blockholder and firm value.[8] First, as a benchmark, we find a *convex* relationship between ownership and firm value. Second, we find that the presence of an additional individual blockholder makes the convex relationship described above more pronounced. This is consistent with our prediction that in the presence of a coalition, the observed ownership-firm value relationship will be steeper than that observed in the case of a single blockholder firm. Third, we find that the presence of a corporate blockholder has a *concave* influence on the relationship between the largest individual blockholder's ownership and firm value. This finding is consistent with our prediction that the benefits from monitoring by the corporate blockholders will be the largest at the level of ownership at which the ownership-firm value relationship reaches its minimum. Fourth, we find that the identity of the individual blockholder also matters. In particular, we find that in the presence of an additional blockholder, the ownership-firm value

[7] While the identity of the corporate blockholder may influence the observed ownership-firm value relationship, examination of such an influence is beyond the scope of the paper.

[8] Note that we are only showing an association here. While it is possible that certain types of firms (e.g., with a particular value) attract a particular ownership structure, an examination of the causality is beyond the scope of this paper.

relationship is less convex in founder firms (as compared to non-founder firms).[9] Also, we find that the additional non-founder blockholder is more likely to form a coalition with the largest blockholder, while the additional founder blockholder tends to monitor.

Our findings are related to and contribute to several streams of research. The first is the emerging literature on blockholder ownership. The findings of Holderness (2009) indicate that blockholders are more prevalent in the US than formerly believed. Moreover, the work of Bennedson and Wolfenzon (2000), Pagano and Röell (1998), and Bloch and Hege (2001) suggest that the presence and interaction of multiple shareholders could affect firm value. However, the empirical evidence on the interaction of multiple blockholders is sparse. Most of this literature, however, has focused on the number of blockholders and the dispersion of their ownership stakes (see, e.g., Maury and Pajuste, 2005; Laeven and Levine, 2008; and Konijn et al., 2011).[10] Our approach differs in that we allow the influence of multiple blockholders to vary with the level of the largest blockholder's ownership. We find that the positive influence of additional individual blockholders is largely confined to firms with low and high ownership levels of the largest blockholder. In contrast, the positive influence of corporate blockholders is mainly observed in firms with intermediate levels of ownership of the largest blockholder. We also find that there is a range of ownership for which the presence of multiple blockholders has at best a neutral influence on firm value. In other words, the influence of additional blockholders varies by both the level of the largest blockholder's ownership and the identity of the additional blockholders.

Second, we also contribute to the extensive literature on the relationship between (insider) ownership and firm value. While the presence of additional blockholders has been extensively used as control variable in prior studies on the topic, we are not aware of any study that has explicitly allowed for the presence of additional blockholders to change the slope (as well

[9] From now onwards, we will refer to firms in which the largest individual blockholder is (is not) the founder as founder (non-founder) firms.

[10] There is also an emerging literature that argues that blockholders influence firm value through exit threats (see, e.g., Bharat et al., 2011).

as intercept) of the observed ownership-firm value relationship. The study closest to our own in this respect is that of Kim and Lu (2011). They show that the concave relationship between CEO ownership and firm value is present only in firms with low institutional ownership concentration, their proxy for weak external governance.[11] Firms with strong external governance, on the other hand, are found to have an insignificant relationship. Our approach extends the work of Kim and Lu (2011) in several dimensions. First, while they examine the influence of institutional investors holding stakes of any size, we focus on blockholders, who, by virtue of the size of their ownership stakes, are more likely to exert a significant influence on actions of the largest blockholder. Second, we examine all blockholders, not just the institutional ones. Further, our results differ from those of Kim and Lu (2011) – we show that corporate blockholders have a concave influence on the ownership-firm value relationship (as opposed to the convex one implied by their results).

Third, our study contributes to the literature on the influence of shareholder identity on ownership-firm value relationship (see, e.g., Holderness and Sheehan, 1988; Barclay and Holderness, 1991; Demsetz and Lehn, 1985; and Cronqvist and Fahlenbrach, 2009). In particular, our findings of significant differences between individual and corporate blockholders in terms of their influence on the ownership-firm value relationship suggests that treatment of these two types of blockholders as a homogeneous group (as is frequently done in the literature) may result in misleading inferences.

Further, we contribute to the family firm literature. While some studies document the positive influence of founders on firm value, others find that their presence destroys value.[12] Villalonga and Amit (2006) find that agency costs are higher in non-founder firms than in firms having both founder and non-founder shareholders and the founder is the CEO. When a

[11] Their measure of concentration is the sum of the ownership stakes of the five largest institutional investors.

[12] A detailed review of the contradictory findings in this literature is presented in Miller, Le Breton-Miller, Lester, and Cannella (2007).

descendant of the founder is the CEO, the opposite relationship holds. Fahlenbrach (2009) finds that firm value is significantly higher in firms where the founder is the CEO. Morck, Shleifer, and Vishny (1988) find that the presence of a founder in a younger (older) firm is associated with higher (lower) Tobin's q, with the latter finding being indicative of an entrenchment effect. Stock prices are found to increase upon the death of managing founders (Johnson et al., 1985) and blockholders (Slovin and Sushka, 1993). We contribute to this literature by examining the differing influences of founder and non-founder blockholders on the ownership-firm value relationship.

The remainder of the paper is organized as follows. In the next section, we develop hypotheses that will be the basis of our empirical tests. Section 2.3 describes the data employed in this study. Section 2.4 provides the empirical tests and discusses the results. Section 2.5 concludes.

2.2. Hypothesis development

2.2.1. The influence of coalition formation and monitoring on the ownership-firm value relationship

We now formalize the hypotheses described above and discuss in more detail why and how the identity of additional blockholders influences the relationship between the largest individual blockholder's ownership and firm value.

As discussed above, by forming a coalition, the largest blockholder will have a larger *effective* ownership stake in the firm. For example, if two blockholders of a firm, owning 35% and 25%, were to form a coalition, they would behave like a firm with a 60%, rather than 35%, blockholder. Whether such a coalition will have a positive or a negative influence on firm value depends upon the relative importance of incentive alignment and entrenchment effects. For the range of ownership in which the incentive alignment effect dominates, a coalition will have a positive influence on firm value as the larger effective ownership stake will better align her

interests with those of minority shareholders. For the range of ownership in which the entrenchment effect dominates, a coalition will have a negative influence on firm value as the larger effective ownership stake will make her more entrenched. Therefore, firms with multiple blockholders will have a significantly steeper relationship between ownership of the largest blockholder and firm value as compared to a single blockholder firm. This argument leads us to our first hypothesis:

> ***Hypothesis 1***: *In the presence of a coalition formation, the relationship between the ownership of the largest individual blockholder and firm value will become steeper.*

We also argued above that the benefits from monitoring will be the highest at the level of ownership for which, in the absence of monitoring, the ownership-firm value relationship is at its minimum. The necessary condition for the monitoring benefits to be realized is that the additional blockholders are able to influence the actions of the largest. In particular, consider the following two cases. First, a concave relationship between ownership and firm value reported by a number of prior studies (e.g., McConnell and Servaes, 1990) has two minima – one at zero percent and another at 100 percent ownership. The monitoring benefits will be the highest around zero percent ownership since at this point the potential improvements and the ability to influence the largest blockholder will be the greatest. Beyond the maximum of the function, the potential benefits from monitoring will be increasing again, but the ability of the monitoring blockholder to influence the largest will decline rather significantly. This implies that realized benefits from monitoring will be low or non-existent for this ownership range. Therefore, in the case of a concave relationship, we would expect to observe the largest difference in the ownership-firm value relationship at low levels of the largest blockholder's ownership.

Second, suppose the observed ownership-firm value relationship in the absence of monitoring is convex. In this case, we would expect the monitoring benefits to be the highest at intermediate levels of ownership. They will be lower at low levels of ownership (since the private benefits of control will be lower in this range) and at high levels (because both the benefits from

monitoring and the ability to influence the actions of the largest blockholder are lower in this range). Therefore, in the case of a convex relationship, we would expect to observe the largest difference in the ownership-firm value relationship at intermediate levels of the largest blockholder's ownership. This argument leads us to our second hypothesis:

> ***Hypothesis 2***: *The benefits from monitoring will be the highest at the level of ownership for which the ownership-firm value relationship (in the absence of monitoring) is at its minimum, subject to an additional blockholder's ability to influence actions of the largest blockholder.*

2.2.2. Coalition formation versus monitoring: the role of blockholder identity

We now discuss the influence of a blockholder's identity on their propensity to engage in either coalition formation or monitoring. There are three factors that influence a blockholder's participation in a coalition. First, they have to benefit from joining a coalition. Second, they have to have a long-term commitment to the firm since it will be too costly for the largest blockholder to form a coalition with short-term blockholders. Further, such coalitions would be rather unstable. Third, blockholders may have external pressures and reputation concerns that can influence their propensity to engage in coalition formation. We discuss these factors in detail.

The main difference between individual and corporate blockholders is their status in the firm. While individual blockholders are usually insiders (see, e.g., Holderness, 2003), corporate blockholders are more typically outsiders. This observation implies that individual blockholders have two potential ways of benefiting from the formation of a coalition – by increasing their private benefits of control (negative coalition) and by increasing the value of their ownership stake (positive coalition). Corporate blockholders, on the other hand, have only the latter way of benefiting from a coalition formation. The relative absence of a corporate blockholder's access to private benefits rules out the formation of a negative coalition, while monitoring can be seen as equivalent to the formation of a positive coalition. Overall, this suggests that individual

(corporate) blockholders will be more likely to form a coalition with (monitor) the largest blockholder.

Individual and corporate blockholders are also likely to differ in terms of the length of their commitment to the firm. In particular, individual blockholders are more likely to have a long-term commitment as compared to corporate blockholders.[13] Since a coalition between long-term and short-term blockholders is likely to be relatively short-lived, we expect that both parties will find it too costly to form a coalition. Therefore, we expect a coalition between individual and corporate blockholders to be less likely than one between two individual blockholders.

Finally, as noted by Davis and Kim (2007) and Connelly et al. (2010), the obligations of institutional investors toward their clientele may make them more likely to monitor the actions of the largest blockholder.[14] Also, corporate blockholders are more likely to have reputation concerns, especially if they are actively involved in the governance of their portfolio companies (see, e.g., Gilson, 1990). Both of these considerations are also likely to lead to a higher propensity for monitoring by corporate blockholders.

The three factors discussed above suggest that corporate (individual) blockholders are less (more) likely to form a coalition with the largest blockholder. This leads us to our third hypothesis:

> ***Hypothesis 3****: Individual blockholders are more likely to form a coalition with the largest blockholder, while corporate blockholders are more likely to monitor.*

[13] Whether corporate blockholders are long-term or short-term investors has been subject to a considerable debate. See, e.g., Graves and Waddock (1990), Jacobs (1991), Laverty (1996), Porter (1992), and Dobrzynski (1993).

[14] The empirical evidence on monitoring by corporate blockholders (institutions) is contradictory. Brickley, Lease, and Smith (1988), Bethel, Liebeskind, and Opler (1998), and Bertrand and Mullainathan (2001) all find evidence supporting the monitoring role of institutional blockholders. Conversely, Chen, Harford, and Li (2007) report that some institutional investors find it more beneficial to achieve private gains through trading (as opposed to gains from monitoring), while Parrino, Sias, and Starks (2003) find that institutional investors unhappy with firm performance will vote with their feet. Also, broadly-invested (diversified) institutional shareholders (e.g., mutual and pension funds) may find it difficult to maintain an in-depth knowledge about each firm in which they have a stake.

The identity of the individual blockholder can also indicate power beyond that implied by her ownership stake. In particular, following the literature on the special nature of founder and family ownership (see, e.g., Anderson and Reeb, 2003; Villalonga and Amit, 2006; Morck, Shleifer, and Vishny, 1988; Palia and Ravid, 2002; Li and Srinivasan, 2011), we distinguish between founder and non-founder blockholders. Their intimate knowledge of the firm, long-term focus, and founder status are likely to make the founder the most influential blockholder in the firm. This has two implications. First, an additional blockholder in a founder firm (i.e., with a founder as the largest blockholder) will have a smaller influence, as compared to that in a non-founder firm. This implies a flatter (less steep) ownership-firm value relationship in founder firms with multiple individual blockholders. Second, the additional blockholder who is the founder is likely to have a significantly different influence than one who is not the founder. On one hand, their long-term commitment to the firm is likely to make a founder blockholder more likely to engage in a coalition formation, especially if the largest blockholder is also a founder. On the other hand, a founder blockholder may be more independent of the largest blockholder and therefore be more likely to engage in monitoring. The dominating effect remains an empirical matter. This discussion leads us to our last two hypotheses:

> ***Hypothesis 4****: An individual blockholder will have less influence in a founder firm as opposed to a non-founder firm.*
>
> ***Hypothesis 5****: The influence of a founder blockholder will be different from that of a non-founder blockholder.*

2.3. Data and sample selection

We test the above hypotheses using a sample of newly public firms. We choose a sample of newly public firms for two reasons. First, multiple individual blockholders are more likely to be present in these firms which allows us to examine the interactions among them. While 25% of our sample firms have at least two individual blockholders, only 9.4% of the Dlugosz et al.

(2006) sample of index-listed firms does. Second, corporate shareholders (apart from venture capitalists) are likely to play a less prominent role in the newly public firms, allowing us to observe large individual blockholders in the *absence* of significant corporate blocks. Thus, our unique hand-collected sample allows us to analyze the role and importance of individual as well as corporate blocks.[15]

We start with all US IPOs of common equity between 1993 and 1996, obtained from the SDC/Platinum New Issues database.[16] We eliminate REITs, closed-end funds, unit offerings, equity carve-outs, financial firms (those with SIC codes between 6000 and 6999), utilities, foreign firms, leveraged buyouts, and roll-ups. We also eliminate firms which are not found in the Center for Research in Security Prices (CRSP) or COMPUSTAT databases. Finally, we remove firms for which there is a discrepancy between the first date of trading provided by CRSP and SDC. We are left with a total of 1,448 firms. Panel A of Table 1 summarizes how we arrived at this sample.

We follow these firms for up to 12 years after the IPO or until delisting, whichever comes first. Panel B of Table 1 reports the distribution of our sample by post-IPO year. COMPUSTAT data requirements reduce the sample size for various tests. Of the 1,448 firms at the time of IPO, 356 survive until the 12th listing anniversary. Our total sample consists of 10,402 firm-year observations with available ownership and accounting data. We define a blockholder (whether individual or corporate) as any entity owning more than 5% voting rights as reported in the proxy statements.[17]

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[15] It can be argued that, to the extent that IPOs are subject to market valuation driven waves, our sample of newly public firms may not be representative of all public firms. To address this potential criticism, we are following our sample firms for up to 12 years after the IPO. Market conditions at the time of going public are unlikely to influence market valuations several years after the IPO.

[16] Our choice of 1993 to 1996 IPOs as the basis of our sample is motivated by two considerations. First, availability of pre-1993 IPO prospectuses on Thomson Research, our source of pre-Edgar filings, is limited. Second, to ensure that we have a sufficiently long (post-IPO) time-series, we choose to limit our sample to firms that went public before 1997.

[17] Securities and Exchange Commission (SEC) regulations require the disclosure of ownership positions of (1) all officers and directors and (2) all shareholders holding more than 5% of any class of shares.

For tractability purposes and ease of exposition, we classify our sample firms into subcategories based only on the top three blockholders. For example, if the top three blockholders in the firm are all corporations, we classify such a firm as having a corporate blockholder and no individual blockholders, irrespective of the presence and identity of any blockholders beyond the third. Further, we do not distinguish between the firms with one and more than one additional blockholder of the same type. That is, we do not distinguish between firms with two and more than two individual blockholders. Similarly, we do not distinguish between firms with one and more than one corporate blockholder. While the additional blockholders may matter, an examination of such differences is beyond the scope of the paper.

Table 2 provides the description of the presence and ownership of the largest individual, second individual, and corporate blockholders in our sample firms. In 231 (2.2%) firm-years there are no blockholders, neither individual nor corporate, present. In 1,208 (11.6%) firm-years the only blockholder present is an individual, while in 3,397 (32.7%) firm-years only corporate blockholder(s) is (are) present. In the remaining 5,566 (53.5%) firm-years there is more than one blockholder present. More specifically, in 1,480 (14.23%) firm-years there are only multiple individual blockholders present, while in 2,922 (28.1%) firm-years there is one individual blockholder and at least one corporate blockholder present. Finally, in 1,164 (11.2%) firm-years there are multiple individual and at least one corporate blockholder present. Overall, multiple individual blockholders are present in 25.4% firm-years, while corporate blockholders are present in 71.9% of firm-years.

The largest individual blockholder, on average (median), controls 28.3% (21%) of voting rights. The ownership stake of the largest individual blockholder varies with the ownership structure (i.e., the presence of other blockholders) and her identity. In particular, if the largest is the sole blockholder, she, on average (median), controls 49.4% (52.4%) of voting rights. Conversely, in a firm with multiple individual and corporate blockholders, she controls, on average (median), 20.7% (17.1%) of votes. Also, founders represent 65.8% of the largest

individual blockholders in our sample. They tend to have larger controlling stakes as compared to non-founders – 32.3% (25.6%) versus 20.5% (14.4%), on average (median). Second individual blockholders, when present, hold significant ownership stakes – 12.6% (10.7%) of votes, on average (median). Of these blockholders, 62.6% are founders. Finally, the largest corporate blockholders control, on average (median) 15.7% (11.7%) of voting rights.

2.4. Empirical tests and results

This section reports the results of our empirical tests. We begin by examining the effect of the largest individual blockholder's ownership on firm value in Section 4.1. We then examine the impact the presence of a second individual blockholder has on the above relationship in Section 4.2. In Section 4.3, we examine how the ownership-firm value relationship changes in the presence of the founder as the largest and second individual blockholder. In Section 4.4, we examine the impact of the presence of a corporate blockholder on the ownership-firm value relationship. Appendix 1 lists the variables used in this study, while Table 3 provides relevant summary statistics both for the overall sample and by ownership structure classification.

2.4.1. The influence of the largest individual blockholder on firm value

We now examine the relationship between the ownership of the largest individual blockholder and firm value, as proxied by Tobin's q. We do so by estimating the following regression equation:

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Largest\, individual\, own_i + \gamma_2 Largest\, individual\, own_i^2 \\ & + \gamma_3 Largest\, individual\, wedge_i + \sum_{k=1}^{n} \alpha_k Controls_{ki} + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \quad (1)$$

The dependent variable is Tobin's q, which is defined as the ratio of book value of assets plus the market value of equity minus the book value of equity to the book value of assets. *Largest individual own* is the percentage of voting rights controlled by the largest individual blockholder. *Largest individual own*^{2} is *Largest individual own* squared. *Largest individual wedge* is the difference between the voting and cash flow rights of the largest individual blockholder. Control

variables (as defined in Appendix 1) are *Ln(Firm size)*, *Leverage*, *Sales growth*, *R&D*, *Diversification*, and *Delaware*, as well as year and the Fama-French industry dummies.

The results of the empirical tests of Eq. (1) are reported in column 1 of Table 4. We find that the coefficient estimate for γ_1 is negative, while the coefficient estimate for γ_2 is positive, and they are statistically significant at the 5% and 1% levels, respectively. Our results imply a convex relationship between the ownership of the largest individual blockholder and firm value. This suggests that entrenchment effect dominates the incentive alignment effect at low levels of ownership while the opposite is true at high levels.

As argued by Demsetz and Lehn (1985), Demsetz and Villalonga (2001), Himmelberg, Hubbard, and Palia (1999), Coles, Lemmon, and Meschke (2012) and others, ownership and firm value (performance) may be endogenous. More specifically, the results of any study of the ownership-firm value relationship may be biased in the presence of unobservable firm heterogeneity. Therefore, ordinary least-squares (OLS) tests may be vulnerable to biases that arise from this potential endogeneity of ownership. In order to alleviate this bias, three main approaches are generally used: proxy (control) variables, firm fixed effects in panel data, and instrumental variables. Each of these approaches has problems of its own. Zhou (2001) argues that due to the static nature of ownership over time, firm fixed effects may be inappropriate. Coles, Lemmon, and Meschke (2012) argue, however, that none of these methods is an effective solution to the endogeneity problem. [18]

For endogeneity correction in traditional (linear) OLS specifications, the two-stage least squares (2SLS) approach is generally used. However, given our quadratic specification of the relationship between the largest individual blockholder's ownership and firm value, the 2SLS approach is likely to be inappropriate. Wooldridge (2002) notes that when a model is linear in parameters but nonlinear in endogenous variables the identification must be treated differently.

[18] They propose a structural model approach which uses numerical methods to calculate exogenous parameters jointly determining CEO ownership and performance.

We thus employ the nonlinear two-stage least squares (N2SLS) approach proposed by Amemiya (1974), which permits consistent estimates of regression coefficients in nonlinear models (for additional details, refer to Appendix 4).

We choose the instruments as follows. Gompers, Ishii, and Metrick (2010) note that corporate fraud has recently been observed in large firms that are major regional employers and they argue that private benefits of control are higher in these types of firms. Additionally, they argue that private benefits of control will also be higher for firms having a large proportion of the total sales in a given region. Based on these arguments, we argue that ownership stakes will be more attractive in these types of firms. Thus, we use *Sales/Regional sales* and *%Sales* as instrumental variables, each as defined in Appendix 1.[19]

The results of the N2SLS estimation are provided in column (2) of Table 4. As before, the coefficient estimate for the largest individual block is negative, while the coefficient estimate for the squared term is positive, and the significance has increased to the 1% level for both estimates. This finding suggests that the convex relationship documented above is unlikely to be driven by endogeneity.

2.4.2. The influence of an additional individual blockholder on the ownership-firm value relationship

We now examine the effect of the presence of a second individual blockholder on the relationship between the ownership of the largest individual blockholder and firm value. We do so by estimating the following regression equation:

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Largest\, indiv.\, own_i + \gamma_2 Largest\, indiv.\, own_i^{\,2} + \gamma_3 Largest\, indiv.\, wedge_i \\ & + \gamma_4 Largest\, indiv.own_i * Second_i + \gamma_5 Largest\, indiv.\, own_i^{\,2} * Second_i \\ & + \gamma_6 Second_i + \sum_{k=1}^{n} \alpha_k Controls_{ki} + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \tag{2}$$

[19] Based on the recommendations in Bowden and Turkington (1984) and Davidson and McKinnon (2004), we also include the squares and cross-products of all exogenous and instrumental variables as instruments.

Second is a dummy variable that takes on a value of one if there is at least one more individual blockholder present among the top three blockholders, and zero otherwise. If the largest and second individual blockholders form a coalition, we would expect the coefficient estimates of γ_4 and γ_5 to be negative and positive, respectively. Conversely, if the second individual blockholder monitors the largest, we would expect the coefficient estimates of γ_4 and γ_5 to be positive and negative, respectively.

The results of the OLS estimation of Eq. (2) are reported in column 1 of Table 5. Similar to the results in Table 4, we find a convex relationship between the size of the largest individual block and firm value. Moreover, in the presence of an additional individual blockholder the convex relationship becomes more pronounced. In particular, we find that the coefficient estimate for γ_4 is negative, while the coefficient estimate for γ_5 is positive, with the coefficient estimates being statistically significant at the 5% and 1% levels, respectively.[20] The results support our conjecture that individual blockholders are likely to form a coalition.

It should also be noted that the coefficient estimate of second individual dummy is positive and statistically significant at the 5% level. This implies that firms with more than one blockholder have a higher value, on average. Thus, the presence of an additional individual blockholder has a twofold influence on the firm value – it influences both the shape of the curve (making it steeper) and the position of the curve (shifting it upwards). To better understand how these two effects influence the observed ownership-firm value relationship, we plot the estimated relationship in Figure 1. Our results suggest that in the presence of an additional individual blockholder, firm value is higher if the largest individual blockholder owns less than 15% or more than 40% (approximately).

[20] The results of the N2SLS estimation of Eq. (2), reported in column 2 of Table 5, are qualitatively similar to those estimated using OLS.

As approximately half of our sample firms are backed by venture capitalists (VC), VC backing is an important consideration for our sample of newly public firms. As a robustness test, we examine their potential influence on the ownership-firm value relationship documented above.[21] Using Eq. (2), we include interaction terms with *VC*, a dummy variable equal to one if the firm is backed by venture capitalists, and zero otherwise.

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Largest\, indiv.\, own_i + \gamma_2 Largest\, indiv.\, own_i^{\,2} + \gamma_3 Largest\, indiv.\, wedge_i \\ & + \gamma_4 Largest\, indiv.\, own_i * VC_i + \gamma_5 Largest\, indiv.\, own_i^{\,2} * VC_i + \gamma_6 VC_i \\ & + \sum_{k=1}^{n} \alpha_k Controls_{ki} + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \tag{3}$$

The results of the empirical tests of Eq. (3) are reported in column 1 of Table 6. The coefficient estimates of γ_4 and γ_5 are positive and negative, respectively. Our results thus suggest that venture capitalists have a concave impact on the ownership-firm value relationship through their influence on the largest individual blockholder, indicating that VCs play a monitoring role.

As a second robustness test, we examine whether constraining the largest individual blockholder to be an insider of the firm changes the observed relationship. The literature generally defines an insider in a firm to be an individual involved either in management or on the board of directors. We employ this definition and re-estimate Eq. (2) constraining the largest individual blockholder to be a manager or director in the firm. The results are reported in column 2 of Table 6. Overall, we find very similar results to those in the individual case as most of the largest individual blockholders in our sample are either a manager or director of the firms in which they have invested. Overall, there exists a significant convex relationship between the ownership of the largest *inside* blockholder and firm value, and the convexity of the relationship increases in the presence of a second individual.

[21] We identify VCs from various issues of *Pratt's Guide to Venture Capital Sources*.

2.4.3. The influence of the individual blockholder's identity on the ownership-firm value relationship

We now examine the effect of the identity of the largest individual blockholder and firm value. We focus here on the difference between founder and non-founder blockholders. We estimate the following regression:

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Largest\, indiv.\, own_i + \gamma_2 Largest\, indiv.\, own_i^{\,2} + \gamma_3 Largest\, indiv.\, wedge_i \\ & + \gamma_4 Largest\, indiv.\, own_i * NonFamily_i + \gamma_5 Largest\, indiv.\, own_i^{\,2} * NonFamily_i \\ & + \gamma_6 Largest\, indiv.\, own_i * Second_i + \gamma_7 Largest\, indiv.\, own_i^{\,2} * Second_i \\ & + \gamma_8 Largest\, indiv.\, own_i * Second_i * NonFamily_i \\ & + \gamma_9 Largest\, indiv.\, own_i^{\,2} * Second_i * NonFamily_i + \gamma_{10} Second_i \\ & + \gamma_{11} NonFamily_i + \sum_{k=1}^{n} \alpha_k Controls_{ki} + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \quad (4)$$

The results of the estimation of Eq. (4) are reported in column (1) of Table 7. We find no significant differences between founder and non-founder largest blockholders in terms of their direct influence on the firm value – the coefficient estimates for the non-founder interactive terms, γ_4 and γ_5, are insignificant. We do, however, find significant differences between founder and non-founder firms when considering the influence of an additional individual blockholder. In particular, in the founder case, an additional individual blockholder makes the relationship more convex (γ_6 and γ_7 are significantly negative and positive, respectively). The non-founder interactive terms, (γ_8 and γ_9), which capture the difference between the founder and non-founder case, are also significantly negative and positive, respectively. To put it differently, additional individual blockholders have a significantly more convex influence on the ownership-firm value relationship in non-founder firms than in founder firms. Overall, our results provide support to Hypothesis 4, in which we stated that an individual blockholder will have less influence in a founder firm as opposed to a non-founder firm.

Again, to better understand how the identity of the largest individual blockholder changes the ownership-firm value relationship, we plot the estimated relationship in Figure 2. There are several things to note. First, single blockholder firms in which the founder is the largest

blockholder have higher value than do firms in which she is not a founder. This holds for the entire spectrum of ownership. Second, the presence of additional individual blockholders in a non-founder firm has the most negative influence on firm value for ownership range below 50% and has the most positive influence above 57% ownership stake (approximately).

We additionally examine the influence of the identity of the second individual blockholder on the ownership-firm value relationship. Our focus once again is on the difference between founder and non-founder blockholders. We estimate the following regression:

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Largest\, indiv.\, own_i + \gamma_2 Largest\, indiv.\, own_i^{\,2} + \gamma_3 Largest\, indiv.\, wedge_i \\ & + \gamma_4 Largest\, indiv.\, own_i * Second_i + \gamma_5 Largest\, indiv.\, own_i^{\,2} * Second_i \\ & + \gamma_6 Largest\, indiv.\, own_i * Second_i * 2NonFamily_i \\ & + \gamma_7 Largest\, indiv.\, own_i^{\,2} * Second_i * 2NonFamily \\ & + \gamma_8 Second_i + \gamma_9 2NonFamily_i + \sum_{k=1}^{n} \alpha_k Controls_{ki} \\ & + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \tag{5}$$

The results of the estimation of Eq. (5) are provided in column (2) of Table 7. We find significant differences between the cases where the second individual blockholder is and is not the founder. In particular, the convex influence of the presence of an additional individual blockholder documented above is largely driven by non-founder second individual blockholders – the coefficient estimates of γ_6 and γ_7 are significantly negative and positive, respectively. At the same time, we find some evidence that the second founder blockholder has a *concave* influence on the relationship between the ownership of the largest individual blockholder and firm value. The coefficient estimates on γ_4 and γ_5 are positive and negative, respectively, with only the former being significant at the 10% level. Our results suggest that a founder blockholder is more independent of the largest blockholder and is more likely to engage in monitoring.

Again, we also find that the coefficient estimates on the second individual dummy and the dummy denoting the presence of the second non-founder are positive and statistically significant. To better understand how the identity of the second individual blockholder changes the ownership-firm value relationship, we plot the estimated relationship in Figure 3. As can be

seen from the figure, for an ownership stake between 12% and 60% (approximately), a firm in which founder is the second individual blockholder has a higher value than a firm in which he or she is not the founder.

2.4.4. The influence of a corporate blockholder on the ownership-firm value relationship

We now examine the effect of the presence of a corporate blockholder on the relationship between the ownership of the largest individual blockholder and firm value. We do so by estimating the following regression equation:

$$\begin{aligned} Tobin's\ q_i = {} & \gamma_0 + \gamma_1 Largest\ indiv.\ own_i + \gamma_2 Largest\ indiv.\ own_i^{\ 2} + \gamma_3 Largest\ indiv.\ wedge_i \\ & + \gamma_4 Largest\ indiv.\ own_i * Second_i + \gamma_5 Largest\ indiv.\ own_i^{\ 2} * Second_i \\ & + \gamma_6 Largest\ indiv.\ own_i * Corporate_i + \gamma_7 Largest\ indiv.\ own_i^{\ 2} * Corporate_i \\ & + \gamma_8 Second_i + \gamma_9 Corporate_i + \sum_{k=1}^{n} \alpha_k Controls_{ki} + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \tag{6}$$

Corporate is a dummy variable that takes on a value of one if one of the three largest blocks is held by a corporate entity, and zero otherwise. If corporate blockholders do in fact monitor the largest individual blockholder, we would expect the coefficient estimates of γ_6 and γ_7 to be positive and negative, respectively.

The results of the empirical tests of Eq. (6) are reported in column 1 of Table 8. Similar to the results in Table 5, we find a convex relationship between firm value and the size of the largest individual's block, and that the presence of an additional individual blockholder makes the convex relationship even more pronounced. When considering the impact of a corporate blockholder, we find that the coefficient estimate for γ_6 is positive, while the coefficient estimate for γ_7 is negative, with the coefficient estimates being statistically significant at the 10% and 1% levels, respectively. Our results thus imply a concave impact of the presence of a corporate blockholder on the ownership-firm value relationship. The results support the second part of Hypothesis 3 – the benefits from monitoring are highest when the ownership-firm value

relationship (in the absence of a corporate blockholder) is the lowest. We plot the estimated relationship in Figure 4.

2.5. Conclusions

To our knowledge, this is the first paper to examine the influence of interactions between multiple blockholders on the relationship between ownership and firm value. Our results suggest that the relationship between ownership of the largest individual blockholder and firm value is significantly affected by the presence of additional blockholders, both individual and corporate. We find that individual blockholders are more likely to form a coalition with the largest blockholder and thus make the observed ownership-firm value relationship steeper. The corporate blockholders, on the other hand, tend to monitor the largest blockholder and thus change the shape of the observed ownership-firm value relationship.

Furthermore, we find that the identity of individual blockholders matters. In particular, we find that the second individual blockholder has a larger influence (either positive or negative) when the largest individual blockholder is not a founder. Similarly, a second individual blockholder who is not a founder is more likely to form a coalition with the largest blockholder, while the founder counterpart is more likely to monitor. Overall, our results suggest that the relationship between the ownership of the largest individual blockholder and firm value critically depends on both the presence and identity of additional blockholders.

CHAPTER THREE – THINKING INSIDE THE BLOCKS

3.1. Introduction

A fundamental issue in corporate finance is the relationship between insider ownership and firm value. Much of the existing literature has framed this relationship as a trade-off between two opposing effects – incentive alignment and entrenchment. Jensen and Meckling (1976) argue that the greater is the size of the insider's stake, the greater is the focus on creating value over the long-term rather than private benefit extraction. Conversely, Morck, Shleifer, and Vishny (1988), Stulz (1988), and McConnell and Servaes (1990) each argue that higher levels of ownership increase insider power, leading to entrenchment and value-decreasing perquisite consumption at the expense of minority shareholders.

The dominant of the two effects at various levels of insider ownership has implications for the shape of the relationship between insider ownership and firm value. More specifically, if the incentive alignment effect dominates at low levels of insider ownership and entrenchment effect dominates at high levels, the relationship is likely to be concave. On the other hand, if the entrenchment effect dominates at low levels of insider ownership and the incentive alignment effect dominates at high levels, the relationship is likely to be convex.

However, the empirical evidence on this issue has been frustratingly contradictory, with researchers reporting various forms of the insider ownership-firm value relationship. McConnell and Servaes (1990) find a concave relationship between insider ownership and firm value, while Himmelberg, Hubbard, and Palia (1999) and Demsetz and Villalonga (2001) find no relationship at all. On the other hand, Slovin and Sushka (1993) find evidence consistent with a convex relationship between the ownership of the inside blockholder and firm value. Still others report a more complex nonlinear relationship. For example, Morck, Shleifer and Vishny (1988) employ a piecewise linear regression, while other specifications have been considered by McConnell, Lins, and Servaes (2008) and Fahlenbrach and Stulz (2009), among others.

We draw upon the evidence presented in the first essay of this dissertation and test if the various forms of the relationship found in the literature can be explained by differing underlying ownership structures.[22] Many of these prior studies on the insider ownership-firm value relationship rely on samples of large, index-listed firms. Two stylized facts about such firms – the low level of insider ownership and significant presence of corporate investors – suggest that a particular type (and a certain degree of uniformity) of ownership structure.[23] Our unique hand-collected panel dataset of newly public firms allows us to make the broadest inferences possible regarding the influence of ownership structure on the insider ownership-firm value relationship. In particular, in this sample we can observe a variety of different ownership structures, ranging from firms with only insider blockholders to those with corporate blockholders as well.

We draw upon the evidence presented in the first essay of this dissertation and test if the various forms of the relationship found in the literature can be explained by differing underlying ownership structures.[24] Many of these prior studies on the insider ownership-firm value relationship rely on samples of large, index-listed firms. Two stylized facts about such firms – the low level of insider ownership and significant presence of corporate investors – suggest that a particular type (and a certain degree of uniformity) of ownership structure.[25] Our unique hand-collected panel dataset of newly public firms allows us to make the broadest inferences possible regarding the influence of ownership structure on the insider ownership-firm value relationship. In particular, in this sample we can observe a variety of different ownership structures, ranging from firms with only insider blockholders to those with corporate blockholders as well.

[22] An emerging literature has shown that multiple blockholders influence firm value. See, e.g., Pagano and Roell (1998), Maury and Pajuste (2005), Laeven and Levine (2008), and Konijn, Kraussl, and Lucas (2011).
[23] See, e.g., Rosenstein and Wyatt (1997) and Chung and Zhang (2011), respectively.
[24] An emerging literature has shown that multiple blockholders influence firm value. See, e.g., Pagano and Roell (1998), Maury and Pajuste (2005), Laeven and Levine (2008), and Konijn, Kraussl, and Lucas (2011).
[25] See, e.g., Rosenstein and Wyatt (1997) and Chung and Zhang (2011), respectively.

As reported in the first essay, we find that the presence of outsider blockholders makes the observed ownership-firm value relationship more convex, while the presence of corporate blockholders has a concave influence.[26] We build on these findings and split our sample by the presence of additional blockholders in the firm. We then proceed to show that widely different ownership structures lead to widely different relationships between ownership and firm value. We define firms with only insider blockholder as Type A, firms with insider and corporate blockholders as Type B, firms with insider and outsider blockholders as Type C, and firms have all three blockholder types as Type D. For Type A and C firms, we find a significant and convex relationship between ownership and firm value. For Type B and D firms, however, that relationship is insignificant.

We further posit that the manner in which ownership structure affects the ownership-firm value relationship changes over time. As firms mature, they are more likely to attract analyst coverage and face increased pressures from the market for corporate control.[27] As such, firm behaviour (more specifically, the behaviour of firm insiders) is likely to change, and, correspondingly, so will the relationship between ownership and firm value. We allow for this possibility by splitting the above four subsamples by time since IPO. We continue to find a convex relationship between ownership and firm value for Type A firms (i.e, those with only insider blockholders), irrespective of the time since the IPO. In contrast, for firms with a corporate presence (but no outsider presence), we find significant differences over time. In particular, for younger firms, we find an insignificant insider ownership-firm value relationship, while for their older counterparts, the relationship is significantly concave. Overall, we find that

[26] We define an outside blockholder as any individual blockholder who is not part of the firm's management or on the board of directors. We define a corporate blockholder as a corporate entity not affiliated with any of the individual blockholders. These, among others, include institutional investors, such as mutual and pension funds, and various private and public non-financial corporations.

[27] See, e.g., Hong, Lim, and Stein (2000), who report significantly more analyst coverage for larger firms. They report that 18% of firms in the lowest firm-size quintile have analyst coverage, while 94.4% of firms in the largest quintile have analyst coverage.

by splitting our sample based on easily identifiable characteristics of ownership structure we can obtain the whole spectrum of ownership-firm value relationships.

Our findings suggest that there should be a direct correspondence between the underlying ownership structure and the results observed. For example, a study that analyzes large firms, such as that of McConnell and Servaes (1990), is likely to find a concave relationship between ownership and firm value. On the other hand, one that resembles the work of Himmelberg, Hubbard, and Palia (1999) and analyzes a random sample of firms is unlikely to find a significant relationship. This insignificance follows from the fact that a random sample can include firms with widely different ownership-firm value relationships (due to diverse ownership structures). We survey all papers published in the top eleven Finance and Economics journals since the seminal work of Morck, Shleifer, and Vishny (1988) that directly address this issue and find a startling correspondence between the sample selection criteria used in the various studies (and therefore the ownership structures of the sample firms) and the reported results.[28]

Our findings also contribute to (and have implications for) the following literatures. First, researchers have noted methodological and theoretical issues that could result in misleading conclusions regarding the ownership-firm value relationship (see, e.g., Himmelberg, Hubbard, and Palia, 1999; Zhou, 2001).[29] The previous literature, however, has largely neglected the role of sample selection. We show that the choice of sample can have a significant influence on the observed results. In this aspect, our work is similar in spirit to that of Kole (1995), who examines the role played by ownership data source as a potential explanation for the contradictory results between McConnell and Servaes (1990) and Morck, Shleifer, and Vishny (1988) and concludes

[28] We look at Agrawal and Knoeber (1996), Anderson and Reeb (2003), Cho (1998), Gompers, Ishii, and Metrick (2010), Hermalin and Weisbach (1991), Himmelberg, Hubbard, and Palia (1999), Holderness, Kroszner, and Sheehan (1999), Kim and Lu (2011), McConnell and Servaes (1990), McConnell and Servaes (1995), and Morck, Shleifer, and Vishny (1988). Of these eleven studies, eight report results that are consistent with our predictions while the other three report results that are largely consistent with our predictions.

[29] See also Coles, Lemmon, and Meschke (2012) for an alternative viewpoint.

that while differing data sources cannot explain the contradiction, differing sizes of sample firms may play a role.

Second, an emerging literature has focused on the influence of multiple blockholders on firm value (see, e.g., Bennedson and Wolfenzon, 2000; Pagano and Röell, 1998; Bloch and Hege, 2001; Konijn, Kraussl, and Lucas, 2011; Maury and Pajuste, 2005; Laeven and Levine, 2008). We contribute to this growing literature by analyzing the interactions between insiders and additional blockholders and find that these interactions have a significant influence on the observed ownership-firm value relationship.

Finally, we show systematic changes in the ownership structure of firms as they age. These changes are non-trivial in that they significantly influence the relationship between ownership and firm value. Our findings have the potential to inform future research on the life cycle of the firm (see e.g., Bernardo and Chowdhry, 2002; Grabowski and Mueller, 1975; Mueller, 1972).

The remainder of this paper is organized as follows. In the next section, we describe the data employed in this study. Section 3.3 provides the empirical tests and discusses the results. Section 3.4 discusses the implications of our findings for the ownership-firm value literature. Section 3.5 concludes.

3.2. Data and sample selection

Our sample is obtained as follows. We start with all US IPOs of common equity between 1993 and 1996, obtained from the SDC/Platinum New Issues database. We eliminate REITs, closed-end funds, unit offerings, equity carve-outs, financial firms (those with SIC codes between 6000 and 6999), utilities, foreign firms, leveraged buyouts, and roll-ups. We also eliminate firms which are not found in the Center for Research in Security Prices (CRSP) or COMPUSTAT databases. Finally, we remove firms for which there is a discrepancy between the first date of trading provided by CRSP and SDC. We are left with a total of 1,448 firms. Panel A of Table 9 summarizes how we arrived at this sample and Panel B of Table 9 reports the distribution of our

sample by post-IPO year. Of the 1,448 firms at the time of IPO, 356 survive until the 12th listing anniversary. Our total sample consists of 10,402 firm-year observations with available ownership and accounting data.

We follow the approach taken by a majority of the previous studies on the ownership-firm value relationship and focus on insider ownership (defined here as the sum of the ownership stakes of all insider blockholders) as the main variable of interest. We define a blockholder (whether individual or corporate) as any entity owning more than 5% of voting rights as reported in the proxy statements.[30] We collect data on each individual blockholder's ownership stake as well as his involvement in the management and governance of the firm. We then classify each individual blockholder as being either an insider or an outsider. An individual blockholder is considered to be an insider if he is either a manager or a director of the firm. Any other individual blockholder is considered to be an outsider.

Table 10 provides a description of the ownership structures of the firms in our sample. In particular, we report the proportion of firms in each of the following four categories: (1) firms with no insider or outsider blockholders; (2) firms with only insider blockholders; (3) firms with only outsider blockholders; and (4) firms with both insider and outsider blockholders. We further refine the analysis to incorporate the presence/absence of corporate blockholders.

Firms in our sample have no insider blockholders in 31% of firm-years (231 without and 2,999 with corporate presence) and only insider blockholders in 20% of firm-years. The smallest proportion (0.3% of firm-years) occurs where only outsider blockholders are present, while 4% of the firm-years in our sample have both insider and outsider blockholders. Overall, our sample firms are more likely than not to have at least one corporate blockholder – they are present in 74% of firm-years. Thus, our sample contains a wide range of ownership structures, ranging from firms with no blockholders to those having all three blockholder types, enabling us to determine

[30] Securities and Exchange Commission (SEC) regulations require the disclosure of ownership positions of (1) all officers and directors and (2) all shareholders holding more than 5% of any class of shares.

the role played by underlying ownership structure in the relationship between ownership and firm value.

3.3. Empirical tests and results

This section reports the results of our empirical tests. We begin by examining the effect of insider ownership on firm value in Section 3.3.1. In Section 3.3.2, we examine the impact the presence of outsider and corporate blockholders have on the above relationship. In Section 3.3.3, we split our sample by the four firm types described above and show differences in the ownership-firm value relationship between subsamples. In Section 3.3.4, we examine how the ownership-firm value relationship changes with both the presence of additional blockholders and market seasoning. Appendix 2 lists the variables used in this study, while Table 11 provides relevant summary statistics both for the overall sample and by ownership structure classification.

3.3.1. The influence of insider ownership on firm value

We now examine the relationship between insider ownership and firm value, as proxied by Tobin's q. We do so by estimating the following regression equation:

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Insider\ own_i + \gamma_2 Insider\ own^2{}_i + \gamma_3 Insider\ wedge_i \\ & + \sum_{k=1}^{8} \alpha_k Control\, variables_{ki} + \sum_{l=1}^{48} \delta_j Industry\, dummies_{li} \\ & + \sum_{j=1}^{n} \beta_j Year\, dummies_{ji} + u_i \end{aligned} \tag{7}$$

The dependent variable is Tobin's q, measured as the ratio of book value of assets plus the market value of equity minus the book value of equity to the book value of assets. *Insider own* is the sum of the voting rights controlled by insider blockholders. *Insider own*^{2} is *Insider own* squared. *Insider wedge* is the difference between voting and cash flow rights of the insider blockholders. Control variables (as defined in the Appendix) are *Ln(total assets)*, *Leverage*, *Sales growth*, *R&D*, *Delaware, Diversification*, as well as year and Fama-French industry dummies.

The results of the empirical tests of Eq. (7) are reported in Table 12. Column 1 reports the results for the OLS regressions. We find that the coefficient estimate for γ_1 is negative, while the coefficient estimate for γ_2 is positive, and these coefficients are statistically significant at the 1% level. Our results thus imply a convex (U-shaped) relationship between insider ownership and firm value for newly public firms.

As argued by Demsetz and Lehn (1985), Demsetz and Villalonga (2001), Himmelberg, Hubbard, and Palia (1999), Coles, Lemmon, and Meschke (2012) and others, ownership and firm value (performance) may be endogenous. More specifically, the results of any study of the ownership-firm value relationship may be biased in the presence of unobservable firm heterogeneity. Therefore, ordinary least-squares (OLS) tests may be vulnerable to biases that arise from this potential endogeneity of ownership. In order to alleviate this bias, three main approaches are generally used: proxy (control) variables, firm fixed effects in panel data, and instrumental variables. Each of these approaches has problems of its own. Zhou (2001) argues that due to the static nature of ownership over time, firm fixed effects may be inappropriate. Coles, Lemmon, and Meschke (2012) argue, however, that none of these methods is an effective solution to the endogeneity problem.[31]

For endogeneity correction in traditional (linear) OLS specifications, the two-stage least squares (2SLS) approach is generally used. However, given our quadratic specification of the relationship between insider ownership and firm value, the 2SLS approach is likely to be inappropriate. Wooldridge (2002) notes that when a model is linear in parameters but nonlinear in endogenous variables the identification must be treated differently. We thus employ the nonlinear two-stage least squares (N2SLS) approach proposed by Amemiya (1974), which permits

[31] They propose a structural model approach which uses numerical methods to calculate exogenous parameters jointly determining CEO ownership and performance.

consistent estimates of regression coefficients in nonlinear models (for additional details, refer to Appendix 4).[32]

Similar to Gompers, Ishii, and Metrick (2010) we use *Sales / Regional sales* and *%Sales* as instrumental variables. We also include the cross products of all control variables and instruments. As discussed in Davidson and McKinnon (2004) and Bowden and Tarkington (1984), our relatively large sample size indicates that this approach of using powers and cross products of instruments could yield a satisfactory means of improving asymptotic efficiency without creating a serious finite sample bias.

The results are provided in column 2 of Table 12. As before, the coefficient estimate for insider ownership is negative, while the coefficient estimate for the squared insider ownership is positive, and both are significant at the 1% level. This finding suggests that the convex relationship documented above is unlikely to be driven by the endogeneity of insider ownership.

3.3.2. The influence of outsider and corporate blockholders on the ownership-firm value relationship

We now examine the manner in which the presence of outsider and corporate blockholders influences the relationship between insider ownership and firm value. We do so by estimating the following regression equation:

$$\begin{aligned} Tobin's\ q_i = {} & \gamma_0 + \gamma_1 Insider\ own_i + \gamma_2 Insider\ own_i^{\ 2} + \gamma_3 Insider\ wedge_i \\ & + \gamma_4 Insider\ own_i * Outsider_i + \gamma_5 Insider\ own_i^{\ 2} * Outsider_i + \gamma_6 Insider\ own_i * Corporate_i \\ & + \gamma_7 Insider\ own_i^{\ 2} * Corporate_i + \gamma_8 Outsider_i + \gamma_9 Corporate_i + \sum_{k=1}^{8} \alpha_k Control\ variables_i \\ & + \sum_{j=1}^{n} \beta_j Year\ dummies_{ji} + \sum_{l=1}^{48} \delta_l Industry\ dummies_{li} + \varepsilon_i \end{aligned} \quad (8)$$

Outsider is a dummy variable that takes on a value of one if an outsider individual blockholder is present in the firm, and zero otherwise. *Corporate* is a dummy variable that takes on a value of

[32] As described by Davidson and McKinnon (2004), the term "nonlinear two-stage least squares" proposed by Amemiya (1974) is somewhat misleading as the estimation does not proceed in two stages but is completed by projecting the regression problem into the linear space defined by the instruments.

one if a corporate blockholder is present in the firm, and zero otherwise. Control variables (as defined in the Appendix) are *Ln(Firm size)*, *Leverage*, *Sales growth*, *R&D, Delaware,* and *Diversification,* as well as year and industry dummies.

If it is the case that individual blockholders monitor each other as suggested by Fama (1980), we would expect the coefficient estimates of γ_3 and γ_4 to be positive and negative, respectively. Conversely, if the individual blockholders form a coalition we would expect the coefficient estimates of γ_3 and γ_4 to be negative and positive, respectively. In addition, if it is the case that corporate blockholders do in fact monitor insider blockholders, we would expect the coefficient estimates of γ_6 and γ_7 to be positive and negative, respectively.

The results of the empirical tests of Eq. (8) are reported in Table 13. Similar to the results in Table 12, our OLS regressions suggest a convex relationship between insider ownership and firm value. Moreover, in the presence of an outsider blockholder the convex relationship becomes more pronounced. In particular, we find that the coefficient estimate for γ_4 is negative, while the coefficient estimate for γ_5 is positive, with both coefficient estimates being statistically significant at the 1% level. When considering the impact of a corporate blockholder, we find that the coefficient estimate for γ_6 is positive, while the coefficient estimate for γ_7 is negative, with both coefficient estimates being statistically significant at the 1% level. Our results thus imply a concave impact of the presence of a corporate block on the ownership-firm value relationship.

As before, we employ a nonlinear two-stage least squares (N2SLS) approach using the same instrumental variables mentioned above. The results are provided in column 2 of Table 13. The coefficient estimate for γ_1 is negative, while the coefficient estimate for γ_2 is positive, and both are significant at the 1% level. Consistent with the earlier results, the outsider seems to increase the convexity of the insider ownership-firm value relationship (coefficient estimates of γ_3 and γ_4 are significant at the 1% level), while the presence of a corporate blockholder makes the relationship more concave (coefficient estimates of γ_6 and γ_7 are significant at the 5% and 1%

levels, respectively). Taken together, these findings suggest that the relationships documented above are unlikely to be driven by endogeneity.

3.3.3. Presence of additional blockholders and the ownership-firm value relationship

We further examine how the relationship between insider ownership and firm value differs based on the presence of additional blockholders. As shown in the first essay, the presence and identity of additional blockholders, both individual and corporate, influence the ownership-firm value relationship – individual blockholders have a convex influence and corporate blockholders have a concave influence. As our main focus in this essay is insider ownership, we incorporate the findings of the previous essay by examining the impact of outsiders (individual blockholders) and corporate blockholders on the insider ownership-firm value relationship. In order to do so, we thus split our newly public sample into four subsamples based on the presence/absence of outsider and corporate blockholders, as described above. We re-estimate Eq. (7) for each subsample and the results are reported in Table 14.[33]

For Type A firms (column 1), we find that the coefficient estimates for γ_1 and γ_2 are significantly negative and positive, respectively. Our results thus imply a convex relationship between insider ownership and firm value for this type, similar to that found for the overall sample. For Type B firms (column 2), we find the coefficient estimate for γ_1 is positive, while the coefficient estimate for γ_2 is negative. While the coefficient estimates are statistically insignificant at traditional levels, the results imply a more concave relationship between insider ownership and firm value for these firms, similar to that generally found for large, index-listed firms.

The relationship for Type C firms (i.e. those with insider and outsider individual blockholders) is similar to that of Type A firms, and the coefficients are much larger in magnitude (column 3). Thus, outsider blockholders increase the convexity of the relationship between insider ownership and firm value. For the Type D firms (i.e., those with all three

[33] Due to insufficient observations in the four (and later, eight) subsamples, we are unable to provide nonlinear 2SLS results beyond this point.

blockholder types (column 4)), we find that the coefficient estimates for γ_1 and γ_2 are negative and positive, respectively, though statistically insignificant at traditional levels. The finding of insignificance for this subsample is unsurprising as the convex influence of both insider and outsider blockholders is (in part) counteracted by the concave influence of the corporate blockholders.

Overall, by splitting our sample on observable firm characteristics such as the presence of an additional blockholder, we find either a convex or insignificant relationship between insider ownership and firm value.

3.3.4. The influence of market seasoning and additional blockholder presence on the ownership-firm value relationship

Once a firm begins public trading, it is not likely to remain static, but rather evolves over time under the scrutiny of the market. Increased reporting requirements, analyst following, and the market for corporate control all serve to shape firm behaviour (i.e., the behaviour of its insiders) and we thus predict that the relationship between insider ownership and firm value will change as well. In addition, corporate blockholders become more influential (move up in the shareholder ranking) over time, thus changing the firm's monitoring environment. We refer to the combinations of these changes as the "seasoning" effect. We now examine how the relationship between insider ownership and firm value differs based on both the effects of blockholder presence and market seasoning.

In order to examine these effects, we estimate Eq. (7) separately for eight subsamples, dividing each of the above four types into younger and older subsamples based on time since IPO. We define younger (older) firm-years as those occurring within (after) seven years following their IPO.[34] We posit that the relationship between insider ownership and firm value for older Type B firms will be concave, similar to that generally found for large, index-listed firms. On the

[34] We split the sample of firm-years at the seventh year as it marks the midpoint of our data set. Results are robust to splitting the sample at the sixth and eighth years as well.

other hand, their younger counterparts will exhibit a weaker (less concave) relationship given the relative absence of seasoning. The OLS tests of Eq. (7) for each subsample are reported in Table 15. Columns 1, 3, 5, and 7 present the results for younger firms, while columns 2, 4, 6, and 8 present corresponding results for older firms.

In order to examine the seasoning effect in tandem with that of blockholder presence, we compare younger and older firms for each type. As we are grouping on blockholder presence and are controlling for firm characteristics, we posit that any differences between the pairs can be attributable to the market seasoning effect.[35] For younger firms with only corporate presence (Type B), we find that the coefficient estimates for γ_1 and γ_2 are negative and positive, respectively, but are statistically insignificant at traditional levels. Thus, the concave influence of corporate blockholders counterbalances the previously-described convex relationship for younger firms. Conversely, for older firms with a corporate presence, we find that the coefficient estimate for γ_1 is positive, while the coefficient estimate for γ_2 is negative, and the coefficients are statistically significant at the 5% and 1% levels, respectively. Our results imply a concave relationship between insider ownership and firm value for these firms. Thus, the relationship between ownership and firm value moves from insignificant to concave as a Type B firm becomes more seasoned.

For younger firms with only outsider blockholders (Type C), we find that the coefficient estimates for γ_1 and γ_2 are negative and positive, respectively, and are statistically significant at the 1% level. Thus, the previously-described convex relationship for younger firms remains unchanged. Conversely, for older firms with outsider blockholders, we find that the coefficient estimates for both γ_1 and γ_2 are positive, but are statistically insignificant at traditional levels. Thus, the relationship between ownership and firm value moves from convex to insignificant as a Type C firm becomes more seasoned.

[35] It can be argued that splitting the sample by time since IPO introduces a survivorship bias into the analysis. However, we argue that any survivorship bias introduced would be similar to that in all studies of established (mature) firms, which are, by definition, surviving firms.

For younger firms with all three blockholder types (Type D), we find that the coefficient estimates for γ_1 and γ_2 are negative and positive, respectively, but only the former is statistically significant at the 10% level. Thus, the previously-described convex relationship for younger firms is weak. Conversely, for older Type D firms, we find that the coefficient estimates for γ_1 and γ_2 are positive and negative, respectively, but are statistically insignificant at traditional levels. Thus, the relationship between ownership and firm value moves from marginally convex to insignificant as a Type D firm becomes more seasoned. Overall, we show that we can replicate all forms of the ownership-firm value relationship, from convex to insignificant to concave.

3.4. Discussion

Up to this point, our results indicate that the insider ownership-firm value relationship could be concave or convex, depending on the type of firms studied. We now evaluate our conclusions by comparing them against the results of prior studies examining the insider ownership-firm value relationship. In particular, we expect studies using samples consisting of large, index-listed firms to find a concave relationship between ownership and firm value. Similarly, studies using smaller firms should find a convex relationship and studies using a random sample (implying a mix of large and small firms) should find no significant relationship.

We examine this hypothesis using studies published in the top eleven Finance and Economics journals using US data. These journals are defined as The Review of Financial Studies (RFS), Journal of Finance (JF), Journal of Financial Economics (JFE), Journal of Financial and Quantitative Analysis (JFQA), Journal of Banking and Finance (JBF), Journal of Corporate Finance (JCF), Financial Management (FM), Journal of Business (JB), Journal of Political Economy (JPE), Review of Economic Studies (RES) and American Economic Review (AER).

The studies are listed in Table 16. While we also include studies employing linear specifications of the ownership-firm value relationship (Panel B), to facilitate our comparison we focus on papers using either a quadratic or piecewise linear specification (Table 16, Panel A). Furthermore, though family ownership is an important subset of insider ownership, we note that, for the following two reasons, the list of family ownership papers included in Panel B of Table 16 is by no means exhaustive. First, a family firm can be defined in a variety of ways (see, for example, the literature review in Miller et al., 2007). Second, not all studies require that the ownership stake of a family be large enough for the family to be a blockholder of the firm. As our focus is on *insider blockholders*, inconsistencies among definitions and minimum ownership levels can make comparability inappropriate. Thus, our literature review includes only those studies which are directly comparable to our own.

We make a prediction regarding the ownership-firm value relationship based on the sample selection criteria used by each study in question. We then compare our predictions with the reported results. Of the eleven studies found, we can correctly predict the results of eight studies.[36] For example, the study by McConnell and Servaes (1990), which uses a sample of large firms, finds a concave relationship between ownership and firm value. On the other hand, Himmelberg, Hubbard, and Palia (1999) analyze a random sample of 600 Compustat firms and find no significant relationship. This finding of insignificance can be attributable to the mixture of firms having differing ownership structures (and therefore ownership-firm value relationships as well).

[36] The three studies for which our prediction is not fully consistent with the study's results are Gompers, Ishii, and Metrick (2010), Holderness, Kroszner, and Sheehan (1999), and Himmelberg, Hubbard, and Palia (1999). The Gompers, Ishii, and Metrick (2010) study uses only dual-class firms in their analysis, and both voting and cash flow rights are included in their specifications, making direct comparison infeasible. The Holderness, Kroszner, and Sheehan (1999) study uses two samples from 1935 and 1995. We can correctly predict the results for the 1935 sample, but our prediction for the 1995 sample of Compact Disclosure firms is inconsistent with their finding that firm value increases over the 0-5% range and is unchanged for ownership levels above 5%. However, a potential explanation of the inconsistency is the finding by Dlugosz, Fahlenbrach, Gompers, and Metrick (2006) of large biases in Compact Disclosure data. Himmelberg, Hubbard, and Palia (1999) find an insignificant relationship in their main regressions, but find evidence of a concave relationship in their instrumental variable regressions; however, the significance does not hold upon inclusion of firm fixed effects.

A potential limitation of this comparison is that we do not benchmark our predictions to the large number of studies that address the ownership-firm value relationship indirectly using other methodologies, such as event studies. These studies can provide indirect evidence regarding the relationship between ownership and firm value. For example, Slovin and Sushka (1993) examine the market reaction to inside blockholder deaths. Since their sample firms have at least one individual blockholder, by definition, the study sample is more likely to isolate the convex relationship we find for the individual blockholders. They find a concave relationship between the ownership of the deceased blockholder and the abnormal return at the death announcement, evidence which is consistent with a convex relationship between ownership and firm value prior to the announcement.

3.5. Conclusions

This paper revisits a fundamental issue in corporate finance – the relationship between insider ownership and firm value. Although the nature of this relationship has been empirically debated for over two decades, we are still very far from reaching a consensus on the issue. We contribute to this literature by showing that the differences in ownership structure of sample firms are an important factor contributing to the diversity of results found in prior studies.

We do so by drawing on recent research regarding the influence of multiple blockholders on firm value. In particular, we examine the influence of the presence of outsider and corporate blockholders on the observed insider ownership-firm value relationship. We find that for firms in which only insider blockholders are present there exists a statistically significant convex ownership-firm value relationship. For old firms with corporate blockholders, on the other hand, there is a statistically significant concave relationship.

Our paper has important implications for the literature. First, it shows that widely different ownership structures lead to widely different ownership-firm value relationships. In fact, we show how a simple split of a sample by easily observable characteristics of ownership

structure can lead to a full spectrum of relationships – from a convex to insignificant to concave. Second, it highlights the influence of sample selection on the insider ownership-firm value relationship. In particular, we show that the predominantly concave relationship between ownership and firm value found in the literature holds only for firms with significant corporate presence, as is the case with most large and mature firms.

Third, there is a prescriptive element to our study. Researchers using random samples of firms should analyze subgroups based on the presence of additional blockholder. On the other hand, those using firms with homogeneous ownership structures should exercise caution when generalizing their results for the wider universe of American firms. Finally, to our knowledge, our study is one of the first that attempts to integrate the emerging literature on blockholders with the older literature on the relationship between insider ownership and firm value. Although there have been numerous prior studies on each of these issues separately, integrating these two lines of inquiry will help us attain a much deeper understanding of the role of various groups of shareholders in shaping the course of the firm.

CHAPTER FOUR – THE EFFECT OF A FIRM'S IPO ON ITS IOU

4.1. Introduction

A firm's IPO brings about changes in both its information and contracting environments, influencing its lending arrangements. The significant disclosure requirements in order to be publicly traded, along with frequent reporting requirements and analyst coverage after IPO, substantially increase the available information about the firm. As a result, there is an increase in the competition for the provision of bank loans to the newly public firm. This increased competition could manifest either as a change in lender or as a threat of such change.[37] The reduction in information asymmetry and the resulting changes in lending arrangements are likely to lead to changes in the covenants and yields of post-IPO bank loans. This interaction of covenants, yields, and syndication surrounding an IPO has not yet been explored in the literature and this paper fills that gap.

We examine a sample of loans taken by 2,613 IPO firms over the period 1993-2000 and find that both covenants and loan yields decrease after the IPO. This evidence is consistent with the reduction in information asymmetry surrounding the IPO and the resulting increase in lender competition. Consistent with increased competition, we find that the IPO significantly increases the percentage of loans that are syndicated from 42% of loans before IPO to 71% after. Further, these changes in lending agreements have a significant influence on both the covenants and yields. In particular, firms having non-syndicated loans both pre- and post-IPO experience a decrease in covenants without achieving a decline in yields. In contrast, firms that move to syndicated loans after the IPO experience a substantial decline in yields along with a significant increase in covenant usage. These results hold up even when covenants and yields are jointly estimated. We also find some evidence of a decrease in covenant intensity for firms that switched

[37] In addition, a lender may no longer be able to meet the firm's growing financing needs alone or it may wish to diversify the risk of the loan in its own portfolio through syndication. The IPO thereby increases the likelihood of a move from relationship banking to arms-length financing.

lenders after IPO – covenant intensity for loans to most of the non-switchers is not significantly affected by the IPO. In addition, we find evidence of differences in covenant intensity for venture capitalist-backed (VC) and non-VC-backed firms, suggesting that the role played by the IPO on loan terms is influenced by VC presence.

This paper makes several contributions. First, it contributes to the existing literature regarding the trade-off between covenants and yields. Bradley and Roberts (2004) find a significant inverse relationship between covenant intensity and private debt yields. For public debt issues, Chava et al. (2004), Reisel (2004), and Goyal (2005) each find that the cost of debt declines with covenant usage. Demiroglu and James (2010) also find that more restrictive covenants are associated with lower yields. Thus, there appears to be a trade-off – firms wanting to lower their yields may only be able to do so by taking loans with greater covenant intensity.

Second, we contribute to the relatively sparse literature concerning the joint estimation of covenants and yields.[38] As the covenants on a loan and its yield are determined jointly based primarily on characteristics of the borrowing firm, covenant intensity and loan yields are likely to be endogenous. We account for this endogeneity and find the above results robust.

Third, we contribute to the literature regarding changes in bank lending around IPO. Pagano, Panetta, and Zingales (1998) and Sunder (2004) each document a post-IPO decrease in a firm's cost of debt. Schenone (2010) finds that, irrespective of changes in financial risk, the IPO results in lower loan yields as the banks no longer have an information monopoly over the firms. We show that the decline in yields reported in these studies is not uniform – it applies only to certain types of firms (e.g. those using syndicated loans after IPO). Thus, we find evidence that the ability of an IPO to resolve the bank holdup problem as in Schenone (2010) is a function of loan syndication. Firms with non-syndicated loans after IPO do not experience a reduction in loan

[38] Billett et al. (2007) examine, among other things, the endogeneity of covenants, but they do not consider yields.

yields. Also, to our knowledge, we are the first to show significant changes in covenants around IPO.

The remainder of this paper is organized as follows. In the next section, we describe the data employed in this study. Section 4.3 provides the empirical tests and discusses the results. Section 4.4 provides the results for the joint estimation of covenants and yields. Section 4.5 examines the effect of changing lenders on covenants and yields, while Section 4.6 examines the influence of VC backing. Section 4.7 concludes.

4.2. Data samples and methodology

We begin by considering all initial public offerings in the Securities Data Corporation Platinum database over the period 1993-2000 by U.S. firms. We then exclude IPOs by financials (SIC code 6000 to 6999 inclusive) and utilities (SIC code 4900 to 4949 inclusive). Consistent with prior research in IPOs, we further exclude equity carve-outs, leveraged buyouts, unit offerings, roll-ups, and closed-end funds. Firms with no data available on either the Centre for Research in Security Prices (CRSP) or COMPUSTAT databases and firms with inconsistent first trading dates between SDC and CRSP are excluded as well. After these exclusion criteria are employed, 2,613 IPOs remain in the sample. Panel A of Table 17 provides the distribution of the IPOs by year.

We next match the sample of IPOs to the Loan Pricing Corporation's Dealscan database, which provides comprehensive loan data for U.S. firms. As Dealscan does not report traditional company identifiers such as CUSIP or PERMNO, we manually match each IPO firm to the firms in Dealscan based on firm name and ticker, and confirm consistency by comparing SIC codes. Using this approach, we are able to find a match for 1,749 firms in the IPO sample. These firms took a total of 5,724 loan "packages" – groups of loans made to a single firm at the same time. We exclude packages whose purpose is listed as takeover financing or as leveraged/management buyout financing as these loans would likely not be representative of the majority of loans taken

by firms to finance their general day-to-day operations and whose yields and covenants, therefore, could incorporate effects other than those arising from the IPO.

We further exclude loan packages which are not denominated in U.S. dollars (as in Barry et al, 2009) and those which have an incomplete deal status, leaving a total of 4,783 loan packages comprising 6,715 individual loans (Dealscan uses the term "facility"). Of these individual loans, we exclude those for which covenant and loan yield data are unavailable. As our focus is on changes in covenants and yields around IPO, in our empirical analysis we consider only those firms which have loans both before and after their IPOs. In addition, to best measure the influence of the IPO, we consider only the loans closest to the IPO, both before and after. After setting these criteria, our final sample is comprised of 1,029 loans. Panel B of Table 17 describes this matching procedure.

We obtain covenant information for the loan sample from Dealscan. Dealscan provides information regarding several types of covenants – event-induced, financial, dividend restriction, and secured loan.[39] The event-induced covenants force the loan retirement early if the firm sells a pre-specified amount of assets or issues a pre-specified level of new equity or debt. The financial ratio covenants can result in fines or force loan retirement if the firm breaches certain limits imposed by the bank on various types of accounting ratios. The dividend restriction covenant can limit the ability of the firm to pay out dividends during the life of the loan if certain criteria are not met. Finally, the secured loan covenant requires that the loan be secured by the assets of the borrowing firm.

For the analysis of covenant intensity, we follow the approach in Bradley and Roberts (2004). We create a set of dummy variables whose values are equal to one for each of the following cases: if a given loan has two or more financial ratio covenants (*ratiodummy*), an asset (*asweep*), debt (*dsweep*), or equity (*esweep*) sweep covenant, a dividend restriction covenant (*divrest*), and if the loan is secured (*secured*). We then sum these six dummy variables to obtain

[39] See Bradley and Roberts (2004) for a detailed explanation of Dealscan covenant data.

the measure of covenant intensity, *Covintensity*, which can range in value from 0 to 6. A detailed description of the covenant distribution on the loans in our sample is in Table 18.

Loans made to firms can come from either a single lender or a syndicate of lenders (relationship and arms-length lending, respectively). A syndicated loan is made by a group of lenders (termed a syndicate) to provide funds to a particular borrower. Similar to an IPO, a syndicated loan can be fully underwritten, where the loan is syndicated after an arranging bank guarantees the entire amount, or partially underwritten ("best efforts"). A lead bank (also known as the "arranger") typically assumes a larger proportion of the loan than do other syndicate members and has the task of distributing the loan's cash flows to those members. Syndicate members can be banks, finance companies, or corporate investors such as mutual funds and pension funds.[40]

The transition to syndicated loans is an important consideration in this analysis. Carey (1998) finds that covenant use is greater the more widely the loan is syndicated. Rajan and Winton (1995) note that as covenants encourage monitoring, the inherent free-rider problem in monitoring firms with syndicated loans requires the use of more strict covenants. [41] In addition, the finding of Drucker and Puri (2006) that covenants are more restrictive when loans are expected to be sold also could indicate that covenant intensity on syndicated loans is greater.

We consider whether or not the loan is syndicated and the average number of lenders on the loan. Before IPO, 42% of the loans made to the IPO firms are syndicated (with an average of 1.8 lenders), and this percentage increases to 71% after IPO (with an average of 2.9 lenders). Thus, the IPO significantly increases the extent of loan syndication – after the IPO, firms become more likely to rely on arms-length financing rather than borrow from a single lender. In order to better test the possible effects of syndication, we categorize the sample of IPO firms into four groups, using the loans closest to the IPO (both before and after) to determine the type of the

[40] For a detailed description of the syndicated loan process, see Chew and Watters (2011).
[41] Rajan and Winton (1995) note that covenants have the ability to encourage bank monitoring as detection of covenant breach can occur only if the bank has conducted at least a minimum amount of monitoring.

firm: firms having non-syndicated loans before and after their IPOs (NN), firms with non-syndicated pre-IPO loans and syndicated post-IPO loans (NS), firms with syndicated pre-IPO loans and non-syndicated post-IPO loans (SN), and firms with syndicated loans both before and after IPO (SS). Table 19 provides the distribution of the number of cases, by IPO year, for each of the four transition types.

Table 20 provides summary statistics for our sample firms and loans both before and after IPO. Firm-specific accounting data per loan-year is obtained from COMPUSTAT. The sample firms are not highly levered before their IPOs, and as expected, given that issuing equity is a leverage-decreasing event, their mean leverage declines slightly post-IPO. In considering the possibility for venture capitalist backing, we find that 54% of the firms are VC-backed at the time of their IPOs. Covenant intensity increases from an average pre-IPO value of 2.13 to 2.39 post-IPO. Loan yields, defined as the yield in basis points on the firm's loan over the 6-month LIBOR, decline post-IPO, moving from 273bp to 223bp. The average loan amount increases from $64 million pre-IPO to $124 million post-IPO. The average loan maturity increases from 37 months before IPO to 41 months after IPO.

Table 21 provides summary statistics of firm (Panel A) and loan (Panel B) characteristics by the type of loan transition and provides tests for differences in characteristics between types. Overall, we see in Panel A that Type NN firms are significantly smaller (as measured by assets) than all other firm types. Type SS firms are significantly more levered than are Type NN and NS firms and are older and larger than all other firm types. In Panel B, we find that there are significant differences in loan size and maturity between the types both before and after IPO. Loan size increases after IPO for all but Type SN firms and loan maturity significantly increases (decreases) for Type NS (SN) firms after IPO. Type SS firms take significantly larger loans of longer maturity than do the other firm types.

4.3. Results

4.3.1. Univariate analysis of covenant intensity and loan yield

We first examine the changes in covenant intensity around IPOs. Table 22 provides the univariate comparisons (using both mean and median) for the closest pre- and post-loans. For the overall sample, we find a significant increase in both mean and median covenant intensity around the IPO. The average covenant intensity increases from 2.13 to 2.39. When splitting the overall sample into the transition types described above, we find a highly significant increase (1.74 to 2.46) in covenant intensity only for NS firms – those switching from non-syndicated pre-IPO loans to syndicated post-IPO loans. Thus, we find evidence in support of greater covenant use in syndicated loans.

Table 23 provides the univariate comparisons for loan yields. For the overall sample, we find a significant decrease in both mean and median loan yield after the IPO. The average loan yield decreases from 273bp to 223bp. When splitting the overall sample into the loan transition types, we find highly significant decreases in loan yield of 51bp, 68bp, and 35bp for the NN, NS, and SS types, respectively.

Overall, we find some preliminary evidence to suggest that the IPO can play both a direct role and an indirect one (through its potential impact on syndicated loan use) in determining covenant intensity and loan yields. We further explore these relationships in the multivariate analysis.

4.3.2. Multivariate analysis of covenant intensity and loan yields

In order to test the relationship between covenant intensity and the IPO, we estimate the following model for the overall sample and each of Type NN, NS, and SS firms:[42]

$$\begin{aligned} Covintensity = {} & \beta_0 + \beta_1(PostIPO) + \beta_2(LoanSize) + \beta_3(LoanSize * PostIPO) + \\ & + \beta_4(Maturity) + \beta_5(FirmSize) + \beta_6(Leverage) + \beta_7(ZScore) \\ & + \gamma_j(Industry) + \lambda_j(Year) + \varepsilon \end{aligned} \tag{9}$$

[42] Since the Type SN subsample has very few observations, to maintain comparability between the overall sample results and those of the subsamples, we omit the observations for Type SN firms from the overall sample results.

Control variables are *LoanSize*, *PostIPO*LoanSize*, *Maturity*, *FirmSize*, *Leverage*, and *ZScore*, each as defined in Appendix 3. In addition, Fama-French industry (*Industry*) and year (*Year*) dummy variables are included to capture industry and year fixed effects, respectively.[43] As *Covintensity* is a count variable, we also estimate Eq. (9) using Poisson regression.[44] The overall sample results of both approaches are provided in specifications (1) and (5), respectively, in Panel A of Table 24.

For the overall sample, we find a significantly negative coefficient estimate on *PostIPO*, indicative of lower covenant intensity after a firm's IPO. As expected, there is a positive relationship between covenant intensity and each of the loan's maturity and size and the firm's leverage, and a negative relationship between covenant intensity and firm size (as proxied by firm assets). Given the significant differences in covenant intensity found in the univariate analysis based on loan transition type, we run Eq. (9) for each of the Type NN, NS, and SS subsamples using OLS and Poisson specifications. We report these results in specifications (2) through (4) (as well as (6) through (8)) in Panel A of Table 24. The coefficient estimate on the *PostIPO* variable is negative and significant for NN firms, while it is insignificant for NS (in the Poisson specification) and SS firms. Thus, firms with syndicated loans after their IPOs experience no significant change in the covenant intensity of their loans, while firms that continue to use non-syndicated loans after IPO experience significant decreases in covenant intensity.

The lower post-IPO covenant intensity just observed is inconsistent with the significant increase found in the univariate tests. Upon further examination, we find that this inconsistency can be explained by two factors. First, as shown in Panel B of Table 21, loan size and maturity increase significantly after a firm's IPO, especially for Type NS firms. Given the positive and significant relationship between loan size (and maturity) and covenant intensity observed above,

[43] Since loan size is found in Table 20 to significantly increase after IPO, we include the interaction term *PostIPO*LoanSize* as a control variable. Thus, we allow for the possibility that the slope of the relationship between loan size and covenant intensity changes after IPO.
[44] For additional details regarding model estimation using count data, refer to Appendix 4.

the increased loan size leads to greater post-IPO covenant intensity. Second, as documented by Bradley and Roberts (2004), there is a general upward trend in covenant intensity over the 1993 to 2001 period. Thus, the measure of covenant intensity, as described above, has an upward trend over time even in the absence of an IPO. The combination of these two factors results in the observed increase in covenant intensity after IPO at the univariate level. However, once these effects are controlled for in the multivariate setting (using *LoanSize*, *PostIPO*LoanSize*, and year dummies), we observe that the IPO itself results in lower covenant intensity.

Next, we conduct the same analysis as in Eq. (9) but change the dependent variable to loan yield, *Yield*. The results of estimating Eq. (9) are provided in specification (1) in Panel B of Table 24. For the overall sample, we find a negative and significant coefficient estimate on the *PostIPO* variable, indicating that firms experience a decline of 33bp, on average, in loan yield after their IPOs. We find a negative and significant relationship between loan yield and each of loan size, firm size, and z-score, while loan yield is significantly positively related to leverage.

We further conduct subsample analysis based on types NN, NS, and SS and the results are provided in specifications (2) through (4) in Panel B of Table 24. For Type NS and SS firms, the coefficient estimate of *PostIPO* variable is negative and significant, indicating that these firms experience a reduction in the yields on their loans after IPO, averaging 54bp and 36bp, respectively. Conversely, NN firms experience no significant declines in loan yield around IPO.

In order to test whether there are significant differences among the types, we re-estimate Eq. (1) for the overall sample and use interaction terms of *PostIPO* with type indicator variables to capture differences among firm types. The specification is as follows:

$$\begin{aligned} Covintensity = {} & \beta_0 + \beta_1(PostIPO) + \beta_2(PostIPO * Type\ NS) + \beta_3(PostIPO * Type\ SS) \\ & + \beta_4(Type\ NS) + \beta_5(Type\ SS) + \beta_6(LoanSize) + \beta_7(LoanSize * PostIPO) \\ & + \beta_8(Maturity) + \beta_9(FirmSize) + \beta_{10}(Leverage) + \beta_{11}(ZScore) \\ & + \gamma_j(Industry) + \lambda_j(Year) + \varepsilon \end{aligned} \tag{10}$$

Note that we have made Type NN firms the reference group for the above specification. The coefficient estimate of *PostIPO* reflects the change in covenant intensity for Type NN firms. The

coefficient estimates of *PostIPO* interacted with the Type NS and SS indicator variables reflect the differences in changes of covenant intensity between Type NN and Type NS and SS firms, respectively. The pre-IPO differences in covenant intensity between Type NN and Type NS and SS firms are reflected in the coefficient estimates of the indicator variables for Types NS and SS firms, respectively. The definitions of all right-hand-side variables are described in Appendix 3. We also estimate Eq. (10) using Poisson regression. The results of both approaches are provided in specifications (1) and (2), respectively, in Table 25.

We find a significantly negative coefficient estimate on *PostIPO*, indicative of lower covenant intensity after a firm's IPO for Type NN firms. Covenant intensity is also lower for Type SS firms after IPO since the difference from Type NN firms is insignificant.[45] We, however, find no overall effect of the IPO for Type NS firms. The coefficient estimate on *PostIPO*Type NS* is positive and significant, indicating that the post-IPO covenant intensity for Type NS firms is significantly different from that of Type NN firms. The sum of the two coefficient estimates of *PostIPO* and *PostIPO*Type NS* is not significantly different from zero. Thus, firms switching to syndicated loans after their IPOs experience no change in the covenant intensity of their loans while firms continuing to use the same loan type after IPO experience significant decreases in covenant intensity.

Next, we conduct the same analysis as in Eq. (10) but change the dependent variable to loan yield, *Yield*. The results are provided in specification (3) in Table 25. We find a negative but insignificant coefficient estimate on the *PostIPO* variable, indicating that Type NN firms experience little change in yields after IPO. Conversely, Types NS and SS firms experience declines, on average, of 52bp and 32bp, respectively, in the yields on the loans taken after IPO.[46]

[45] A formal test reveals that the sum of the coefficient estimates on *PostIPO*SS* and *PostIPO* is statistically significantly different from zero at the 5% level.

[46] A formal test reveals that the sum of the coefficient estimates on *PostIPO*SS* and *PostIPO* is statistically significantly different from zero (negative) at the 1% level. Also, a test of the sum of the coefficient estimates on *PostIPO*NS* and *PostIPO* indicates that the sum is statistically significantly different from zero (negative) at the 1% level.

Taking the results provided in Tables 24 and 25 together, we find that NN firms who have non-syndicated loans both before and after IPO experience a significant decline in the covenant intensity on their loans but have no significant change in loan yield around IPO. NS firms who have non-syndicated loans before IPO but who switch to syndicated loans after IPO have their loan yields reduced by 52bp but experience no change in covenant intensity after IPO. SS firms who have syndicated loans both before and after IPO experience a significant decline in loan yields (32bp) and covenant intensity after IPO. Thus, we find some evidence of a trade-off between covenant intensity and loan yields. Moreover, we find evidence that the ability of the IPO to resolve the bank holdup problem as in Schenone (2010) is a function of loan syndication. Firms with non-syndicated loans after IPO do not experience a reduction in loan yields.

4.4. The joint determination of covenant intensity and loan yields

As the covenants on a loan and its yield are determined jointly based primarily on characteristics of the borrowing firm, covenant intensity and loan yields are likely to be endogenous. In order to account for this endogeneity, we use three-stage least squares (3SLS) estimation of the two specifications of Eq. (9) used above for *Covintensity* and *Yield*.[47] The 3SLS estimation approach requires the use of instrumental variables for each endogenous dependent variable of interest – namely, instruments for covenant intensity and yields. In practice, given the joint determination of covenants and yields at the time a loan is made, it is difficult to find instruments which are correlated with covenant usage but are only indirectly related to loan rates, and vice versa.

Billett, King, and Mauer (2007) assert that a firm's growth opportunities will have an influence on the covenants on its loans. They argue that high-growth firms can benefit from covenants to mitigate the conflicts between bondholders and shareholders. Conversely, covenants may be more prevalent in low-growth firms as they are of lower cost. Mehran (1995) argues that

[47] The 3SLS method was proposed by Zellner and Theil (1962) and further details regarding this approach are provided in Appendix 4.

R&D can be a proxy for growth opportunities while Sorensen (2000) argues that capital expenditures can be a valid proxy. We thus use the following instruments for covenant intensity: the ratio of R&D expenditures to net sales (*R&D*) and the ratio of capital expenditures to net sales (*Capsale)*. McAlister, Srinivasan and Kim (2007) find that a firm's spending on advertising and R&D creates intangible assets insulating it from stock market changes and lowering its systematic risk. We argue that systematic risk is likely to influence yields and we thus use advertising (*Adsale*) and R&D expenditures, each scaled by sales, as instruments for yields.

The results of the estimation of 3SLS are provided in Table 26. The dependent variables in specifications (1) and (2) are *Covintensity* and *Yield*, respectively. The coefficient estimate of *PostIPO* in specification (1) is negative and significant, indicating that even when controlling for loan yield, covenant intensity declines after IPO. The coefficient estimate of *PostIPO* in specification (2) is also negative and significant – when controlling for covenant intensity, loan yields decline after IPO. Taken together, these two results provide evidence of the informational effect of the IPO on loan terms and that there is a trade-off between covenant intensity and loan yields.

4.5. The effect of lender switching on covenant intensity and loan yields

As discussed in Section 4.3, some firms in the sample change loan syndication type after their IPOs and some do not. We examine whether these firms continue to use the same lenders and the impact that has on the covenants placed on their loans and the loan yields they are charged. In order to do so, we obtain from Dealscan the identity of the lenders on each of the loans pre- and post-IPO and create a dummy variable (*SameLender*) equal to one if the firm's lenders remain unchanged, and zero if the firm switches lenders. If the loan is syndicated, we consider the firm to be using the same lenders if the lead bank and top five participants remain the same for the first loan after the IPO. In the sample, there are 137 firms having the same lender

and loan type before and after IPO, of which 69 are using non-syndicated lenders and 68 are using syndicated lenders.

In order to determine the effect of using the same lender, we estimate the following equation for both the overall sample and each type subsample:

$$\begin{aligned} Covintensity = {} & \beta_0 + \beta_1(PostIPO) + \beta_2(PostIPO * SameLender) + \beta_3(SameLender) \\ & + \beta_4(LoanSize) + \beta_5(LoanSize * PostIPO) + \beta_6(Maturity) + \beta_7(FirmSize) \\ & + \beta_8(Leverage) + \beta_9(ZScore) + \gamma_j(Industry) + \lambda_j(Year) + \varepsilon \end{aligned} \quad (11)$$

The *PostIPO* coefficient estimate reflects the change in covenant intensity around IPO for firms switching lenders. We estimate Eq. (11) using both OLS and Poisson regression and the results are provided in Panel A of Table 27.

For the overall sample using Poisson regression, the *PostIPO* coefficient estimate is negative and significant, while that for *PostIPO*SameLender* is insignificant, indicating that the change in covenant intensity is not significantly different between firms that switch lenders and those that do not. When considering NN firms, the coefficient estimate on *PostIPO* is negative and significant for firms switching lenders. Conversely, NN firms maintaining the same lender experience a significantly smaller reduction in covenant intensity on their post-IPO loans.[48] This finding is not surprising since firms that maintained the same lenders had lower covenant intensity before IPO as compared to firms that switched lenders. In fact, our findings indicate that post-IPO covenant intensity for firms that switched lenders is about the same as that for firms maintaining the same lenders. In particular, the sum of the coefficient estimates of *PostIPO*, *PostIPO*SameLender*, and *SameLender* equals -0.367, similar to the coefficient estimate of *PostIPO* (-0.378).[49]

Conversely, when considering NS firms, the *PostIPO* coefficient estimate is negative and significant, while that for *PostIPO*SameLender* is insignificant, indicating that the change in

[48] We also test for the difference of the coefficient estimates on *PostIPO*SameLender* and *PostIPO* from zero and find that it is not significantly different from zero.

[49] A formal test reveals that the post-IPO difference between firms who switched lenders and those who maintained lenders (i.e. the sum of the coefficient estimates of *PostIPO* and *PostIPO*SameLender*) is not statistically significantly different from zero.

covenant intensity is not significantly different between firms that switch lenders and those that do not. For Type SS firms, both the *PostIPO* and *PostIPO*SameLender* coefficient estimates are insignificant, indicating that there is no change in covenant intensity for Type SS firms either maintaining the same or switching lenders around IPO.

We also consider the impact of switching lenders on loan yields by employing the approach outlined above, except the dependent variable is changed to *Yield*. The results are reported in Panel B of Table 27. For the overall sample, the coefficient estimate on *PostIPO* is negative and significant. The coefficient estimate of *PostIPO*SameLender* is insignificant, indicating that there is no significant difference in the change in yields for firms switching or maintaining the same lenders around IPO. When considering NN firms, we find no significant differences in loan yields charged to firms either keeping the same lenders or switching lenders. For Type NS firms, we find a statistically significant decline in yields for firms that switched lenders. The insignificant coefficient estimate on *PostIPO*SameLender* indicates that firms maintaining the same lenders experience a similar decline in yields. For Type SS firms, we find a negative and significant coefficient estimate on *PostIPO*. The coefficient estimate on *PostIPO*SameLender* is positive but insignificant, again indicating that there is no difference between firms that switched lenders and those that did not. Firms that switch lenders are able to have their loan yields reduced by 53bp and 43bp for Type NS and SS firms, respectively, on average. Overall, we find evidence that changing lenders around IPO leads to a bigger reduction in yields.

4.6. The effect of venture capitalist backing on covenant intensity and loan yields

In Table 20, we noted that approximately half of our IPO sample is comprised of firms backed by venture capitalists. As Gompers (1996) notes, VC backing can help mitigate information asymmetries in the market – the investment by the VC serves as a positive credible

signal.[50] As well, since VCs play an active monitoring role in the companies in which they invest, banks may place fewer covenants on and/or reduce the yield on loans made to VC-backed IPO firms. This potential 'VC effect' can extend past the IPO until eventual VC exit. Thus, if VCs can reduce information asymmetry or lower the perceived risk of a borrowing firm, then there are likely to be significant differences between the venture-backed and non-venture backed firms.

In order to determine the effect of VC backing, we follow a similar approach as above, replacing the *SameLender* dummy variable with *NonVC*, a dummy variable equal to one if a firm is not VC-backed, and zero if it is. We then estimate the following equation for the overall sample and each subsample using both OLS and Poisson regression:

$$\begin{aligned} Covintensity = {} & \beta_0 + \beta_1(PostIPO) + \beta_2(PostIPO * NonVC) + \beta_3(NonVC) + \beta_4(LoanSize) \\ & + \beta_5(LoanSize * PostIPO) + \beta_6(Maturity) + \beta_7(FirmSize) + \beta_8(Leverage) \\ & + \beta_9(ZScore) + \gamma_j(Industry) + \lambda_j(Year) + \varepsilon \end{aligned} \quad (12)$$

The results are provided in Panel A of Table 28. For the overall sample, the coefficient estimate of *PostIPO* is negative and significant while that of *PostIPO*NonVC* is positive but insignificant. These findings suggest no significant differences between venture-backed and non-VC backed firms in terms of changes in covenant intensity around IPO. Similar results hold for NN firms. For NS firms, we find a significantly larger increase in covenant intensity for non-VC backed firms when compared to VC-backed firms.

In order to examine the effect of venture backing on loan yields, we repeat the above analysis using *Yield* as the dependent variable. The results are in Panel B of Table 28. For the overall sample, we find a significant decline in yields (42bp, on average) for VC-backed firms. The coefficient estimate on *PostIPO*NonVC* is positive, suggesting a smaller decline in yields for those firms, and the coefficient estimate is not statistically significant. It is interesting to note that non-VC backed firms had lower yields pre-IPO and that post-IPO yields are approximately the

[50] See, for example, Black and Gilson (1998) for a comprehensive analysis of the role of venture capitalist backing of IPOs.

same. In particular, the sum of the coefficient estimates of *PostIPO*, *PostIPO*NonVC*, and *NonVC* equals -41.683, similar to the coefficient estimate of *PostIPO* (-42.501).[51]

Similar findings apply to Type NS and SS firms. The notable difference here is that non-VC backed firms experience significantly smaller declines in yields, especially for Type NS firms. For NN firms, it is only the non-VC backed subsample firms which experience a significant reduction in loan yields after IPO. It should be noted, however, that for this type, non-VC backed firms had significantly higher yields pre-IPO. These results indicate that the observed decline in loan yields is a function of venture capitalist backing, along with the IPO itself.

Taking Panels A and B of Table 28 together, we find that venture-backed NN firms who have non-syndicated loans both before and after IPO experience reductions in covenant intensity but no significant changes in yields. Venture-backed NS firms who have non-syndicated loans before IPO but who switch to syndicated loans after IPO have their loan yields reduced but experience no significant change in covenant intensity. Venture-backed Type SS firms who have syndicated loans both before and after IPO experience significant reductions in yields after IPO. Thus, we find that while the effect of venture capitalist backing is smaller for covenant intensity changes around IPO, it can have a significant influence on the loan yields charged to VC-backed firms. More specifically, we find evidence that the ability of the IPO to resolve the bank holdup problem is a function of VC backing – venture capitalists are able to mitigate the holdup problem for some firms (e.g. Type NN firms).

4.7. Conclusions

To our knowledge, this paper is the first to examine covenant changes on loans around IPO and link these changes to changing lending arrangements. The IPO provides an ideal test for examining the influence of changing asymmetric information on covenants and yields. We show

[51] A formal test reveals that the post-IPO difference between VC and non-VC backed firms (i.e. the sum of the coefficient estimates of *PostIPO* and *PostIPO*NonVC*) is not statistically significantly different from zero.

that both covenant intensity and loan yields decrease after the IPO. This evidence is consistent with the reduction in information asymmetry surrounding the IPO and the resulting changes in lending arrangements.

We also provide evidence regarding the post-IPO switch to syndicated loans. First, the IPO brings about an increase in the extent of syndication, from 44% of pre-IPO loans to 84% post-IPO. Second, these changes have influence on covenants and yields. Firms having non-syndicated loans both pre- and post-IPO experience a decrease in covenant intensity without achieving a decline in yields. In contrast, firms that move from using non-syndicated pre-IPO loans to syndicated loans after the IPO experience a substantial decline in yields along with a significant increase in covenant usage.

The paper also contributes to the small literature on the joint determination of covenants and yields. As the covenants on a loan and its yield are determined jointly based primarily on characteristics of the borrowing firm, covenant intensity and loan yields are likely to be endogenous. In addition, the research on lending around IPO is relatively new and has so far focused on one variable of interest at a time. To our knowledge, this paper is the first to jointly estimate covenants and yields in the context of IPOs.

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APPENDICES

Appendix 1
Variable description

VARIABLE	DESCRIPTION
	Dependent variable
Tobin's q	The ratio of book value of assets plus the market value of equity minus the book value of equity to the book value of assets
	Ownership variables
Largest individual ownership	The percentage of voting rights controlled by the largest individual blockholder
Largest individual wedge	The difference between the percentage of voting and cash flow rights controlled by the largest individual blockholder
Second	Dummy variable that takes on a value of one if the firm has a second individual blockholder in the top three, and zero otherwise
Corporate	Dummy variable that takes on a value of one if the firm has a corporate blockholder in the top three, and zero otherwise
NonFamily	Dummy variable that takes the value of one if the largest individual blockholder is not a founder, and zero otherwise
2NonFamily	Dummy variable that takes the value of one if the second blockholder is not a founder, and zero otherwise
	Control and instrumental variables
Firm size	The book value of total assets
Leverage	The ratio of book value of long term debt to total assets
Sales growth	The percentage change in sales over the previous year
R&D	The ratio of R&D to firm sales
Delaware	Dummy variable that takes on a value of one if a firm is incorporated in Delaware, and zero otherwise
Diversification	Dummy variable that takes on a value of one if a firm reports more than one segment, and zero otherwise
VC	Dummy variable that takes on a value of one if the firm is backed by a venture capitalist, and zero otherwise
Sales / Regional sales	The ratio of a firm's sales to the sales of all firms in the same region (as defined by the micropolitan or metropolitan statistical area (MSA))
%Sales	The percentage of all Compustat sales by firms located in the same MSA as the sample firm

Appendix 2
Variable description

VARIABLE	DESCRIPTION
	Dependent variable
Tobin's q	The ratio of book value of assets plus the market value of equity minus the book value of equity to the book value of assets
	Ownership variables
Insider own	The percentage of voting rights controlled by the insider blockholders
Insider wedge	The difference between the percentage of voting and cashflow rights controlled by the insider blockholders
Outsider	Dummy variable that takes on a value of one if the firm has at least one outsider individual blockholder, and zero otherwise
Corporate	Dummy variable that takes on a value of one if the firm has a corporate blockholder, and zero otherwise
	Control and instrumental variables
Firm size	The book value of total assets
Firm age	The number of years since CRSP listing
Leverage	The ratio of book value of long term debt to total assets
Sales growth	The percentage change in sales over the previous year
R&D	The ratio of R&D to firm sales
Delaware	Dummy variable that takes on a value of one if a firm is incorporated in Delaware, and zero otherwise
Diversification	Dummy variable that takes on a value of one if a firm reports more than one segment, and zero otherwise
Sales / Regional sales	The ratio of a firm's sales to the sales of all firms in the same region (as defined by the micropolitan or metropolitan statistical area (MSA))
% Sales	The percentage of all Compustat sales by firms located in the same MSA as the sample firm

Appendix 3
Variable description

VARIABLE	DESCRIPTION
	Dependent variables
Covintensity	Sum of the dummy variables indicating the presence of each of the following: two or more financial ratio covenants, asset sweep, debt sweep, equity sweep, dividend restriction, and secured loan covenants
Yield	Dealscan yield in basis points on the firm's loan over the 6-month LIBOR
	Independent variables and subsample types
PostIPO	Dummy variable equal to 1 if the loan occurs after the IPO
Type NN	Firms having non-syndicated loans before and after their IPOs
Type NS	Firms having non-syndicated loans before and syndicated loans after their IPOs
Type SN	Firms having syndicated loans before and non-syndicated loans after their IPOs
Type SS	Firms having syndicated loans before and after their IPOs
SameLender	Dummy variable equal to 1 if the firm uses the same lender after its IPO
NonVC	Dummy variable equal to 1 if the firm is not venture-backed
	Control and instrumental variables
Maturity	Natural log of loan maturity measured in months
LoanSize	Natural log of loan amount measured in $ millions
FirmSize	Natural log of firm's assets measured in $ millions
Leverage	Ratio of book value of firm's long-term debt to book value of assets
ZScore	Altman's z-score (estimated for private firms)
Capsale	Ratio of the firm's capital expenditures to sales
R&D	Ratio of the firm's R&D expenditures to sales
Adsale	Ratio of the firm's advertising expenditures to sales
Year	Dummies for each of loan years 1992 to 2008
Industry	Dummies for each of the 48 Fama-French industries

Appendix 4
Econometric Appendix

Essays #1 and #2

Quadratic Specification

We employ a nonlinear specification to model the relationship between the ownership of the largest individual blockholder (total insider ownership) and firm value. We incorporate both a linear and squared ownership term as follows:

$$\begin{aligned} Tobin's\, q_i = {} & \gamma_0 + \gamma_1 Largest\, individual\ own_i + \gamma_2 Largest\, individual\ own_i^{\,2} \\ & + \gamma_3 Largest\, individual\, wedge_i + \sum_{k=1}^{n} \alpha_k Controls_{ki} + \sum_{k=1}^{n} \beta_k Year_{ki} + \sum_{k=1}^{n} \delta_k Industry_{ki} + \varepsilon_i \end{aligned} \quad (1)$$

Using this approach, we are not forcing the relationship to be nonlinear (here, quadratic) but are merely allowing for the possibility. For example, it may be the case that increases in the ownership stake of the largest individual blockholder initially reduce firm value (increased private benefit extraction), but after a certain point, subsequent increases in ownership stake increase firm value (greater incentive alignment). Conversely, the opposite relationship may hold.

We can estimate (1) using standard OLS.[52] If the coefficient estimate of γ_2 is insignificant and the coefficient estimate of γ_1 is significantly negative or positive, the relationship is (likely to be) linear. The relationship is also linear for the cases where the coefficient estimates of γ_1 and γ_2 are both significantly positive (or negative). If the coefficient estimate of γ_1 is significantly negative and the coefficient estimate of γ_2 is significantly positive, then there is a convex/U-shaped relationship between the ownership of the largest individual blockholder and firm value. Conversely, if the coefficient estimate of γ_1 is significantly positive and the coefficient estimate of γ_2 is significantly negative, the relationship is concave/inverse-U-shaped.

[52] See, for example, Stock and Watson (2003).

The Endogeneity of Ownership

It can be argued that there exists an endogenous relationship between blockholder ownership and firm value. Namely, it can either be the case that greater ownership by individuals/insiders leads to higher firm value or that individuals/insiders hold greater stakes in firms of higher value. Ordinary least-squares (OLS) tests may be vulnerable to biases that arise from this potential endogeneity of ownership.

For endogeneity correction in traditional (linear) OLS specifications, the two-stage least squares (2SLS) approach is generally used. However, given our quadratic specification of the relationship between the largest individual blockholder's ownership and firm value, the 2SLS approach is likely to be inappropriate. Wooldridge (2002) notes that when a model is linear in parameters but nonlinear in endogenous variables the identification must be treated differently. In our case, if we were to regress ownership on our exogenous variables, saving the predicted values and squaring them, the second-stage regression would then regress Tobin's q (the measure of firm value) on predicted ownership, squared predicted ownership, and the instruments. This approach would lead to inconsistent estimates of the structural parameters. Thus, the use of traditional 2SLS when an endogenous variable is nonlinear leads to inconsistent estimators. Wooldridge (2002) calls the attempt to mimic 2SLS by substituting fitted values for endogenous variables inside a nonlinear (in our case, quadratic) function a "forbidden regression." He shows that both the conditional expectation of the linear projection and the linear projection operator do not pass through nonlinear functions and notes that the linear projection of the square is not equivalent to the square of the linear projection.

To circumvent this bias, we employ the nonlinear two-stage least squares (N2SLS) approach suggested by Kelejian (1971) and Amemiya (1974). In N2SLS, the estimation is completed by regressing the endogenous variables (ownership and squared ownership) on the instrument set and using the fitted values of each in the main regression. For example, let X_i be

the ownership of the largest blockholder, X^2_i be the squared ownership, and $\mathbf{Z_{i,j}}$ be the set of instruments. We run the following regressions:

$$X_i = \boldsymbol{\alpha}\mathbf{Z_{i,j}} + e_i$$

$$X^2{}_i = \boldsymbol{\beta}\mathbf{Z_{i,j}} + v_i$$

We obtain fitted values $\widehat{X}$ and $\widehat{X^2}$. We then run the following regression:

$$\mathrm{Y}_i = \delta_1(\hat{X}_i) + \delta_2(\widehat{X^2}_i) + \delta_k \mathbf{Z}_{i,j} + \partial_i.$$

Despite its name, the approach can be accomplished in one stage using modern econometric software.

For N2SLS, there is no specific approach for the choice of instrumental variables. However, Bowden and Turkington (1984) note that if the function being specified is nonlinear then using only linear forms of the exogenous variables will result in a poor specification. Bowden and Turkington (1984), Kelejian (1971), and Amemiya (1974) suggest the use of second- (or higher) order terms and cross-products, in addition to the linear terms of the exogenous variables, in order to better capture nonlinearities in the endogenous variables. Bowden and Turkington (1984) note that using even a quadratic-augmented instrument set greatly improves the performance of the N2SLS estimator. However, they also caution that too many instruments may cause a loss of degrees of freedom in finite samples.

Instrumental Variables

The main objective in any instrumental variable approach is to find instruments which are correlated with the endogenous regressor(s) while being uncorrelated with the error term. Thus, for our analysis, we need to find instruments which affect firm value only through their effect on the ownership of the largest individual blockholder. Gompers, Ishii, and Metrick (2010) note that corporate fraud has recently been observed in large firms that are major regional employers and thus they suggest that private benefits of control are greater when there are fewer large firms in the same region. Therefore, we would expect that a greater ownership stake would be more

attractive in firms that are among the major employers in a region. In addition, Gompers, Ishii, and Metrick (2010) note that the greater is the firm's proportion of all sales in the region, the greater will be the private benefits of control. Based on their arguments, we use the following instrumental variables: (1) *%Sales* – the percentage of all Compustat sales by firms located in the same metropolitan or micropolitan statistical area (MSA) as firm *i* in the year before firm *i*'s IPO, and (2) *Sales/Regional sales* – the ratio of a firm's sales to the sales of all firms in the same region. We also include the squares and cross products of all control variables and instruments as suggested by Davidson and McKinnon (2004) and Bowden and Turkington (1984).

Essay #3

Poisson Specification

One of the dependent variables of interest, *Covintensity*, is a count variable ranging in value from zero to six. Thus, it cannot take negative values and is bounded on the right at the value of 6. King (1988) notes that there are serious problems with using standard OLS on count data. First, OLS incorrectly assumes a linear relationship (which requires continuous data), potentially leading to the prediction of negative counts. Worse, though, is the implicit assumption that, for example, the difference between zero and one covenant is equivalent to the difference between five and six covenants. Second, King (1988) notes that using OLS regression on count data leads to inefficient and biased estimators, standard errors, and test statistics.

A potential remedy is to use a Poisson specification as count variables often follow a Poisson distribution.[53] The Poisson regression model is estimated using maximum likelihood. Gujarati (2011) notes that, for Poisson-distributed variables, the mean and variance are equal (also known as equidispersion). Gujarati (2011) indicates that when there is over- (under-) dispersion, where the variance exceeds (is less than) the mean, the estimates obtained under the Poisson regression model are still consistent but the standard errors are downward- (upward-)

[53] See, for example, Long (1997) and Gujarati (2011).

biased. The statistical significance of the estimated coefficients would therefore be overstated (understated). For the Covintensity measure, we observe the following statistics:

Variable	Obs	Mean	Std. Dev.	Min	Max
Covintensity	1,029	2.258	1.717	0	6

Thus, as the variance is greater than the mean, the *Covintensity* measure appears to be overdispersed.

To overcome an overdispersion problem, a Negative Binomial regression model may be employed. The Negative Binomial probability distribution does not assume the equivalence of the mean and variance. In fact, it assumes that the variance is always larger than the mean. Gujarati (2011) thus argues that for count data, the Negative Binomial probability distribution is more suitable than a Poisson probability distribution. We also employ this approach and obtain equivalent coefficient estimates to those under the Poisson estimation. The equivalence indicates that the conditional mean of *Covintensity* is equal to its conditional variance and the estimated parameter alpha is zero. In this case, the Negative Binomial model reduces to the Poisson model.[54] Thus, as the two methods lead to similar results, we report only the Poisson specifications.

Another consideration for count data is the potential for an excess number of zeros compared to the frequency predicted by the Poisson model. Mullahy (1997) indicates that the underprediction of zero counts by the Poisson model is the result of unobserved heterogeneity. As a potential remedy, Greene (2007) notes that zero-inflated models, which adjust the Poisson or Negative Binomial distributions toward the zero outcome, can be used. Zero-inflated models nest different probability models for the zero and nonzero counts.

[54] See, for example, Long (1997) and Cameron and Trivedi (1998).

We observe the following statistics for our *Covintensity* measure:

Covintensity	**Freq.**	**Percent**	**Cum.**
0	131	12.73	12.73
1	295	28.67	41.4
2	205	19.92	61.32
3	197	19.14	80.47
4	60	5.83	86.3
5	59	5.73	92.03
6	82	7.97	100
Total	**1,029**	**100**	

The Covintensity measure does not appear to have a large number of zeros relative to other counts, indicating the excess zeros problem may not be a significant issue for our sample. In additional robustness testing, we employ the zero-inflated Poisson procedure in the estimation of Eq. (1) for *Covintensity* and find the results to be qualitatively similar to those using the traditional Poisson specification. Thus, excess zeros do not appear to be a problem for our data.

Joint Estimation of Covenants and Yields

As the covenants on a loan and its yield are determined jointly based primarily on characteristics of the borrowing firm, covenant intensity and loan yields are likely to be endogenous. In order to account for this joint determination, we use a three-stage least squares (3SLS) estimation approach for simultaneous equations introduced in Zellner and Theil (1962).[55] The 3SLS approach is a combination of traditional two-stage least squares and the Seemingly Unrelated Regression (SUR) method developed by Zellner (1962). The former deals with the dependent regressors (as described above) while the latter deals with the correlation of errors across equations. When error terms are correlated across the equations, joint estimation leads to greater precision in regression coefficients. Thus, the main objective of the SUR method is to

[55] See also Theil (1971).

increase parameter estimation precision in a given regression model by using the sample information of other regressions. Zellner and Theil (1962) developed the three-stage least squares estimator by jointly estimating the structural model coefficients, taking into account error-term correlation in the system equations. Residuals from the 2SLS method are used to estimate the covariance matrix required for 3SLS.

FIGURES

Figure 1 – The influence of the second individual blockholder
This figure plots the estimated relationship between the ownership of the largest individual blockholder and firm value, as proxied by Tobin's q. It also plots that relationship in the presence of a second individual blockholder. It uses the parameters in column (1) of Table 5 and holds the control variables fixed at zero.

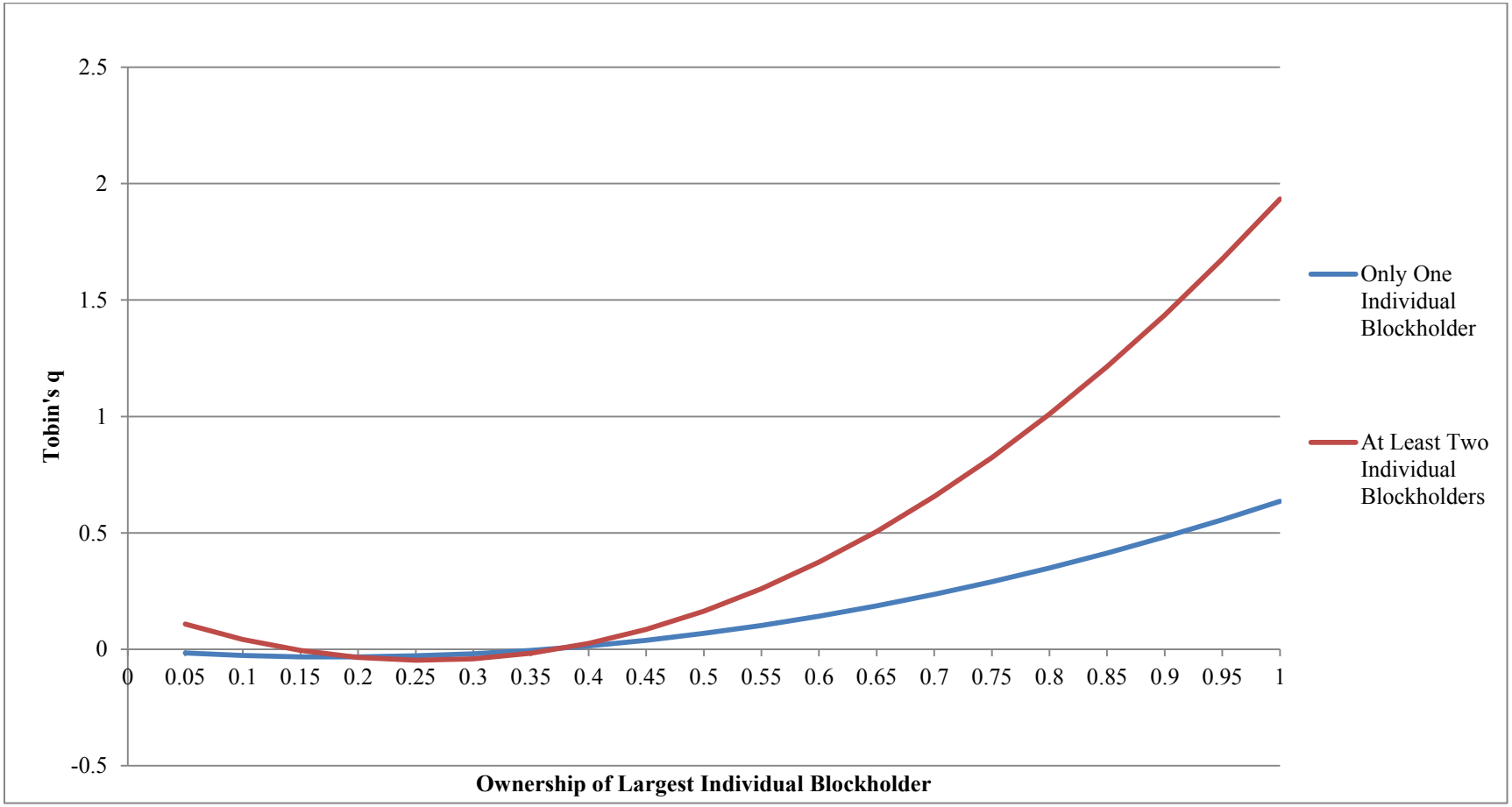


Figure 2 – The influence of the identity of the largest individual blockholder
This figure plots the estimated relationship between the ownership of the largest individual blockholder and firm value, as proxied by Tobin's q, for each of the cases where the largest blockholder is and is not the founder. The figure also plots the basic relationship in the presence of a second individual blockholder for both founder and non-founder firms. It uses the parameters in column (1) of Table 7 and holds the control variables fixed at zero.

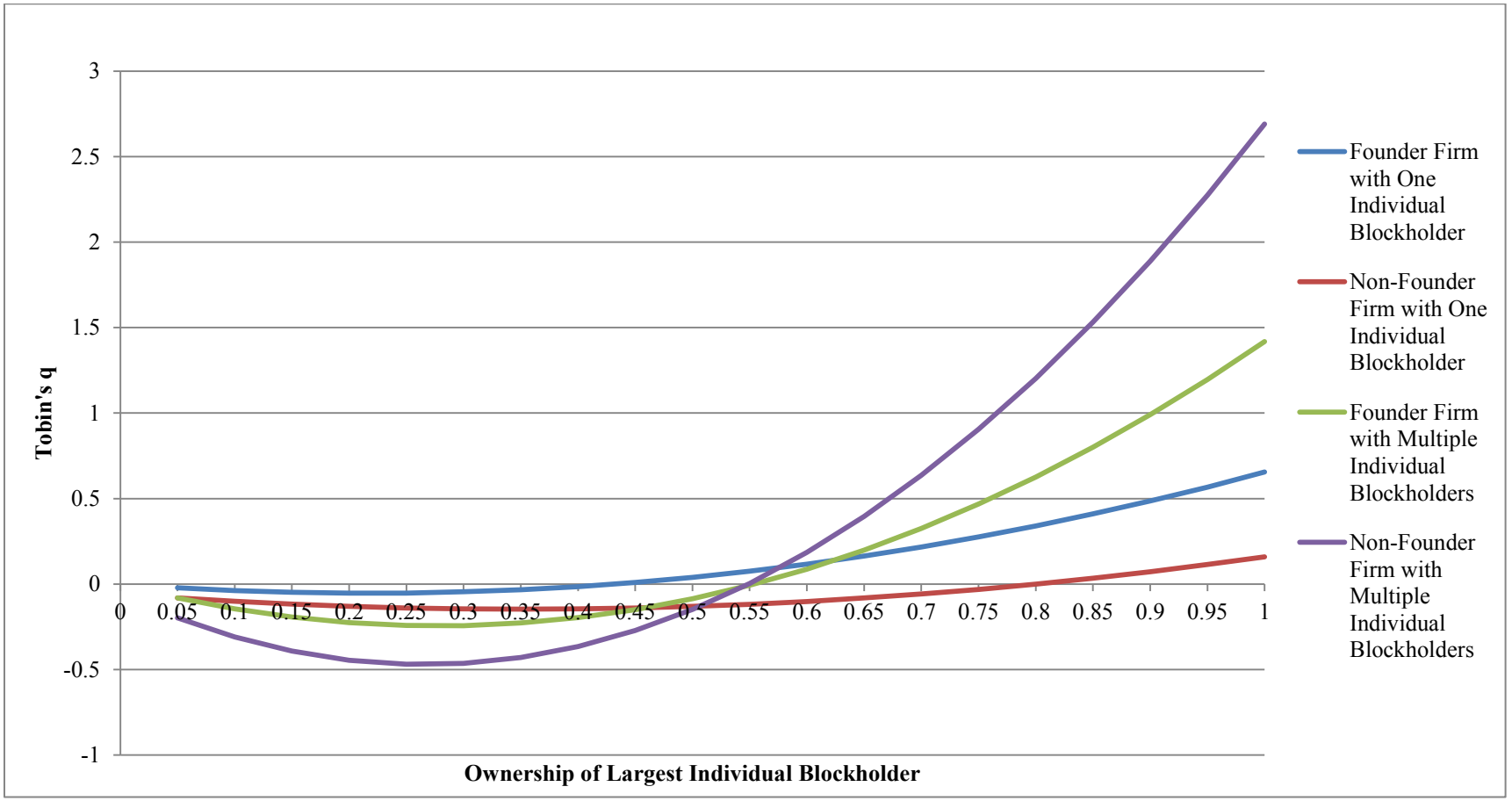


Figure 3 – The influence of the identity of the second individual blockholder
This figure plots the estimated relationship between the ownership of the largest individual blockholder and firm value, as proxied by Tobin's q, for each of the cases where the second individual blockholder is and is not the founder. It uses the parameters in column (2) of Table 7 and holds the control variables fixed at zero.

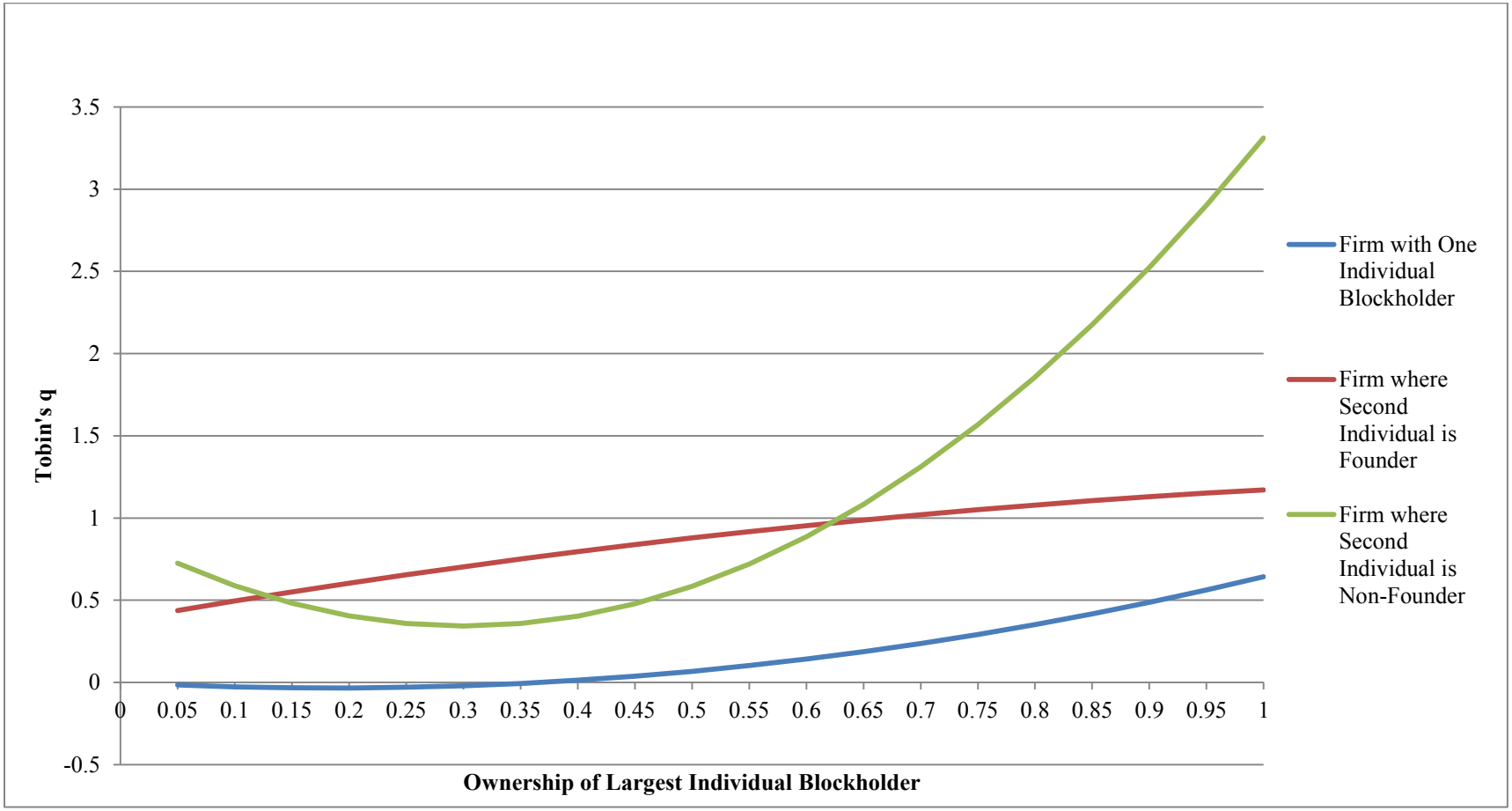
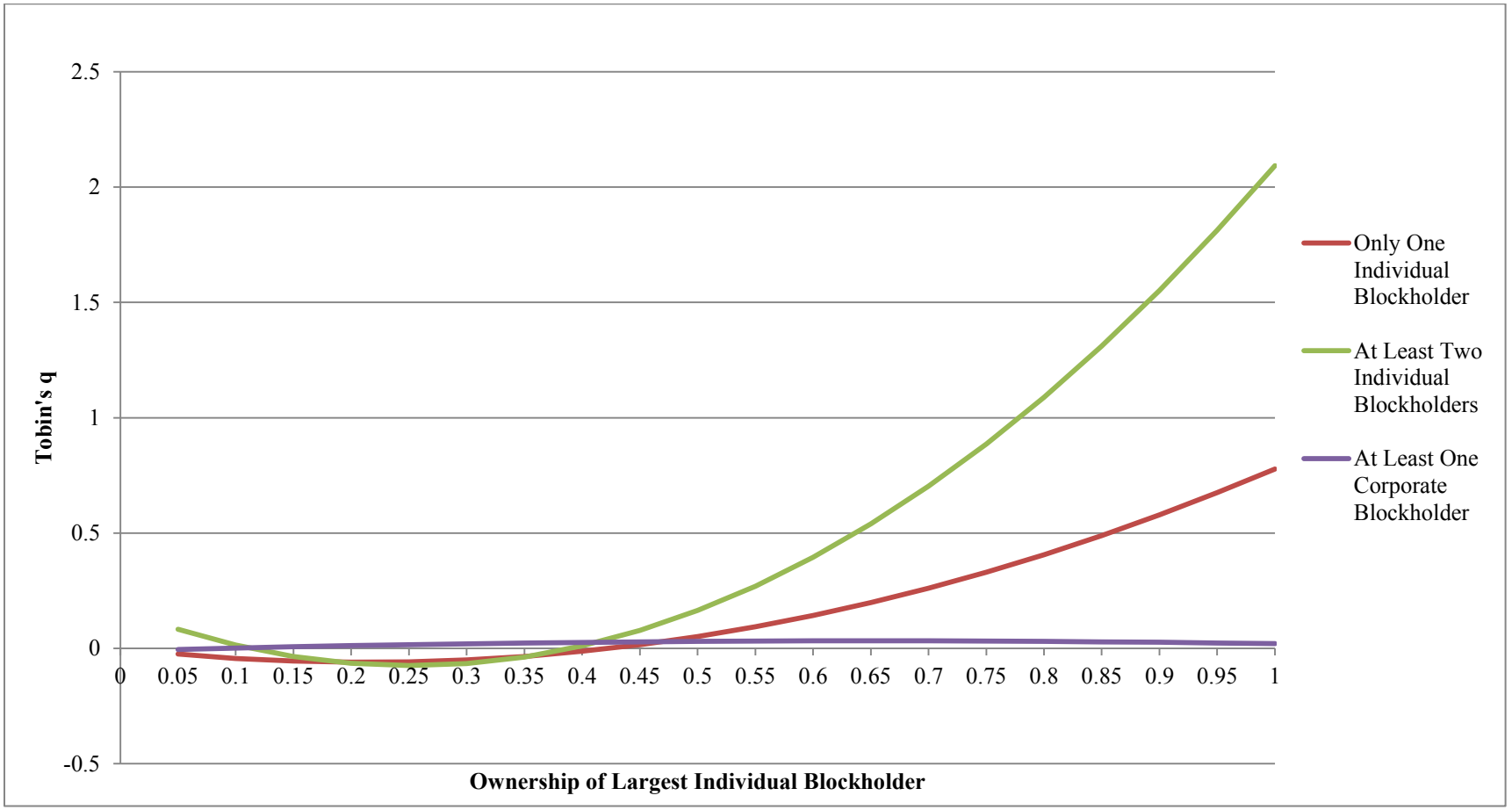


Figure 4 – The influence of a corporate blockholder
This figure plots the estimated relationship between the ownership of the largest individual blockholder and firm value, as proxied by Tobin's q, for the case where there is a second individual blockholder. The figure also plots the basic relationship in the presence of a corporate blockholder. It uses the parameters in column (1) of Table 8 and holds the control variables fixed at zero.



TABLES

Table 1 – Sample distribution by IPO and post-IPO years

Panel A: Sample distribution by the IPO year

	1993	***1994***	***1995***	***1996***	***Total***
Common stock issues	615	516	539	792	2,462
Less					
units	91	108	86	122	407
carve-outs	98	69	40	64	271
LBOs	40	12	11	15	78
financial	48	29	31	62	170
foreign	10	4	19	27	60
CRSP/Compustat not available	3	4	1	4	12
unclear 1st day of trading	0	2	0	1	3
roll-ups	0	0	2	11	13
Final sample	**325**	**288**	**349**	**486**	**1,448**

Panel B: Distribution of firm-years with available ownership and accounting data by post-IPO year

	Post-IPO year												
IPO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	*Total*
1,442[56]	1,339	1,200	1,070	920	797	699	629	569	524	455	402	356	10,402

[56] Six of the 1,448 firms disappear from the sample before the first proxy date after IPO. No data is available for these firms.

Table 2 – Presence and ownership of individual and corporate blockholders
The table reports presence as well as ownership of the largest and second individual blockholders as well as that of the largest corporate blockholder. The sample is split by the number of blocks present in the firm. Ownership is the percentage of voting rights controlled by the blockholder (as reported in the prospectuses and the subsequent proxy statements). Median ownership is reported in parentheses.

		Largest individual			*Second individual*			*Corporate*
	N	Overall sample	Founder	Non-Founder	Overall sample	Founder	Non-founder	
No blocks	231 [2.22%]	0	0	0	0	0	0	0
One individual block	1,208 [11.61%]	0.494 (0.524)	0.540 (0.578) [916]	0.350 (0.271) [292]	0	0	0	0
Two or more individual blocks	1,480 [14.23%]	0.285 (0.242)	0.324 (0.280) [887]	0.227 (0.199) [593]	0.134 (0.120)	0.128 (0.109) [980]	0.147 (0.135) [500]	0
One or more corporate blocks	3,397 [32.66%]	0	0	0	0	0	0	0.181 (0.131)
One individual and one or more corporate blocks	2,922 [28.09%]	0.224 (0.151)	0.258 (0.200) [1,919]	0.160 (0.102) [1,003]	0	0	0	0.141 (0.107)
Two or more individual and one or more corporate blocks	1,164 [11.19%]	0.207 (0.171)	0.224 (0.185) [737]	0.180 (0.145) [427]	0.116 (0.093)	0.107 (0.085) [688]	0.128 (0.110) [476]	0.130 (0.102)
TOTAL	**10,402**	**0.283 (0.210) [6,774]**	**0.323 (0.256) [4,459]**	**0.205 (0.144) [2,315]**	**0.126 (0.107) [2,644]**	**0.119 (0.097) [1,668]**	**0.138 (0.124) [976]**	**0.157 (0.117) [7,483]**

Table 3 – Summary statistics
All variables are as described in Appendix 1. *Leverage* is winsorized at 1. *Tobin's q* is winsorized at 5. *R&D* is winsorized at 2. *Sales growth* is winsorized at the 99th percentile. Panel A presents the summary statistics for the overall sample and Panel B provides summary statistics by ownership structure classification. Differences in mean between ownership structure types are reported for each variable, along with the significance of the two-sample t-tests for mean. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Mean	**Median**
Tobin's q	2.271	1.808
Largest individual own	0.184	0.106
Largest individual wedge	0.016	0
Ln(Firm size)	4.608	4.522
Leverage	0.180	0.065
Sales growth	0.365	0.168
Delaware	0.582	1
Diversification	0.883	1
R&D	0.124	0.004
Second	0.254	0
Corporate	0.719	1
VC backing	0.477	0
NonFounder	0.571	1
2NonFounder	0.906	1

Panel B – Summary statistics by ownership structure classification

		Firm size	Leverage	Sales growth	Delaware	Diversification	R&D
1	No blocks	4.732	0.175	1.333	0.597	0.861	0.153
2	One or more corporate blocks	4.873	0.175	1.361	0.710	0.858	0.196
3	One individual block	4.727	0.205	1.339	0.462	0.909	0.068
4	One individual and one or more corporate blocks	4.771	0.193	1.369	0.564	0.881	0.102
5	Two or more individual blocks	3.842	0.156	1.409	0.455	0.911	0.060
6	Two or more individual and one or more corporate blocks	4.250	0.164	1.349	0.540	0.899	0.107
	Differences						
	1 less 2	-0.141	0.000	-0.028	-0.112***	0.003**	-0.043**
	1 less 3	0.005	-0.030**	-0.007	0.135***	-0.047***	0.085***
	1 less 4	-0.039	-0.018	-0.036	0.033	-0.020	0.051***
	1 less 5	0.890	0.019**	-0.076	0.143***	-0.050***	0.094***
	1 less 6	0.482	0.011*	-0.016	0.057	-0.037	0.046***
	2 less 3	0.145	-0.030***	0.021	0.248***	-0.051***	0.128***
	2 less 4	0.102	-0.018***	-0.008	0.146***	-0.023***	0.094***
	2 less 5	1.030	0.019***	-0.048*	0.255***	-0.053***	0.136***
	2 less 6	0.623	0.011***	0.012	0.169***	-0.040***	0.089***
	3 less 4	-0.044	0.012***	-0.029	-0.102***	0.028***	-0.034***
	3 less 5	0.885	0.049	-0.069*	0.007	-0.003	0.008
	3 less 6	0.478	0.041	-0.009	-0.078***	0.010***	-0.039***
	4 less 5	0.929	0.037***	-0.040	0.109***	-0.030***	0.042***
	4 less 6	0.521	0.029	0.020	0.024	-0.017	-0.005
	5 less 6	-0.407	-0.008	0.060*	-0.086***	0.013***	-0.047***

Table 4 – The influence of the largest individual blockholder on firm value

The dependent variable is *Tobin's q*, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. All independent variables are as defined in Appendix 1. The dependent variable is winsorized at 5. Regression results reported in column 2 are estimated using non-linear two-stage least squares (N2SLS). The instruments include the squares and cross products of exogenous variables and the following instruments: *Sales / Regional sales* and *%Sales.* Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	**(2)**
	OLS	N2SLS
Largest individual own	-0.349	-5.487
	(2.19)**	(5.90)***
Largest individual own^2	1.054	6.115
	(4.61)***	(4.36)***
Largest individual wedge	-0.731	1.133
	(4.57)***	(1.28)
Control variables		
Ln(Firm size)	-0.043	-0.090
	(4.11)***	(7.19)***
Leverage	-0.721	-0.788
	(10.50)***	(12.71)***
Sales growth	0.239	0.245
	(14.03)***	(15.50)***
Delaware	0.070	-0.043
	(2.80)***	(1.39)
Diversification	-0.190	-0.161
	(4.26)***	(3.55)***
R&D	0.268	0.085
	(4.07)***	(1.26)
Year dummies	YES	YES
Industry dummies	YES	YES
Constant	2.027	2.424
	(5.60)***	(13.17)***
Observations	9929	9854
Adjusted R-squared	0.24	

Table 5 – The influence of an additional individual blockholder on the ownership-firm value relationship

The dependent variable is *Tobin's q*, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. All independent variables are as defined in Appendix 1. The dependent variable is winsorized at 5. Regression results reported in column 2 are estimated using non-linear two-stage least squares (N2SLS). The instruments include the squares and cross products of exogenous variables and the following instruments: *Sales / Regional sales* and *%Sales*. Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	**(2)**
	OLS	N2SLS
Largest individual own	-0.362	-4.511
	(2.01)**	(3.96)***
Largest individual own^2	0.998	5.035
	(3.92)***	(3.18)***
Largest individual wedge	-0.705	1.129
	(4.39)***	(1.24)
Largest individual own*Second	-1.492	-9.132
	(2.46)**	(1.86)*
Largest individual own^2*Second	2.598	12.152
	(3.05)***	(1.63)
Second	0.192	1.127
	(2.20)**	(1.65)*
Control variables		
Ln(Firm size)	-0.041	-0.090
	(3.82)***	(5.68)***
Leverage	-0.719	-0.777
	(10.47)***	(12.39)***
Sales growth	0.239	0.246
	(14.04)***	(15.42)***
Delaware	0.068	-0.037
	(2.73)***	(1.18)
Diversification	-0.187	-0.154
	(4.19)***	(3.27)***
R&D	0.271	0.101
	(4.11)***	(1.46)
Year dummies	YES	YES
Industry dummies	YES	YES
Constant	1.621	2.403
	(13.73)***	(12.09)***
Observations	9929	9854
Adjusted R-squared	0.24	

Table 6 – Robustness tests

The dependent variable is *Tobin's q* and all independent variables are as defined in Appendix 1. Regression results reported in column 2 are estimated using ownership of the largest insider blockholder and the interactions thereof. Heteroskedasticity-adjusted standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	OLS	OLS
Largest individual own	-0.606	-0.362
	(3.50)***	(2.01)**
Largest individual own^2	1.434	0.998
	(5.88)***	(3.92)***
Largest individual wedge	-0.829	-0.705
	(5.11)***	(4.39)***
Largest individual own*VC	1.125	
	(3.40)***	
Largest individual own^2*VC	-1.208	
	(1.75)*	
VC	0.002	
	(0.05)	
Largest insider own*Second		-1.492
		(2.46)**
Largest insider own^2*Second		2.598
		(3.05)***
Second		0.192
		(2.20)**
Control variables		
Ln(Firm size)	-0.046	-0.041
	(4.35)***	(3.82)***
Leverage	-0.723	-0.719
	(10.49)***	(10.47)***
Sales growth	0.239	0.239
	(14.03)***	(14.04)***
Delaware	0.065	0.068
	(2.58)***	(2.73)***
Diversification	-0.188	-0.187
	(4.21)***	(4.19)***
R&D	0.257	0.271
	(3.91)***	(4.11)***
Year dummies	YES	YES
Industry dummies	YES	YES
Constant	2.047	2.009
	(5.67)***	(5.56)***
Observations	9929	9929
Adjusted R-squared	0.24	0.24

Table 7 – The influence of the individual blockholder's identity on the ownership-firm value relationship

The dependent variable is *Tobin's q* and all independent variables are as defined in Appendix 1. Heteroskedasticity-adjusted standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	Largest Individual	*Second Individual*
Largest individual own	-0.497	-0.373
	(1.55)	(2.07)**
Largest individual own^2	1.152	1.016
	(3.13)***	(3.99)***
Largest individual wedge	-0.718	-0.729
	(4.53)***	(4.52)***
Largest individual own*NonFounder	-0.014	
	(0.03)	
Largest individual own^2*NonFounder	-0.424	
	(0.68)	
Largest individual own*Second	-1.267	1.582
	(2.05)**	(1.69)*
Largest individual own^2*Second	2.031	-1.432
	(2.36)**	(1.12)
Largest individual own*Second*NonFounder	-1.336	
	(2.36)**	
Largest individual own^2*Second*NonFounder	3.103	
	(2.58)***	
Second	0.223	0.378
	(2.41)**	(3.43)***
NonFamily	-0.057	
	(0.96)	
Largest individual own*Second_NonFounder		-4.859
		(4.17)***
Largest individual own^2*Second_NonFounder		6.485
		(4.04)***
Second_NonFounder		0.514
		(3.00)***
Control variables		
Ln(Firm size)	-0.042	-0.041
	(3.94)***	(3.82)***
Leverage	-0.714	-0.720
	(10.38)***	(10.52)***
Sales growth	0.239	0.241
	(14.06)***	(14.11)***
Delaware	0.072	0.064
	(2.87)***	(2.56)**
Diversification	-0.190	-0.189
	(4.25)***	(4.24)***
R&D	0.262	0.264
	(3.98)***	(4.01)***
Year dummies	YES	YES
Industry dummies	YES	YES
Constant	2.072	1.114
	(5.67)***	(5.31)***
Observations	9929	9929
Adjusted R-squared	0.24	0.24

Table 8 – The influence of corporate blockholder on the ownership-firm value relationship
The dependent variable is *Tobin's q*, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. All independent variables are as defined in Appendix 1. Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)
Largest individual own	-0.573
	(1.76)*
Largest individual own^2	1.351
	(3.60)***
Largest individual wedge	-0.754
	(4.70)***
Largest individual own*Second	-1.375
	(2.22)**
Largest individual own^2*Second	2.520
	(2.94)***
Largest individual own*Corporate	0.706
	(1.81)*
Largest individual own^2*Corporate	-1.453
	(2.74)***
Corporate	-0.011
	(0.19)
Second	0.170
	(1.88)*
Control variables	
Ln(Firm size)	-0.041
	(3.87)***
Leverage	-0.718
	(10.46)***
Sales growth	0.239
	(13.99)***
Delaware	0.068
	(2.72)***
Diversification	-0.188
	(4.21)***
R&D	0.272
	(4.12)***
Year dummies	YES
Industry dummies	YES
Constant	2.018
	(5.58)***
Observations	9929
Adjusted R-squared	0.24

Table 9 – Sample selection and distribution by year

Panel A – Selection of the newly public firm sample

	1993	***1994***	***1995***	***1996***	***Total***
Common stock issues	615	516	539	792	2,462
Less					
Units	91	108	86	122	407
carve-outs	98	69	40	64	271
LBOs	40	12	11	15	78
financial	48	29	31	62	170
foreign	10	4	19	27	60
CRSP/Compustat not available	3	4	1	4	12
unclear 1st day of trading	0	2	0	1	3
roll-ups	0	0	2	11	13
Final IPO sample	**325**	**288**	**349**	**486**	**1,448**

Panel B – Distribution of firm-years with available ownership data by post-IPO year

	Post-IPO year												
IPO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	*Total*
1,442[57]	1,339	1,200	1,070	920	797	699	629	569	524	455	402	356	10,402

[57] Six of the 1,448 firms disappear from the sample before the first proxy date after IPO. No data is available for these firms.

Table 10 – Presence of firm insider and outsider blockholders, by corporate presence
The table reports the presence of firm insiders and outsiders, by corporate presence. Percentage of sample is reported in square brackets.

	No Corporate Presence	Corporate Presence
No insider or outsider blocks	231 [2.22%]	2,999 [28.83%]
Insider blocks only	2,104 [20.23%]	3,947 [37.94%]
Outsider blocks only	29 [0.28%]	179 [1.72%]
Both insider & outsider blocks	392 [3.77%]	521 [5.01%]
Total	**10,402**	

Table 11 – Summary statistics

The table presents the summary statistics for the dependent, independent, and control variables used. Firm size is the total value of assets in millions and firm age is the number of years since CRSP listing. All other variables are as described in Appendix 2. Leverage is winsorized at 1, R&D is winsorized at 2, and Tobin's q is winsorized at 5. Panel A presents the summary statistics for the overall sample and Panel B provides summary statistics by ownership structure classification. Differences in mean between ownership structure types are reported for each variable, along with the significance of the two-sample t-tests for mean. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Variable	**Mean**	**Median**
Tobin's q	2.271	1.808
Insider ownership	0.223	0.133
Insider wedge	0.018	0
Outsider block	0.108	0
Corporate block	0.735	1
Ln(Firm size)	4.608	4.522
Leverage	0.180	0.065
Sales growth	0.365	0.168
Delaware	0.582	1
Diversification	0.883	1
R&D	0.124	0.004

Panel B – Summary statistics by ownership structure classification

		Firm size	Leverage	Sales growth	Delaware	Diversif.	R&D
1	No blocks	4.732	0.175	1.333	0.597	0.861	0.153
2	Only insider blocks	4.332	0.181	1.368	0.447	0.920	0.065
3	Only outsider blocks	4.063	0.113	1.369	0.483	0.862	0.134
4	Only insider and outsider blocks	3.831	0.173	1.433	0.508	0.888	0.040
5	Only corporate blocks	4.932	0.178	1.343	0.706	0.856	0.199
6	Only insider and corporate blocks	4.666	0.185	1.376	0.570	0.890	0.102
7	Only outsider and corporate blocks	4.289	0.182	1.432	0.659	0.826	0.236
8	All three blockholder types	4.082	0.153	1.340	0.543	0.854	0.118
	Differences						
	1 less 2	0.400***	-0.006	-0.035	0.150***	-0.058***	0.088***
	1 less 3	0.669*	0.062	-0.037	0.115	-0.001	0.020
	1 less 4	0.901***	0.002	-0.100	0.090**	-0.026	0.113***
	1 less 5	-0.200*	-0.003	-0.010	-0.108***	0.006	-0.045**
	1 less 6	0.066	-0.010	-0.043	0.028	-0.029	0.051***
	1 less 7	0.443***	-0.006	-0.099	-0.062	0.036	-0.083***
	1 less 8	0.650***	0.022	-0.008	0.054	0.007	0.035*
	2 less 3	0.269	0.068	-0.001	-0.036	0.058	-0.069**
	2 less 4	0.501***	0.008	-0.065	-0.060**	0.032**	0.025***
	2 less 5	-0.600***	0.003	0.025	-0.258***	0.064***	-0.134***
	2 less 6	-0.334***	-0.005	-0.008	-0.122***	0.029***	-0.037***
	2 less 7	0.043	-0.001	-0.064	-0.212***	0.094***	-0.171***
	2 less 8	0.250***	0.028**	0.028	-0.096***	0.065***	-0.053***
	3 less 4	0.232	-0.060	-0.064	-0.025	-0.026	0.094***
	3 less 5	-0.869***	-0.065	0.027	-0.223***	0.006	-0.065
	3 less 6	-0.603**	-0.072	-0.007	-0.087	-0.028	0.032
	3 less 7	-0.226	-0.068	-0.063	-0.176*	0.036	-0.102
	3 less 8	-0.019	-0.040	0.029	-0.060	0.008	0.015
	4 less 5	-1.101***	-0.005	0.090*	-0.198***	0.032*	-0.159***
	4 less 6	-0.835***	-0.013	0.057	-0.062**	-0.003	-0.062***
	4 less 7	-0.459***	-0.009	0.001	-0.152***	0.062**	-0.196***
	4 less 8	-0.251**	0.020	0.093	-0.036	0.034	-0.079***
	5 less 6	0.267***	-0.008	-0.034	0.136***	-0.035***	0.097***
	5 less 7	0.643***	-0.004	-0.089	0.046	0.030	-0.037
	5 less 8	0.850***	0.025**	0.002	0.162***	0.002	0.080***
	6 less 7	0.376***	0.004	-0.056	-0.090**	0.065***	-0.134***
	6 less 8	0.583***	0.032***	0.036	0.026	0.036**	-0.017
	7 less 8	0.207	0.028	0.091	0.116***	-0.028	0.117***

Table 12 – The relationship between insider ownership and firm value

The dependent variable is Tobin's q, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. Tobin's q is winsorized at 5. All independent variables are as defined in Appendix 2. Regression results reported in column 2 are estimated using non-linear two-stage least squares (N2SLS). The instruments for the ownership of the largest inside blockholder are Sales/Regional sales %Sales, as defined in Appendix 2. Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	OLS	N2SLS
Insider ownership	-0.531	-4.977
	(3.42)***	(5.42)***
Insider ownership squared	1.131	4.877
	(5.17)***	(3.61)***
Insider wedge	-0.600	1.564
	(4.03)***	(1.97)**
Control variables		
Ln(Firm size)	-0.042	-0.096
	(3.97)***	(7.58)***
Leverage	-0.724	-0.797
	(10.51)***	(12.75)***
Sales growth	0.238	0.244
	(13.98)***	(15.47)***
Delaware	0.066	-0.053
	(2.65)***	(1.75)*
Diversification	-0.188	-0.163
	(4.21)***	(3.59)***
R&D	0.263	0.033
	(3.97)***	(0.48)
Year dummies	YES	YES
Industry dummies	YES	YES
Constant	1.644	2.508
	(13.95)***	(13.55)***
Observations	9921	9846
R-squared	0.24	

Table 13 – The influence of the presence of outsider and corporate blockholders on the ownership-firm value relationship

The dependent variable is Tobin's q, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. Tobin's q is winsorized at 5. All independent variables are as defined in Appendix 2. Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	OLS	N2SLS
Insider ownership	-0.906	-6.069
	(3.12)***	(2.89)***
Insider ownership squared	1.576	6.968
	(4.72)***	(2.92)***
Insider wedge	-0.625	0.886
	(4.19)***	(0.89)
Insider ownership*Outsider	-1.803	-15.055
	(3.25)***	(2.97)***
Insider ownership squared*Outsider	3.004	27.97
	(3.48)***	(3.71)***
Insider ownership*Corporate	1.040	5.444
	(2.94)***	(2.19)**
Insider ownership squared*Corporate	-1.721	-12.767
	(3.57)***	(-3.65)***
Outsider	0.125	-0.249
	(1.77)*	(0.38)
Corporate	-0.081	-0.242
	(1.38)	(0.54)
Control variables		
Ln(Firm size)	-0.043	-0.135
	(4.02)***	(6.89)***
Leverage	-0.715	-0.693
	(10.39)***	(9.45)***
Sales growth	0.237	0.248
	(13.93)***	(13.35)***
Delaware	0.068	-0.048
	(2.71)***	(1.32)
Diversification	-0.188	-0.176
	(4.20)***	(3.25)***
R&D	0.265	-0.002
	(4.00)***	(0.03)
Year dummies	YES	YES
Industry dummies	YES	YES
Constant	1.697	3.055
	(13.24)***	(6.94)***
Observations	9921	9846
R-squared	0.24	

Table 14 – Subsample analysis of the relationship between insider ownership and firm value, by blockholder presence classification

The dependent variable is Tobin's q, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. Tobin's q is winsorized at 5. Type A firms have no corporate and no outsider blockholders. Type B firms have corporate blockholders but no outsider blockholders. Type C firms have outsider blockholders but no corporate blockholders. Type D firms have both corporate and outsider blockholders. All independent variables are as defined in Appendix 2. Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Type A	***Type B***	***Type C***	***Type D***
	(1)	(2)	(3)	(4)
Insider ownership	-0.584	0.067	-4.286	-1.295
	(1.78)*	(0.28)	(3.48)***	(1.48)
Insider ownership squared	1.323	-0.101	6.613	2.061
	(3.57)***	(0.25)	(4.14)***	(1.17)
Insider wedge	-0.605	-0.716	1.243	-0.199
	(2.82)***	(2.87)***	(0.87)	(0.20)
Control variables				
Ln(Firm size)	-0.018	-0.039	-0.152	-0.119
	(0.87)	(2.88)***	(2.33)**	(2.64)***
Leverage	-1.176	-0.548	-0.841	-0.985
	(7.88)***	(6.55)***	(1.75)*	(4.52)***
Sales growth	0.290	0.237	0.066	0.183
	(8.31)***	(11.08)***	(0.75)	(3.05)***
Delaware	0.090	0.064	0.130	-0.017
	(1.83)*	(2.01)**	(0.86)	(0.16)
Diversification	-0.067	-0.234	-0.028	-0.191
	(0.70)	(4.28)***	(0.11)	(1.21)
R&D	0.927	0.165	1.632	0.188
	(4.22)***	(2.29)**	(2.82)***	(0.69)
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Constant	1.576	1.649	0.940	2.623
	(3.54)***	(12.09)***	(1.67)*	(7.11)***
Observations	2249	6607	405	660
R-squared	0.28	0.23	0.32	0.29

Table 15 – Subsample analysis of the relationship between insider ownership and firm value, by seasoning and blockholder presence classification
The dependent variable is Tobin's q, defined as the ratio of the book value of assets plus the market value of equity minus the book value of equity to the book value of assets. Tobin's q is winsorized at 5. Younger (older) firms are those occurring within (after) seven years following their IPO. All independent variables are as defined in Appendix 2. Heteroskedasticity-adjusted (White) standard errors are used in calculation of t-statistics that are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Younger Type A	***Older Type A***	***Younger Type B***	***Older Type B***	***Younger Type C***	***Older Type C***	***Younger Type D***	***Older Type D***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Insider ownership	-0.154	-1.361	-0.264	0.907	-4.339	1.255	-1.866	0.272
	(0.39)	(2.04)**	(0.91)	(2.31)**	(3.03)***	(0.26)	(1.77)*	(0.14)
Insider own. squared	1.030	1.273	0.663	-2.075	6.188	1.146	3.052	-1.229
	(2.37)**	(1.67)*	(1.35)	(3.14)***	(3.31)***	(0.18)	(1.58)	(0.27)
Insider wedge	-0.593	0.142	-0.801	-0.270	3.049	-1.790	-1.826	1.155
	(2.24)**	(0.39)	(2.33)**	(0.87)	(1.78)*	(0.43)	(1.28)	(0.61)
Control variables								
Ln(Firm size)	-0.013	-0.051	-0.026	-0.061	-0.099	-0.213	-0.031	-0.249
	(0.48)	(1.40)	(1.41)	(3.13)***	(1.26)	(1.30)	(0.50)	(4.06)***
Leverage	-1.537	-0.205	-0.742	-0.120	-1.419	2.795	-1.264	-0.610
	(8.33)***	(0.74)	(6.61)***	(0.96)	(2.44)**	(2.55)**	(4.75)***	(1.70)*
Sales growth	0.278	0.361	0.231	0.255	0.057	0.413	0.171	0.085
	(7.70)***	(3.57)***	(10.09)***	(4.38)***	(0.58)	(2.44)**	(2.59)***	(0.86)
Delaware	0.091	0.128	0.094	0.024	0.152	-0.403	0.029	0.038
	(1.61)	(1.18)	(2.32)**	(0.49)	(0.90)	(0.68)	(0.22)	(0.21)
Diversification	-0.095	-0.081	-0.184	-0.237	-0.077	-1.351	-0.195	-0.092
	(0.66)	(0.62)	(2.23)**	(3.21)***	(0.22)	(1.79)*	(0.76)	(0.40)
R&D	0.848	1.399	0.187	0.020	1.523	8.671	0.335	-0.279
	(4.12)***	(1.49)	(2.20)**	(0.16)	(2.78)***	(2.70)***	(1.04)	(0.64)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	2.931	1.300	0.708	3.314	2.513	1.167	1.430	3.078
	(4.73)***	(3.37)***	(6.53)***	(6.44)***	(3.81)***	(1.29)	(3.91)***	(6.12)***
Observations	1810	439	4528	2079	326	79	449	211
R-squared	0.29	0.28	0.24	0.20	0.31	0.56	0.25	0.55

Table 16 – Review of the insider ownership-firm value relationship literature

Panel A – Studies using quadratic and/or piecewise linear specifications of the ownership-firm value relationship

Authors	Journal, Year	Sample Period	Sample Selection	Ownership Type	Econometric Specifications	Predicted Relationship	Findings	Consistent
Agrawal & Knoeber	JFQA 1996	1987	Forbes 500	1. Officers and directors 2. Blockholders	1. Linear 2. Nonlinear	Concave	Concave relationship: linear term positive and significant, squared term negative but insignificant	Consistent
Anderson & Reeb	JF 2003	1992 - 1999	S&P 500	Family	1. Linear 2. Quadratic	Concave	Significant concave relationship	Consistent
Cho	JFE 1998	1991	Fortune 500	Officers and directors	Piecewise linear	Concave	Concave relationship: significant positive from 0-7%, significant negative from 7-38%, insignificant >38%	Consistent
Gompers, Ishii & Metrick	RFS 2010	1995 - 2002	SDC, CRSP, Compustat, IRRC	Officers and directors	1. Linear 2. Quadratic	Insignificant	1. Concave relationship using cash flow rights 2. Convex relationship using voting rights	Mostly consistent
Hermalin & Weisbach	FM 1991	1971, 1974, 1977, 1980, 1983	NYSE firms	Present and all former CEOs still on board of directors	Piecewise linear	Concave	Significant non-monotonic relationship between managerial ownership and q: positive (0 to 1%), decreasing (1 to 5%), increasing (5 to 20%), decreasing beyond 20%	Consistent
Himmelberg, Hubbard & Palia	JFE 1999	1982 - 1984, tracked up to 1992	Random sample of Compustat firms	Officers and directors	1. Linear 2. Quadratic 3. Piecewise linear	Insignificant	1. Insignificant relationship 2. Some evidence of concave relationship (in instrumental variable regressions)	Mostly consistent
Holderness, Kroszner & Sheehan	JF 1999	1935, 1995	1935 sample: SEC Section 16 reports; 1995 sample: Compact Disclosure	Officers and directors	Piecewise linear	Insignificant	1935 sample: Concave relationship: significant positive from 0-5%, significant negative from 5-25%, insignificant >25% 1995 sample: Linear relationship: significant positive from 0-5%, insignificant from 5-25% and >25%	Mostly consistent

Authors	Journal, Year	Sample Period	Sample Selection	Ownership Type	Econometric Specifications	Predicted Relationship	Findings	Consistent
Kim & Lu	JFE 2011	1992 - 2006	Merge of Execucomp, CRSP, and Compustat	1. CEO 2. Officers and directors	Quadratic	Concave	1. Concave relationship using CEO ownership 2. No relationship using insider ownership	Consistent
McConnell & Servaes	JFE 1990	1976, 1986	NYSE or AMEX-listed Value Line Investment Survey firms	Officers and directors	1. Quadratic 2. Piecewise linear	Concave	1. Significant concave relationship 2. Piecewise results: significantly positive relationship for 0-5% range, insignificant for >5% range	Consistent
McConnell & Servaes	JFE 1995	1976, 1986, 1988	NYSE or AMEX-listed firms (in Value Line Investment Survey for 1976 and 1986 and in Compustat for 1988)	Officers and directors	Quadratic	Concave	Concave relationship	Consistent
Morck, Shleifer & Vishny	JFE 1988	1980	Fortune 500	Officers and directors	1. Quadratic 2. Piecewise linear	Concave	Concave relationship: significantly positive in 0-5% range, significantly negative in 5-25% range, increasing but insignificant above 25%	Consistent

Panel B – Studies using linear specifications of the ownership-firm value relationship

Authors	Journal, Year	Sample Period	Sample Selection	Ownership Type	Econometric Specifications	Predicted Relationship	Findings	Consistent
Anderson, Duru & Reeb	JFE 2009	2001 - 2003	Largest 2000 industrial firms in Compustat @ December 2001	Founder and heirs	Linear	Concave	Positive and significant relationship	Not comparable
Demsetz & Villalonga	JCF 2001	1976 - 1980	Random sample of Demsetz & Lehn (1985) sample	1. Officers and directors 2. Five largest shareholders	Linear	Concave	Positive and significant relationship	Not comparable
Fahlenbrach & Stulz	JFE 2009	1988 - 2005	Compact Disclosure	Officers and directors	Linear	Insignificant	Large increases in insider ownership lead to increases in firm value; no evidence that decreases in insider ownership decrease firm value	Not comparable
Mehran	JFE 1995	1979 - 1980	Randomly-selected manufacturing firms on Compustat	1. CEO 2. Officers and directors	Linear	Insignificant	1. Significantly positive relationship using CEO ownership 2. Insignificant positive relationship using insider ownership	Not comparable
Villalonga & Amit	JFE 2006	1994 - 2000	Fortune 500	Family	Linear	Concave	Positive and significant relationship	Not comparable
Villalonga & Amit	RFS 2009	1994 - 2000	Fortune 500	Family	Linear	Concave	Positive but insignificant relationship	Not comparable

Table 17 – Distribution by IPO year and sample selection

Panel A – Number of IPOs by year over sample period

IPO Sample by Year	
1993	325
1994	288
1995	349
1996	486
1997	321
1998	188
1999	368
2000	288
Total	**2,613**

Panel B – Matching the IPO sample to Loan Pricing Corporation's Dealscan database

Matching IPOs to Dealscan	
1993 - 2000 IPOs	2,613
No Dealscan match available	864
# of Matched Firms	**1,749**
Total Packages	**5,724**
Loan purpose is LBO/MBO or takeover	851
Currency is non-$USD	4
Not completed deal	86
	4,783
Total Loans	6,715
Covenants and loan yield unavailable	2,069
Loans by firms having loans only before or after IPO	2,133
Loans not closest to those occurring before or after IPO	1,484
Total Loan Sample	**1,029**

Table 18 – Covenant intensity distribution
The table reports the mean and median statistics for the covenant intensity measure and its components by loan year. *Covintensity* is the sum of the dummy variables indicating the presence of each of the following: two or more financial ratio covenants, asset sweep, debt sweep, equity sweep, dividend restriction, and secured covenants, respectively.

Loan Year		ratiodummy	asweep	dsweep	esweep	divrest	secured	Covintensity
1992 (N=20)	Mean	0.000	0.000	0.000	0.000	0.000	0.750	0.750
	Median	0.000	0.000	0.000	0.000	0.000	1.000	1.000
1993 (N=86)	Mean	0.023	0.000	0.000	0.000	0.012	0.814	0.849
	Median	0.000	0.000	0.000	0.000	0.000	1.000	1.000
1994 (N=125)	Mean	0.040	0.040	0.008	0.024	0.096	0.696	0.904
	Median	0.000	0.000	0.000	0.000	0.000	1.000	1.000
1995 (N=113)	Mean	0.389	0.248	0.097	0.124	0.558	0.770	2.186
	Median	0.000	0.000	0.000	0.000	1.000	1.000	2.000
1996 (N=156)	Mean	0.622	0.282	0.173	0.199	0.603	0.833	2.711
	Median	1.000	0.000	0.000	0.000	1.000	1.000	2.000
1997 (N=148)	Mean	0.669	0.189	0.101	0.101	0.574	0.784	2.419
	Median	1.000	0.000	0.000	0.000	1.000	1.000	2.000
1998 (N=147)	Mean	0.687	0.319	0.197	0.211	0.741	0.830	2.990
	Median	1.000	0.000	0.000	0.000	1.000	1.000	3.000
1999 (N=74)	Mean	0.689	0.311	0.216	0.257	0.824	0.851	3.149
	Median	1.000	0.000	0.000	0.000	1.000	1.000	3.000
2000 (N=62)	Mean	0.629	0.419	0.290	0.242	0.774	0.774	3.129
	Median	1.000	0.000	0.000	0.000	1.000	1.000	3.000
2001 (N=27)	Mean	0.481	0.111	0.074	0.038	0.667	0.741	2.111
	Median	0.000	0.000	0.000	0.000	1.000	1.000	2.000
2002 (N=22)	Mean	0.545	0.091	0.091	0.045	0.773	0.818	2.364
	Median	1.000	0.000	0.000	0.000	1.000	1.000	2.000
2003 (N=12)	Mean	0.583	0.000	0.000	0.000	0.583	1.000	2.167
	Median	1.000	0.000	0.000	0.000	1.000	1.000	3.000
2004 (N=9)	Mean	0.556	0.333	0.333	0.333	0.667	0.889	3.111
	Median	1.000	0.000	0.000	0.000	1.000	1.000	2.000
2005 (N=14)	Mean	0.571	0.429	0.286	0.143	0.571	0.786	2.790
	Median	1.000	0.000	0.000	0.000	1.000	1.000	2.000
2006 (N=8)	Mean	0.500	0.250	0.250	0.250	0.750	0.500	2.500
	Median	0.000	0.000	0.000	0.000	1.000	0.500	2.000
2007 (N=2)	Mean	1.000	0.000	0.000	0.000	0.500	0.000	1.500
	Median	1.000	0.000	0.000	0.000	0.500	0.000	1.500
Total (N=1029)	Mean	0.475	0.211	0.126	0.133	0.521	0.791	2.258
	Median	0.000	0.000	0.000	0.000	1.000	1.000	2.000

Table 19 – Distribution of transition types based on IPO year

The table reports the number of cases, by the year of IPO, for each loan transition type, where NN is non-syndicated to non-syndicated loans, NS is non-syndicated to syndicated loans, SN is syndicated to non-syndicated loans, and SS is syndicated to syndicated loans. The corresponding percentage of each type per IPO year is denoted in parentheses and the proportion of the sample in each IPO year and type is denoted in square brackets.

	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**Type Total**
Type NN	57 (40.4%)	58 (42.6%)	30 (32.6%)	24 (15.3%)	55 (32.7%)	14 (19.4%)	8 (9.4%)	2 (4.8%)	248 [27.8%]
Type NS	48 (34.0%)	38 (27.9%)	24 (26.1%)	38 (24.2%)	50 (29.8%)	22 (30.6%)	23 (27.1%)	12 (28.6%)	255 [28.5]
Type SN	2 (1.4%)	2 (1.5%)	6 (6.5%)	8 (5.1%)	4 (2.4%)	6 (8.3%)	0 (0%)	2 (4.8%)	30 [3.4%]
Type SS	34 (24.1)	38 (27.9%)	32 (34.8%)	87 (55.4%)	59 (35.1%)	30 (41.7%)	54 (63.5%)	26 (61.9%)	360 [40.3]
Yearly Total	141 [15.8%]	136 [15.2%]	92 [10.3%]	157 [17.6%]	168 [18.8%]	72 [8.1%]	85 [9.5%]	42 [4.7%]	893 [100%]

Table 20 – Summary statistics for overall sample

The table reports the summary statistics for the overall sample by pre-IPO and post-IPO. Covenant Intensity is the sum of the dummy variables indicating the presence of each of the following: two or more financial ratio covenants, asset sweep, debt sweep, equity sweep, dividend restriction, and secured covenants. Loan Yield is the yield in basis points on the firm's loan over the 6-month LIBOR. Assets, Sales, and Loan Amount are in $millions. Leverage is defined as the book value of long-term debt over assets and is winsorized at one. VC-Backed Dummy is a dummy variable equal to one if the firm has venture capitalist backing. Syndicated is a dummy variable equal to one if the loan is syndicated. Number of Lenders is a count variable of the number of lenders listed on a loan package. ZScore is the Altman z-score estimated for private firms and is winsorized at the 1% and 99% levels. Differences in sample mean and proportion are reported, along with the significance of the two-sample t-tests for mean and proportion differences. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	N		**Mean**			**Median**		
Variable	*Pre-IPO*	*Post-IPO*	*Pre-IPO*	*Post-IPO*	*Difference*	*Pre-IPO*	*Post-IPO*	*Difference*
Covenant Intensity	517	512	2.130	2.387	0.257**	2	2	1**
Loan Yield (bp)	517	512	272.784	223.196	-49.588***	275	225	-50***
Loan Amount ($ mil)	517	512	64.393	124.079	59.686***	15	38.350	23.350***
Loan Maturity (months)	495	484	37.008	40.756	3.748**	29	36	7***
Syndicated Dummy	492	506	0.424	0.706	0.282***	0	1	1***
Number of Lenders	508	472	1.841	2.940	1.099***	1	1	1***
VC-Backed Firm Dummy	517	512	0.544	0.531	-0.013	1	1	0
Assets ($ mil)	462	454	206.087	427.846	221.759***	55.514	150.178	94.664***
Leverage	517	512	0.349	0.354	0.005	0.236	0.284	0.048
ZScore	433	442	1.979	1.908	-0.071	1.992	1.814	-0.178

Table 21 – Firm and loan characteristics by transition type

Panel A of the table reports the summary statistics at the time of IPO by transition type, where NN is non-syndicated to non-syndicated loans, NS is non-syndicated to syndicated loans, SN is syndicated to non-syndicated loans, and SS is syndicated to syndicated loans. Assets are in $millions. Leverage is defined as the book value of long-term debt over assets and is winsorized at one. Firm age is in number of years since founding. Panel B reports the summary statistics for both pre- and post-IPO loan size and maturity by transition type. Loan size is the natural log of the loan amount in thousands. Maturity is the natural log of the number of months of the loan. Differences in sample mean and proportion are reported, along with the significance of the two-sample t-tests for mean and proportion differences. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A – Summary statistics of firm characteristics at IPO by type

	ASSETS			**LEVERAGE**			**FIRM AGE**		
	N	***Mean***	***Median***	***N***	***Mean***	***Median***	***N***	***Mean***	***Median***
Type NN	112	40.987	26.972	125	0.275	0.118	125	12.32	9
Type NS	115	73.347	43.938	125	0.287	0.191	125	13.704	8
Type SN	13	121.068	47.671	15	0.428	0.369	15	8.933	6
Type SS	156	481.648	179.611	178	0.471	0.431	178	21.596	11.5
Type Differences									
Type NN - Type NS		-32.360***	-16.966***		-0.012	-0.073		-1.384	1
Type NN - Type SN		-80.081***	-20.699*		-0.153*	-0.251		3.387	3
Type NN - Type SS		-440.661***	-152.639***		-0.196***	-0.313***		-9.276***	-2.5*
Type NS - Type SN		-47.721	-3.733		-0.141	-0.178		4.771	2
Type NS - Type SS		-408.301***	-135.673***		-0.184***	-0.240***		-7.892***	-3.5**
Type SN - Type SS		-360.580***	-131.940***		-0.043	-0.062		-12.663*	-5.5*

Panel B – Summary statistics for loan characteristics by type

			LoanSize		***Maturity***	
		N	***Mean***	***Median***	***Mean***	***Median***
Overall	Pre-IPO	517	16.774	16.588	3.298	3.397
	Post-IPO	512	17.544	17.488	3.465	3.584
	Difference		0.770***	0.900***	0.167***	0.217***
Type NN	Pre-IPO	125	15.805	15.751	2.964	2.639
	Post-IPO	127	16.189	16.123	3.073	3.178
	Difference		0.384***	0.463***	0.109	0.539
Type NS	Pre-IPO	125	16.125	16.213	3.069	3.178
	Post-IPO	130	17.427	17.399	3.439	3.584
	Difference		1.302***	1.186***	0.370***	0.405***
Type SN	Pre-IPO	15	16.751	16.973	3.483	3.611
	Post-IPO	15	16.349	16.213	2.769	2.485
	Difference		-0.402	-0.759	-0.714**	-1.126**
Type SS	Pre-IPO	178	18.202	18.118	3.822	4.06
	Post-IPO	184	18.583	18.562	3.768	4.078
	Difference		0.381***	0.534***	-0.054	0.017
Type Differences						
Type NN - Type NS	*Pre-IPO*		-0.320***	-0.463***	-0.105	-0.539
	Post-IPO		-1.238***	-1.186***	-0.366***	-0.405***
Type NN - Type SN	*Pre-IPO*		-0.946***	-1.222***	-0.519**	-0.971**
	Post-IPO		-0.160	0	0.304	0.693
Type NN - Type SS	*Pre-IPO*		-2.397***	-2.367***	-0.858***	-1.421***
	Post-IPO		-2.394***	-2.438***	-0.695***	-0.899***
Type NS - Type SN	*Pre-IPO*		-0.626**	-0.759**	-0.414*	-0.432*
	Post-IPO		1.078***	1.186***	0.670***	1.099***
Type NS - Type SS	*Pre-IPO*		-2.077***	-1.905***	-0.753***	-0.882***
	Post-IPO		-1.156***	-1.253***	-0.329***	-0.494***
Type SN - Type SS	*Pre-IPO*		-1.451***	-1.145***	-0.339**	-0.450*
	Post-IPO		-2.234***	-2.438***	-0.999***	-1.593***

Table 22 – Univariate comparisons of covenant intensity

The table reports pre- and post-IPO levels and changes in covenant intensity, *Covintensity*, defined as the sum of the dummy variables indicating the presence of each of the following: two or more financial ratio covenants, asset sweep, debt sweep, equity sweep, dividend restriction, and secured covenants. The table includes the overall sample and subsamples based on loan-type transition, where NN is non-syndicated to non-syndicated loans, NS is non-syndicated to syndicated loans, SN is syndicated to non-syndicated loans, and SS is syndicated to syndicated loans. ***, **, and * indicate significant differences at the 1%, 5%, and 10% levels, respectively.

		N	Mean	Median
Overall	Pre-IPO	517	2.130	2
	Post-IPO	512	2.387	2
	Difference		0.257**	0**
Type NN	Pre-IPO	125	1.424	1
	Post-IPO	127	1.559	1
	Difference		0.135	0
Type NS	Pre-IPO	125	1.736	1
	Post-IPO	130	2.461	2
	Difference		0.726***	1***
Type SN	Pre-IPO	15	2.667	3
	Post-IPO	15	2.267	2
	Difference		-0.400	-1
Type SS	Pre-IPO	178	2.842	3
	Post-IPO	184	2.815	3
	Difference		0.027	0

Type Differences			**Mean**	**Median**
Type NN - Type NS	*Pre-IPO*		-0.312**	0**
	Post-IPO		-0.902***	-1***
Type NN - Type SN	*Pre-IPO*		-1.243***	-2***
	Post-IPO		-0.708***	-1**
Type NN - Type SS	*Pre-IPO*		-1.419***	-2***
	Post-IPO		-1.256***	-2***
Type NS - Type SN	*Pre-IPO*		-0.931***	-2*
	Post-IPO		0.195	0
Type NS - Type SS	*Pre-IPO*		-1.107***	-2***
	Post-IPO		-0.354	-1
Type SN - Type SS	*Pre-IPO*		-0.176	0
	Post-IPO		-0.549	-1

Table 23 – Univariate comparisons of loan yields
The table reports pre- and post-IPO levels and changes in loan yield, *Yield*, defined as the yield in basis points on the firm's loan over the 6-month LIBOR. The table includes the overall sample and subsamples based on pre- to post-IPO loan-type transition, as defined in Appendix 3. ***, **, and * indicate significant differences at the 1%, 5%, and 10% levels, respectively.

		N	Mean	Median
Overall	Pre-IPO	517	272.784	275
	Post-IPO	512	223.196	225
	Difference		49.588***	-50***
Type NN	Pre-IPO	125	305.113	305
	Post-IPO	127	253.944	255
	Difference		-51.169***	-50***
Type NS	Pre-IPO	125	290.350	292.5
	Post-IPO	130	212.272	210
	Difference		-78.079***	-82.5***
Type SN	Pre-IPO	15	285.833	255
	Post-IPO	15	240.333	250
	Difference		-45.500	-5
Type SS	Pre-IPO	178	231.523	250
	Post-IPO	184	197.289	175
	Difference		-34.233***	-75***

Type Differences		Mean	Median
Type NN - Type NS	*Pre-IPO*	14.763	-12.5
	Post-IPO	41.673***	45***
Type NN - Type SN	*Pre-IPO*	19.279	50
	Post-IPO	13.611	5
Type NN - Type SS	*Pre-IPO*	73.590***	55***
	Post-IPO	56.655***	80***
Type NS - Type SN	*Pre-IPO*	4.517	37.5
	Post-IPO	-28.062	-40
Type NS - Type SS	*Pre-IPO*	58.828***	42.5***
	Post-IPO	14.982	35*
Type SN - Type SS	*Pre-IPO*	54.311**	5
	Post-IPO	43.044	-75

Table 24– The effect of the IPO on covenant intensity and loan yields

The dependent variable in Panel A is *Covintensity*, as defined in Appendix 3. For specifications (1) to (4), standard OLS is used. For specifications (5) to (8), Poisson regressions are used. Specifications (1) and (5) are for the overall sample, which is the combination of Types NN, NS, and SS. Specifications (2), (3), (4), and (6), (7), (8) are for Types NN, NS, and SS firms, respectively. The dependent variable in Panel B is *Yield*, defined as the yield in basis points on the firm's loan over the 6-month LIBOR. Standard OLS is used for all specifications in Panel B, where specification (1) is for the overall sample and specifications (2), (3), and (4) are Types NN, NS, and SS firms, respectively, as defined in Appendix 3. All independent and control variables are as defined in Appendix 3. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A – Covenant intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SPECIFICATION	OLS	OLS	OLS	OLS	POISSON	POISSON	POISSON	POISSON
SAMPLE	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*
PostIPO	-0.325	-0.444	0.482	-0.359	-0.111	-0.301	0.171	-0.111
	(2.64)***	(2.57)**	(1.85)*	(1.37)	(2.35)**	(3.11)***	(1.53)	(1.49)
LoanSize	0.413	0.023	0.143	0.658	0.173	0.015	0.100	0.215
	(6.10)***	(0.17)	(1.10)	(3.91)***	(5.96)***	(0.19)	(1.59)	(3.78)***
PostIPO*LoanSize	-0.000	-0.005	0.001	-0.000	-0.000	-0.004	0.000	-0.000
	(1.39)	(0.99)	(1.03)	(0.19)	(2.39)**	(1.05)	(0.04)	(0.53)
Maturity	0.221	0.058	0.054	0.585	0.117	0.023	0.030	0.225
	(2.85)***	(0.69)	(0.45)	(2.95)***	(3.19)***	(0.43)	(0.51)	(2.81)***
FirmSize	-0.109	-0.023	0.023	-0.479	-0.058	-0.002	0.011	-0.172
	(1.67)*	(0.32)	(0.19)	(3.69)***	(2.21)**	(0.05)	(0.22)	(3.82)***
Leverage	0.633	0.181	1.030	0.087	0.221	0.198	0.468	0.015
	(2.03)**	(0.41)	(1.85)*	(0.15)	(2.04)**	(0.73)	(2.12)**	(0.09)
ZScore	-0.002	0.028	0.016	-0.116	-0.002	0.012	0.009	-0.040
	(0.06)	(1.17)	(0.30)	(1.34)	(0.22)	(0.84)	(0.40)	(1.51)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-5.643	5.372	-3.715	-10.795	-3.689	1.888	-1.212	-4.665
	(4.00)***	(2.48)**	(1.76)*	(2.73)***	(7.74)***	(1.42)	(1.37)	(4.75)***
Observations	697	197	212	288	701	199	213	289
Adjusted R-squared	0.42	0.40	0.34	0.39				

Panel B – Loan yields

	(1)	(2)	(3)	(4)
SAMPLE	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*
PostIPO	-32.757	-28.410	-53.893	-36.397
	(4.17)***	(1.64)	(2.43)**	(2.83)***
LoanSize	-31.696	-54.173	-27.115	-8.963
	(5.18)***	(3.31)***	(2.36)**	(0.88)
PostIPO*LoanSize	0.025	-0.077	0.021	0.001
	(2.18)**	(0.19)	(0.41)	(0.03)
Maturity	-9.589	-15.876	-14.608	10.774
	(1.19)	(1.43)	(0.94)	(0.70)
FirmSize	-4.210	0.733	-2.011	-10.266
	(0.74)	(0.05)	(0.19)	(1.38)
Leverage	87.230	18.728	143.382	56.818
	(4.12)***	(0.29)	(3.79)***	(1.77)*
ZScore	-6.778	-10.415	-3.125	-7.154
	(2.81)***	(2.43)**	(0.83)	(1.69)*
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Constant	872.201	1,370.501	593.087	439.855
	(10.17)***	(6.37)***	(3.03)***	(2.93)***
Observations	697	197	212	288
Adjusted R-squared	0.32	0.29	0.32	0.28

Table 25 – The differential effect of the IPO on covenant intensity and loan yields
For specifications (1) and (2), the dependent variable is Covintensity, defined in Appendix 3. For specification (1), standard OLS is used. For specification (2), a Poisson regression for censoring at lower and upper levels of 0 and 6, respectively, is used. For specification (3), the dependent variable is *Yield*, defined in Appendix 3, and standard OLS is used. All independent and control variables are defined in Appendix 3. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	**(2)**	**(3)**
	Covintensity		*Yield*
	OLS	POISSON	OLS
PostIPO	-0.462	-0.196	-23.153
	(3.07)***	(2.47)**	(1.60)
PostIPO*Type NS	0.398	0.226	-28.761
	(1.70)*	(2.10)**	(1.52)
PostIPO*Type SS	0.159	0.065	-9.194
	(0.69)	(0.68)	(0.55)
Type NS	-0.019	0.027	-7.095
	(0.13)	(0.35)	(0.52)
Type SS	0.264	0.164	-18.310
	(1.30)	(1.91)*	(1.21)
LoanSize	0.321	0.125	-23.128
	(4.44)***	(4.11)***	(3.73)***
Maturity	0.249	0.134	-11.656
	(3.41)***	(3.82)***	(1.53)
FirmSize	-0.105	-0.057	-5.398
	(1.70)*	(2.26)**	(1.03)
Leverage	0.474	0.161	93.652
	(1.80)*	(1.72)*	(4.97)***
Year dummies	YES	YES	YES
Industry dummies	YES	YES	YES
Constant	-6.062	-2.422	831.683
	(5.45)***	(3.09)***	(9.94)***
Observations	731	736	731
Adjusted R-squared	0.43		0.29

Table 26 – Joint estimation of covenant intensity and loan yields

The table reports the results of three-stage least squares (3SLS) estimation where the two endogenous dependent variables of interest are *Covintensity* and *Yield*, each as defined in Appendix 3. The instrumental variables used are *Capsale*, *R&D*, and *Adsale*, each as defined in Appendix 3. All independent and control variables are defined in Appendix 3. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	**(2)**
	Covintensity	*Yield*
PostIPO	-0.249	-28.622
	(2.23)**	(4.73)***
Covintensity	-	9.410
	-	(4.94)***
Yield	-0.001	-
	(2.78)***	-
LoanSize	0.545	-30.912
	(8.46)***	(8.60)***
LoanSize*PostIPO	-0.000	0.000
	(2.58)***	(4.97)***
Maturity	0.173	-7.094
	(2.34)**	(1.75)*
FirmSize	-0.249	-16.592
	(4.20)***	(5.12)***
Leverage	-0.022	72.833
	(0.10)	(5.89)***
ZScore	0.026	-5.870
	(1.27)	(5.29)***
Year dummies	YES	YES
Industry Dummies	YES	YES
Constant	2.016	878.419
	(1.93)*	(17.20)***
Observations	865	865

Table 27 – The effect of switching lenders on covenant intensity and loan yields

The dependent variable in Panel A is *Covintensity*, as defined in Appendix 3. For specifications (1) to (4) ((5) to (8)) in Panel A, OLS (Poisson) regressions are used. Specifications (1) and (5) are for the overall sample, which is the combination of Types NN, NS, and SS. Specifications (2) and (6), (3) and (7), and (4) and(8) are for Types NN, NS, and SS firms, respectively. The dependent variable in Panel B is *Yield*, defined as the yield in basis points on the firm's loan over the 6-month LIBOR. Standard OLS is used for all specifications in Panel B, where specification (1) is for the overall sample and specifications (2) to (4) are Types NN, NS, and SS firms, respectively, as defined in Appendix 3. All independent and other control variables are as defined in Appendix 3. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A – Covenant intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SAMPLE	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*
PostIPO	-0.284	-0.543	0.608	-0.291	-0.103	-0.378	0.263	-0.095
	(2.00)**	(2.78)***	(2.02)**	(0.99)	(1.91)*	(3.54)***	(2.05)**	(1.20)
PostIPO*SameLender	-0.069	0.341	-0.385	-0.087	-0.020	0.258	-0.199	-0.016
	(0.32)	(1.34)	(1.02)	(0.21)	(0.23)	(1.89)*	(1.35)	(0.12)
SameLender	-0.139	-0.346	-0.215	-0.076	-0.053	-0.247	-0.074	-0.011
	(0.89)	(1.66)*	(0.64)	(0.25)	(0.83)	(1.99)**	(0.54)	(0.12)
LoanSize	0.429	0.025	0.101	0.682	0.178	0.001	0.060	0.224
	(6.20)***	(0.18)	(0.68)	(3.95)***	(6.02)***	(0.01)	(0.92)	(3.87)***
PostIPO*LoanSize	-0.000	-0.005	0.001	-0.000	-0.000	-0.003	0.000	-0.000
	(1.28)	(0.96)	(1.23)	(0.13)	(2.15)**	(0.94)	(0.54)	(0.54)
Maturity	0.216	0.059	0.062	0.560	0.118	0.021	0.039	0.222
	(2.73)***	(0.65)	(0.51)	(2.75)***	(3.16)***	(0.37)	(0.65)	(2.75)***
FirmSize	-0.135	-0.038	0.032	-0.526	-0.068	-0.013	0.016	-0.186
	(2.03)**	(0.53)	(0.26)	(3.92)***	(2.50)**	(0.31)	(0.30)	(3.99)***
Leverage	0.745	0.209	1.008	0.280	0.259	0.218	0.429	0.074
	(2.45)**	(0.47)	(1.83)*	(0.50)	(2.43)**	(0.84)	(1.96)**	(0.46)
ZScore	0.001	0.031	0.018	-0.096	-0.001	0.013	0.010	-0.034
	(0.06)	(1.29)	(0.30)	(1.14)	(0.11)	(0.90)	(0.40)	(1.31)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-5.900	2.384	-3.387	-11.180	-3.782	2.292	-2.076	-4.775
	(4.15)***	(1.22)	(1.43)	(2.57)**	(7.98)***	(1.74)*	(2.09)**	(4.66)***
Observations	683	193	208	282	687	195	209	283
Adjusted R-squared	0.47	0.55	0.49	0.51				

Panel B – Loan yields

	(1)	(2)	(3)	(4)
SAMPLE	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*
PostIPO	-36.806	-26.738	-53.493	-43.159
	(4.00)***	(1.21)	(2.23)**	(3.21)***
PostIPO*SameLender	14.297	-7.305	-1.100	31.909
	(1.02)	(0.28)	(0.04)	(1.40)
SameLender	-6.025	10.567	16.963	-15.475
	(0.56)	(0.56)	(0.70)	(0.86)
LoanSize	-30.711	-54.616	-27.479	-6.766
	(4.91)***	(3.30)***	(2.24)**	(0.66)
PostIPO*LoanSize	0.025	-0.072	0.026	-0.005
	(2.16)**	(0.18)	(0.47)	(0.15)
Maturity	-9.003	-13.463	-13.807	11.716
	(1.10)	(1.13)	(0.93)	(0.74)
FirmSize	-5.057	1.474	-1.712	-12.204
	(0.86)	(0.09)	(0.16)	(1.61)
Leverage	90.586	20.744	144.672	62.914
	(4.21)***	(0.32)	(3.86)***	(1.94)*
ZScore	-6.869	-10.294	-2.999	-6.836
	(2.77)***	(2.37)**	(0.78)	(1.62)
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Constant	856.038	1,228.130	599.655	511.308
	(9.81)***	(5.31)***	(2.88)***	(2.94)***
Observations	683	193	208	282
Adjusted R-squared	0.32	0.29	0.31	0.28

Table 28 – The effect of venture capitalist backing on covenant intensity and loan yields
The dependent variable in Panel A is *Covintensity*, as defined in Appendix 3. For specifications (1) to (4) ((5) to (8)) in Panel A, OLS (Poisson) regressions are used. Specifications (1) and (5) are for the overall sample, which is the combination of Types NN, NS, and SS. Specifications (2) and (6), (3) and (7), and (4) and(8) are for Types NN, NS, and SS firms, respectively. The dependent variable in Panel B is *Yield*, defined as the yield in basis points on the firm's loan over the 6-month LIBOR. Standard OLS is used for all specifications in Panel B, where specification (1) is for the overall sample and specifications (2) to (4) are Types NN, NS, and SS firms, respectively, as defined in Appendix 3. All independent and other control variables are as defined in Appendix 3. Robust t-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A – Covenant intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SAMPLE	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*
PostIPO	-0.405	-0.366	0.156	-0.426	-0.162	-0.243	0.025	-0.132
	(2.41)**	(1.54)	(0.47)	(1.33)	(2.54)**	(1.86)*	(0.17)	(1.48)
PostIPO*NonVC	0.182	-0.161	0.566	0.235	0.116	-0.114	0.259	0.078
	(0.90)	(0.62)	(1.58)	(0.65)	(1.51)	(0.83)	(1.70)*	(0.72)
NonVC	-0.162	0.190	-0.004	-0.418	-0.086	0.127	-0.042	-0.119
	(1.08)	(0.81)	(0.01)	(1.50)	(1.43)	(1.06)	(0.30)	(1.37)
LoanSize	0.410	0.025	0.132	0.654	0.170	0.017	0.091	0.211
	(6.06)***	(0.19)	(1.01)	(3.88)***	(5.90)***	(0.21)	(1.42)	(3.72)***
PostIPO*LoanSize	-0.000	-0.005	0.001	-0.000	-0.000	-0.004	0.000	-0.000
	(1.33)	(1.01)	(1.07)	(0.21)	(2.18)**	(1.08)	(0.10)	(0.53)
Maturity	0.221	0.052	0.044	0.579	0.119	0.018	0.032	0.227
	(2.85)***	(0.63)	(0.37)	(2.98)***	(3.25)***	(0.34)	(0.54)	(2.85)***
FirmSize	-0.113	-0.008	0.057	-0.492	-0.059	0.007	0.023	-0.173
	(1.71)*	(0.10)	(0.46)	(3.76)***	(2.24)**	(0.15)	(0.41)	(3.88)***
Leverage	0.646	0.153	0.999	0.090	0.223	0.181	0.466	0.008
	(2.08)**	(0.34)	(1.80)*	(0.16)	(2.07)**	(0.67)	(2.12)**	(0.05)
ZScore	0.004	0.017	-0.004	-0.099	-0.000	0.006	0.004	-0.037
	(0.15)	(0.58)	(0.06)	(1.14)	(0.03)	(0.37)	(0.18)	(1.37)
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-5.506	5.218	-1.146	-9.104	-3.597	1.787	-1.082	-4.538
	(3.81)***	(2.34)**	(0.59)	(3.38)***	(7.58)***	(1.34)	(1.20)	(4.55)***
Observations	697	197	212	288	701	199	213	289
Adjusted R-squared	0.48	0.55	0.50	0.51				

Panel B – Loan yields

	(1)	(2)	(3)	(4)
SAMPLE	*OVERALL*	*TYPE NN*	*TYPE NS*	*TYPE SS*
PostIPO	-42.501	4.065	-93.369	-49.833
	(4.33)***	(0.17)	(3.57)***	(3.57)***
PostIPO*NonVC	22.364	-60.722	83.452	34.759
	(1.63)	(2.27)**	(3.18)***	(1.71)*
NonVC	-21.546	46.195	-66.070	-18.919
	(1.98)**	(2.18)**	(2.91)***	(1.13)
LoanSize	-32.043	-51.749	-27.797	-9.271
	(5.28)***	(3.17)***	(2.55)**	(0.92)
PostIPO*LoanSize	0.026	-0.199	0.024	0.008
	(2.20)**	(0.50)	(0.49)	(0.25)
Maturity	-9.546	-17.300	-14.174	10.606
	(1.20)	(1.57)	(0.98)	(0.70)
FirmSize	-4.870	2.082	-3.352	-11.013
	(0.86)	(0.13)	(0.33)	(1.49)
Leverage	89.188	13.665	146.673	55.667
	(4.25)***	(0.21)	(3.98)***	(1.75)*
ZScore	-6.013	-12.623	-1.869	-6.741
	(2.41)**	(2.90)***	(0.52)	(1.54)
Year dummies	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES
Constant	890.762	1,323.943	646.733	472.103
	(10.12)***	(6.21)***	(3.61)***	(2.56)**
Observations	697	197	212	288
Adjusted R-squared	0.32	0.31	0.37	0.28