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Do Founders Control Start-Up Firms that Go Public?

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Abstract

Black & Gilson (1998) argued that an IPO-welcoming stock market stimulates venture deals by enabling VCs to give founders a valuable "call option on control". We study 18,000 startups to investigate the value of this option. Among firms that IPO, 60% of founders are no longer CEO. With little voting power, only half of the others survive three years as CEO. At initial VC financing, the probability of getting real control of a public firm for three years is 0.4%. Our results shed light on control evolution in startups, and cast doubt on the plausibility of the call-option theory linking stock and VC markets.

Keywords: Startups, Founders, Venture Capital, VC, IPOs, Stock Markets, Innovation, Entrepreneurs, Venture Capitalists, Corporate Governance, CEO, Shareholders, NASDAQ

JEL Classifications: G24, G30, G32, G34, G38, H25, K2, K22, M13

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1. INTRODUCTION

Startup founders, who typically must cede control of their firms to obtain VC[1] financing, are widely believed to regain control in the event of an IPO. This view is reinforced by the media salience of prominent founders such as Facebook's Mark Zuckerberg, Google's Sergey Brin and Larry Page, and Snap's Evan Spiegel. Travis Kalanick's loss of the CEO position before Uber's anticipated IPO seems to be the exception that proves the rule.[2]

Indeed, the possibility of founder control-reacquisition via IPO underlies an influential theory for why venture capital requires a robust stock market (Black & Gilson 1998).[3] On this theory, an IPO-welcoming stock market makes possible a VC exit that can return control to founders, enabling VCs to implicitly give founders a valuable "call option on control" that they can exercise if successful. VCs' ability to offer this call option, this theory claims, makes VC financing more acceptable to control-loving founders and can thereby spur more founder-VC "deals."[4]

But we know little about the likelihood of founder-control return via IPO, and the extent and duration of any such control. In short, we know little about the *ex ante* value of this call option on control at the time when founders agree to accept VC financing. Prior work has, in passing, reported the frequency of founders being CEO at IPO (e.g., Baker & Gompers 2003, Kaplan et al. 2009). But the samples are small, non-random, and old. And because these studies had a different focus, they did not consider the voting power of founder-CEOs at IPO,

[1] We use the abbreviation "VC" to denote "venture capitalist," "venture capital," or "venture-capital fund".

[2] For Travis Kalanick's (forced) resignation from his position as CEO of Uber, see https://www.wsj.com/articles/uber-ceo-travis-kalanick-resigns-1498023559.

[3] According to SCOPUS (May 2018), Black & Gilson (1998) is in the top 5% of JFE papers based on citation count.

[4] See Section 2.

the extent and duration of founders' control post IPO, and the *ex ante* likelihood of founder-control return via IPO.

We investigate the *ex ante* value of founders' call option on control via IPO by collecting a sample of over 18,000 startups receiving first-round VC funding during 1990-2012 ("financing vintages" 1990-2012), and then investigating, within a random sub-sample of these firms that conduct an IPO, two measures of founder control: serving as CEO and voting power. For each firm, we measure founder control at three points: upon completion of IPO ("at IPO"), one year after IPO ("IPO+1"), and three years after IPO ("IPO+3").

We start by measuring the frequency of founder control reacquisition via IPO *ex post* (i.e., conditional on IPO). A founder is considered to have "weak" control if she is CEO ("founder-CEO") and "strong" control if she is CEO and, along with co-founders, has a voting interest of at least 30% ("founder-CEO/blockholder"). At IPO, most founders lack even weak control: the frequency of founder-CEO is only 41%. Even fewer have strong control. At IPO, the frequency of founder-CEO/blockholder is about 7%. Moreover, for either type of control, founders' control generally is not "durable" (lasting at least three years). By IPO+3, the frequency of founder-CEO drops from 41% to 21%, and the frequency of founder-CEO/blockholder drops from about 7% to 2.5%. Even if a startup is successful enough to reach IPO, the probability that a founder will exercise the call option on control and enjoy some form of control for three years is only 2.5%-21% (depending on the type of control).

We then use the 11,104 firms in financing vintages 1990-2002 to investigate the *ex ante* likelihood of founders exercising the call option on control. We find that, as of initial VC financing, the likelihood is extremely remote. The main reason: most VC-backed firms—including many of the most successful—exit not via IPO but via M&A. In these financing vintages, which include financing vintages that had the highest rate of IPOs, only about 6% of founders take their firms to IPO as CEO, and 1% take their firms to IPO as

CEO/blockholder. Because of the high frequency of post-IPO control attrition, the *ex ante* likelihood of obtaining *durable* control is even lower (3% for founder-CEO and 0.4% for founder-CE0/blockholder).

We also investigate whether control return via IPO is a carrot to reward the most successful founders—those generating the highest returns for VCs. Since IPO exits are on average more profitable for VCs than M&A exits, and only an IPO can return founder-control, founders reacquiring control via IPO likely generate above-average returns for VCs. But the "carrot" hypothesis might also be expected to apply *within* IPO exits: founders of IPO firms should be more likely to retain control as IPO profitability for VCs increases. Yet we find no evidence that VC returns are positively correlated with control reacquisition. Indeed, we find the opposite in some models; higher VC returns are associated with a *lower frequency* of founder control.

Our paper contributes to the literature on founder exit from the CEO position in VC-backed startups. Most prior work focuses on firms where VCs exit via M&A (Broughman & Fried 2013) or have not yet exited (Wasserman 2003; Wasserman 2012; Conti & Graham 2016; Hellmann & Puri 2002).[5] This work finds that founders often exit the CEO position (e.g., Broughman & Fried 2013; Broughman 2010), many times involuntarily (e.g., Wasserman 2012). Baker & Gompers (2003) and Kaplan et al. (2009) report the frequency of founder-CEO at IPO only in passing, as their focus is not the arc of founder control.[6] Our work is the first to systematically examine founders' propensity to remain CEO in VC-backed

[5] A notable recent exception is Ewens & Marx (2018), which investigates the rate and effect of replacing founders using a large sample of VC-backed startups founded between 1995 and 2008, some of which reach IPO. But their study does not distinguish between founders serving as CEOs and founders serving in other executive roles, or between startups that reach IPO and those with successful M&A exits, as its focus is not on measuring founder control reacquisition via IPO.

[6] Baker & Gompers (2003) examines several hundred VC-backed IPOs during 1978-1987 and Kaplan et al. (2009) looks at more recent IPOs (in 2004), but the sample is small and non-random. Similarly, Jain & Tabak (2008) report founder-CEO at IPO in several hundred VC-backed IPOs in a single year (1997) and Pollock et al. (2009) report founder-CEO at IPO in about 190 VC-backed firms during 1995-2000.

firms that are successful enough to go public. Our results suggest that this propensity is surprisingly low. Our paper is also the first to systematically measure founder voting power at and after IPO, which is important for understanding how control of VC-backed firms evolves over time.

Our paper sheds light on the plausibility of Black & Gilson's "call option on control" theory linking VC and stock markets. We show that the *ex ante* likelihood of founders reacquiring control via IPO is extremely low, especially when we focus on control that is both strong (founders have enough voting power to ensure they remain in the saddle) and durable (control lasts at least three years). Our findings thus call into question the claim that founders deciding whether to accept VC financing weigh heavily the *ex ante* value of their call option on control via IPO. Our results therefore suggest that an active IPO market might not be as important for sustaining a venture ecosystem as is generally believed.

The remainder of this paper proceeds as follows. Section 2 describes the motivation for our study. Section 3 describes our data. Section 4 describes the frequency of founder-CEO at and after IPO. Section 5 describes the frequency of founder-CEO/blockholder at and after IPO. Section 6 briefly describes the *ex ante* probability of founder-CEO and founder-CEO/blockholder. Section 7 examines the relationship between VC returns and founder control among IPO firms. Section 8 discusses limitations of our analysis. Section 9 concludes.

2. Venture Capital and Stock Markets

2.1 The Observed Link between Venture Capital and Stock Markets

The American venture-capital (VC) market is widely admired at home and abroad. Many of the country's largest and most successful companies—such as Apple, Google,

Microsoft, and Amazon—began life as startups backed by VCs. VC-backed firms are also believed to play a significant role in supporting innovation across the economy.[7]

Not surprisingly, policy makers around the world have sought to cultivate local VC markets.[8] The academic literature suggests that an important ingredient is an active stock market, particularly one that welcomes small VC-backed companies seeking an IPO.[9] As Armour & Cumming (2006) conclude, "[t]he principal proposition established in the literature is that venture capital flourishes in countries with deep and liquid stock markets." This belief is reflected in policymaking such as the 2012 JOBS Act, [10] which aims to remove barriers to IPOs to stimulate entrepreneurship.

Casual observation certainly confirms an association between the robustness of VC ecosystems and the depth and liquidity of stock markets. The United States, home to the world's deepest and most liquid stock market, was the first country to develop a VC market.[11] Even as VC has globalized in search of opportunities outside the U.S., the U.S. still has by far the biggest VC market, attracting more than 50% of VC investment worldwide.[12] Notably, other developed western economies—such as Japan and Germany—lack both a vibrant VC market and an active stock market that welcomes IPOs (Black & Gilson 1999).[13]

Of course, there may well be *non-causal* reasons for this cross-country association. A country's robust legal protection of investors might cause both VC markets and stock

[7] Gompers & Lerner 2001; Metrick & Yasuda 2010; Puri & Zarutskie 2012.

[8] Gilson 2003; Becker & Hellmann 2003; Ibrahim 2008.

[9] Black & Gilson 1998; Jeng & Wells 2000; Da Rin et al. 2006; Gompers & Lerner 1998; Gilson 2003; Armour & Cumming 2006.

[10] For background on the Jumpstart Our Business Startups (JOBS) Act, see https://www.sec.gov/spotlight/jobs-act.shtml.

[11] Oehler et al. 2007.

[12] Marovac 2017.

[13] For Germany and Japan, little appears to have changed in this respect since the mid 1990s (McKinsey & Company 2015; KFW Research 2015).

markets to flourish, even if each could flourish without the other. Similarly, cultures that are more risk-taking, individualistic, and focused on personal wealth creation (e.g., the United States) are more likely than other cultures (e.g., Japan and Germany) to generate large pools of risk capital and human capital in the form of high-powered financiers and operational talent necessary for both vibrant VC markets and deep and liquid stock markets.

But the association between VC and stock markets might be driven, at least in part, by causal factors. One possibility: the stock market boosts the VC market by providing a "thicker exit" for VCs. VCs seek to generate financial returns by purchasing shares in private firms and then later selling them at a much higher price, either to an acquirer in an M&A transaction or to public investors in an IPO.[14] The availability of IPO exit as an alternative to M&A can increase VCs' expected financial returns (thereby boosting VC investment) by increasing the number of "bidders" for VC-backed firms.[15]

2.2 The Control-Reacquisition Theory

In an influential paper, Black & Gilson (1998) dismissed (without elaboration) the thicker-exit explanation for why the U.S. had an active VC market and Germany and Japan did not, offering instead their call-option theory, concisely summarized in subsequent work (Black & Gilson 1999):

[14] A third potential exit option is to have the startup repurchase the VCs' equity stake. But startups generally do not have sufficient capital to cash out VCs (Black & Gilson 1998).

[15] A stock market can boost VCs' expected returns for a variety of reasons. First, public investors may assign a higher valuation to a VC-backed firm than the most interested M&A acquirer. Public investors might assign a higher valuation than the M&A acquirer for any number of reasons, including the possibility that the firm will be worth more as a stand-alone public firm than as the wholly-owned subsidiary of a public or private firm (think Google, Amazon, or Facebook). Second, the possibility of exit via an IPO gives additional leverage to VCs negotiating with a potential M&A acquirer, especially when there is only a single such buyer. Indeed, many IPOs are part of an IPO-to-M&A strategy where VCs intending to sell a firm first take it public to set a floor on the valuation. For either or both of these reasons, the possibility of IPO exit may encourage VC investment *ex ante* by increasing expected returns. For evidence of a link between stock market performance and fluctuations in VC activity (Da Rin et al. 2006; Jeng & Wells 2000).

> The United States has both an active venture capital industry and well-developed stock markets. Japan and Germany have neither. We argue here that this is no accident—that venture capital can flourish especially—and perhaps only—if the venture capitalist can exit from a successful portfolio company through an initial public offering (IPO), which requires an active stock market. Understanding the link between the stock market and the venture capital market requires understanding the contractual arrangements between entrepreneurs and venture capital providers especially the importance of exit by venture capitalists and the opportunity, present only if IPO exit is possible, for the venture capitalist and the entrepreneur to enter into an implicit contract over control, in which a successful entrepreneur can reacquire control from the venture capitalist by using an IPO as the means of exit.

According to Black and Gilson, "the prospect of an IPO exit gives the the entrepreneur something of a call option on control, contingent on the firm's success" (Black & Gilson 1998, at 261).

The "call option on control" theory linking the stock and VC markets is quite plausible, requiring only three noncontroversial assumptions:

Many Founders Value Control. While control can always provide financial private benefits (Jensen & Meckling 1976), *non-pecuniary* private benefits (e.g., the satisfaction of bringing new products to market) are likely to be just as—or even more—valuable to the founders of a startup. And a founder's non-pecuniary interest in her firm is vulnerable if she is forced to give up control to an equity investor that focuses solely on monetary returns (Aghion & Bolton 1992).

Founders Must Cede Control to Obtain VC Financing. VCs will not invest in a startup without receiving substantial control rights at a founder's expense, including the ability to

(1) remove and replace the founder as CEO (Broughman & Fried 2013) and (2) block transactions they dislike (Bengtsson 2011).[16] Thus, VCs typically provide funding in stages as a means to obtain leverage between financing rounds (Gompers 1995); negotiate for preferred shares with substantial blocking rights (Kaplan & Stromberg 2003; Fried & Ganor 2006); and typically ensure that VCs and independent directors have enough board seats to replace the CEO (Broughman & Fried 2010; Broughman 2010). The fact that founders are frequently involuntarily removed from the CEO position (e.g., Wasserman 2012) indicates that they have lost control.

An IPO, Unlike an M&A Exit, Can Restore Founder Control. An IPO exit can, in theory, return control to a control-valuing founder, as an IPO requires VCs to give up their blocking rights and convert their preferred shares into common stock (Broughman & Fried 2013). Following the standard 180-day lockup period, VCs will begin selling these common shares (Field & Hanka 2001; Cumming & MacIntosh 2003). And, as the firm transitions to a public company, VC directors will start leaving the board.[17] In short, an IPO replaces the VCs—with their concentrated positions and substantial control rights—with relatively dispersed and generally more passive public investors.[18] By contrast, an M&A exit *never* returns control to the founder (Broughman & Fried 2013). Rather, the sale consolidates control in the hands of the acquirer, for which the founder can now work as a hired manager.

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[16] For evidence that VCs' removal of founders from executive positions can improve startup outcomes, see Ewens & Marx (2018).

[17] Wasserman (2012) [pp.384-385]. This transition allows the VC investors to redeploy their human capital (and financial capital) into new ventures (Black & Gilson 1998; Michelacci & Suarez 2004).

[18] Because of the increased availability of financing for late-stage private firms, some founders may seek to postpone an M&A sale or IPO exit by remaining private longer (Ewens & Farre-Mensa 2017). But the VCs must exit at some point.

Obviously, Black & Gilson's "call option on control" theory and the thicker-exit causal explanation are not mutually exclusive. A vibrant stock market might lead to a more dynamic VC market because both (1) VCs earn higher returns when IPOs provide an alternative to M&A *and* (2) founders are more willing to cede control to VCs if there is a prospect of an IPO.[19] And neither of these causal explanations is mutually exclusive with the non-causal cultural and legal explanations for the observed association between VC and stock markets.

The question we seek to address is whether the prospect of control-reacquisition by founders in the event of IPO is likely to affect the VC ecosystem by inducing founders to cede control to VCs in exchange for funding. In other words, how valuable is the call option on control likely to be for a founder at the time of initial VC funding? The option's value will depend in large part on (a) the likelihood that a founder will reacquire control in the event of IPO (as well as the extent and duration of control); and (b) the *ex ante* likelihood of IPO, all of which we investigate.

3. DATABASE OF VC-BACKED FIRMS

We construct a database of VC-backed startups, a subset of which eventually conduct an IPO. The remainder of this section explains how we assembled and collected data (§ 3.1) and provides descriptive statistics for these firms (§ 3.2).

3.1 Constructing a Sample of VC-Backed Firms

[19] One potential critique of the control-reacquisition theory for why the United States has an active VC market and Japan and Germany do not (which would also apply to the thicker-exit explanation) is that VC-backed firms in Japan and Germany could go public in the U.S. As Rock (2001) points out, the stock market that returns control to founders need not be domestic. In fact, VC-backed Israeli firms frequently go public on Nasdaq rather than on the Tel Aviv Stock Exchange (Rock 2001). However, cultural, legal, or other barriers might make such a cross-border IPO difficult.

Using the VentureXpert (VX) database, we identify a population of VC-backed startup firms: U.S.-based firms that receive their first round of VC funding between January 1, 1990 and December 31, 2012 ("financing vintages" 1990-2012). We limit our analysis to firms that are private at the time of initial VC investment, and we exclude firms that receive less than $5 million in aggregate VC funding.[20] These criteria yield a population of 18,809 VC-backed firms (the "VC-backed population").

We then identify firms in the VC-backed population that conducted an IPO during 1990-2012 ("IPO vintages" 1990-2012), of which there were 1,961 (10.4%) (the "full IPO subgroup"). To obtain information on founder control at IPO, we randomly select 700 IPO firms—about 35% of the full IPO subgroup—and hand-collect data from SEC filings.[21] We obtain data for 652 of these 700 firms.[22] We refer to this group of 652 firms as the "IPO research sample." For the IPO research sample, we record two variables: (1) whether the CEO is a founder ("founder-CEO"); and (2) aggregate equity voting rights of each firm's founder(s) ("founder voting power").

Black & Gilson's (1998) "call option on control" theory assumes that founders value the prospect of reacquiring control in the event of IPO. Presumably, they would expect to enjoy control not only right after IPO but also for a reasonable duration thereafter. However, many VC-backed firms that conduct an IPO remain independent and public only for a brief period, either because the firms are acquired or otherwise forced to delist.[23] Even if a firm remains public, a founder-CEO at IPO may be replaced as CEO shortly after IPO. To the extent

[20] The $5 million funding threshold may bias our sample towards larger and more successful startup firms, as firms that fail to obtain $5 million in funding are unlikely to be successful enough to IPO. Thus our findings overstate the probability that any given startup (or even one receiving VC financing) will IPO.

[21] As data collection from SEC filings is labor intensive, we did not collect data for each firm in the full IPO subgroup.

[22] Most of the SEC filings used in this project are available online via the SEC's EDGAR website (https://www.sec.gov/edgar/searchedgar/companysearch.html). Pre-1996 filings were pulled from microfiche files.

[23] Gill & Walz (2012) find that 80% of all VC-backed firms that entered the public market during 1975-2010 delisted within ten years, versus 37% of other IPO firms.

the control reacquired via IPO is expected to be short-lived (say, 1 year), its *ex ante* value is likely to be lower than if such control were longer-lived. To determine duration of founder control post IPO, we measure founder-CEO and founder voting power not only at IPO but also at two subsequent dates: IPO+1 (one year after IPO) and IPO+3 (three years after IPO).[24] We measure these variables at IPO by using the final IPO prospectus filing[25] and at IPO+1 and IPO+3 by using annual proxy statement filings.[26]

There is potential truncation in our analysis, as some of the VC-backed population may have an (unobserved) IPO after 2012. Given the 10-year duration of VC funds, VC-backed startups are generally expected to reach exit within 5 to 7 years of initial financing. Thus, truncation is primarily a concern for later financing vintages. By contrast, the truncation concern is fairly minimal for firms with pre-2003 financing vintages, as such firms have had more than 10 years to reach an exit event.[27] We thus limit the *ex ante* portion of our analysis and corresponding regression models to startups from pre-2003 financing vintages.

3.2. Description of Sample Firms

[24] If a CEO-founder at IPO is no longer a public-company CEO at IPO+1 or IPO+3, it is likely for one of the following three reasons. First, the founder voluntarily left the CEO position (or sold the firm) even though she could have remained CEO of a public company. Such a decision would suggest, *contra* Black & Gilson (1998), that the founder does not place such a high value on being CEO of a public company. Second, the founder preferred to remain CEO of a public company, but was involuntarily replaced. Such a move would suggest, also *contra* Black & Gilson (1998), that being the CEO does not, in fact, give the founder control (or sufficiently "broad discretions"). Third, business setbacks forced the founder-CEO to sell the firm to an acquirer or cause the firm to file for bankruptcy.

To the extent founders accepting first round financing from VCs anticipate *any* of these post-IPO outcomes, each of which causes the founders to cease being CEO of a public company, the possibility of a control-restoring IPO will have less effect on their decision to cede control to VCs *ex ante*. That is, a founder who anticipates losing control post-IPO, will place less value *ex ante* on the prospect of an IPO exit, and the existence or non-existence of an IPO market will have less impact on their decision to take VC financing. Thus, to examine the plausibility of the control-reacquisition theory, we must look not only at whether the founder is CEO at IPO, but also at whether remains CEO for some time thereafter.

[25] We use the 424b4 SEC filing on the IPO date, as it includes better price data than the S-1 filing prior to IPO.

[26] For IPO+1, we use the firm's first definitive proxy statement (DEF 14A) filed at least 12 months after IPO (which could be filed as late as 24 months after IPO). For IPO+3, we use the first DEF 14A filed at least 36 months after IPO (which could be filed as late as 48 months after IPO).

[27] We limit data collection to firms that IPO before 2013 so we can observe founder control at IPO+1 and IPO+3.

Table 1 compares the IPO research sample (n=652) to the full IPO subgroup (n=1,961) and the VC-backed population (n=18,809). In the VC-backed population, firms receive on average $50 million in VC financing (before any IPO) by the end of 2012. We denote this amount as "total VC financing" even though some of these firms may receive additional VC financing after 2012. IPO firms receive on average approximately twice as much total VC financing ($98.7 million for the full IPO subgroup and $94.1 million for the IPO research sample).[28]

Panel A of Table 1 sorts results by financing vintage (1990 to 2012). Reflecting the effect of the dotcom bubble, Panel A shows a steep increase in firms receiving initial VC financing during 1994–2000, followed by a sharp drop-off in 2001.

Figure 1 shows IPO frequency. Panel A sorts IPOs by IPO vintage. Reflecting the dotcom bubble, there is a surge in IPOs in 1999 and 2000, followed by a large decline in 2001. Panel B (Figure 1) reports similar data, but sorted by financing vintage rather than by IPO vintage. Firms in the VC-backed population with pre-1995 financing vintage have a 30%-40% likelihood of IPO. By contrast, the IPO likelihood for later financing vintages is much lower: less than 10% for most vintages. To be sure, the low rate of IPOs on the right side of the graph (Panel B) may be partially explained by truncation (unobserved future IPOs). Other research, however, suggests the decline is not due simply to truncation of IPO events, but rather reflects a fundamental change in the IPO market: a decline in small-firm IPOs that began before the collapse of the dotcom bubble (Bartlett et al. 2017; Gao et al. 2013).[29]

[INSERT TABLE 1 and FIGURE 1 HERE]

[28] For all three groups, however, there is a wide gap between mean and median amounts of total VC financing.

[29] See Section 7.

Panel B of Table 1 sorts firms by business sector. VC-backed firms are typically in high-tech sectors; software, Internet, and communications-related businesses are particularly common. Among these sectors, however, there is considerable variance in IPO likelihood. For example, Panel B shows that of the 1,201 biotechnology firms in the VC-backed population, nearly a quarter (24.1%) have had an IPO exit by the end of 2012, while the rate is less than 10% for software (7.2%) and Internet (8.1%).

Panel C presents the same data sorted by location (the state in which the firm is headquartered). Venture capital is geographically clustered in entrepreneurial enclaves. Approximately 40% of the VC-backed population is headquartered in California and another 10% is in Massachusetts. The only other headquarters states that exceed 5% are New York and Texas. Firm location, however, does not appear to materially affect IPO likelihood.

Table 2 provides summary statistics for the IPO research sample. In this sample, firms average 5 separate rounds of VC financing, with investments from 8 different VC firms. Firms that reach IPO typically do so quickly. We find that the average length of time from initial VC financing to IPO is a little over four years. The average amount of pre-IPO VC financing is $94.1 million and the average market cap at IPO is $443 million. Consistent with Bartlett et al. (2017), we find that firms with post-1998 financing vintage years receive more VC financing before IPO and have larger IPOs.

Consistent with prior research, the vast majority of firms incorporate in Delaware (Broughman et al. 2014). California is the only other domicile to exceed 5% of total incorporations, and its use has declined sharply over time.

[INSERT TABLE 2 ABOUT HERE]

Table 2 also shows that approximately 5% of the firms in the IPO research sample went public with a dual-class structure.[30] Dual-class IPOs are particularly relevant for our study, as they can be used to increase a founder's post-IPO voting power and in some cases secure long-term control. Indeed, this strategy was famously used in several high-profile VC-backed IPOs (including Google, Facebook, and Snap). Consistent with the view that dual-class IPOs are increasingly common, we find that approximately 15% of IPO research sample firms with financing vintages 2005-2012 go public with a dual-class structure. Interestingly, for at least 20 years VC-backed firms have been *less* likely than other firms to have a dual-class structure immediately following their IPO.[31]

4. DO FOUNDERS BECOME (AND REMAIN) CEO OF A PUBLIC COMPANY?

The "call option on control" theory linking IPO and VC markets assumes the founders can regain control at IPO. But what does "control" mean? In this section, we consider a "weak" version of control: a founder becomes CEO of a public company, even if she does not have enough voting power to thwart replacement.[32] Of course, the CEO position by itself does not confer *real* control on the founder. While the CEO of a public company does have power, she can be replaced by directors (and thus, indirectly, by the shareholders who elect them), constraining her room to maneuver. At best, the CEO position provides c*onditional* control: as long as the CEO keeps directors and shareholders sufficiently satisfied, she can do

[30] By "dual-class structure," we mean the firm has at least two classes of common stock. To identify these firms, we use Jay Ritter's list of IPOs—from 1980 to 2015—with multiple share classes outstanding https://site.warrington.ufl.edu/ritter/ipo-data/. This classification is described in Loughran & Ritter (2004).

[31] Field & Lowry (2017). We confirm their results by comparing the baseline rate of dual-class IPOs for all IPOs to the rate for VC-backed IPOs (data from https://site.warrington.ufl.edu/ritter/ipo-data/).

[32] Black & Gilson (1998, at 216), which put forward the control-reacquisition theory, appear to use this founder-CEO definition of control: "Control becomes vested in the entrepreneur, who often retains a controlling stock interest and, even if not, retains the usual broad discretions enjoyed by chief executives of companies without a controlling shareholder."

whatever she wants. In the next section, we consider a "strong" version of control: the founder is CEO and has enough voting power to remain CEO.

To investigate whether founders acquire weak control in the event of IPO, we examine the 652 firms in the IPO research sample to check for founder-CEO at (i.e., right after the) IPO. We then determine whether the firm remains public and the founder continues to be CEO at IPO+1 and IPO+3.[33] If the founder remains in the CEO position through IPO+3, we deem the founder's (weak) control to be "durable."

4.1. Founder-CEO at IPO?

To check for founder-CEO at IPO, we review the CEO's biography in the management section of the IPO prospectus and classify the CEO as a founder if she is described as a founder, a co-founder, or a person employed by the firm since formation. Table 3 (Panel A) shows that 269 (41.2%) of the 652 firms in the IPO research sample had a founder-CEO at IPO. [34] This rate is lower than that reported in other studies.[35]

We investigate the correlates of founder-CEO at IPO. Consistent with Baker & Gompers (2003), the frequency of founder-CEO at IPO is higher if duration to IPO is shorter and pre-IPO VC financing is lower [Table 3 - Panel B]. We also sort by the presence of elite

[33] Henceforth, we use the term "CEO" to mean "CEO of the public incarnation of the startup."

[34] In another 20 firms, the founder group had at least 30% of the equity voting power but a non-founder served as CEO [compare Table 5 – Panels B and C (second row, first column of each panel)]. In such firms, a founder might have been able to remain CEO had he or she so chosen.

[35] Kaplan et al. (2009) reports a 51% frequency of founder-CEO in a sample of 106 VC-backed IPOs in 2004. Pollock et al. (2009) reports a frequency of 60% in a sample of 193 VC-backed IPOs during 1995-2000. Jain & Tabak (2008) report a frequency of 58% in a sample of several hundred VC-backed IPOs in 1997. Baker & Gompers (2003) report a rate of 57% for several hundred VC-backed IPOs during 1978-1987.

VCs.[36] Consistent with Baker & Gompers (2003), their presence is associated with a lower probability of founder-CEO at IPO.[37]

[INSERT TABLE 3 ABOUT HERE]

For the 652 firms in the IPO research sample, Figure 2 illustrates time trends in the likelihood of founder-CEO at IPO. In each graph the solid black curve reports founder-CEO likelihood at IPO. Panel A reports results based on IPO vintage (i.e., year of IPO). We observe that the likelihood of a founder-CEO at IPO peaks around 45% at the height of the dotcom bubble in the late 1990s (Figure 2 – Panel A), when Black and Gilson put forward their "call option on control" theory, but did not subsequently drop below 30%. Research on IPO grandstanding (Gompers 1996; Lee & Wahal 2004) suggests many VC-backed firms in the late 1990s were taken public early—after minimal financing—so VCs seeking to raise new funds could tout their achievements. Because a founder is more likely to be replaced as CEO as time goes on, grandstanding could account for the higher frequency of IPO firms with founder-CEO during the dotcom bubble. Panel B reports the same data sorted by financing vintage rather than IPO vintage.

[INSERT FIGURE 2 ABOUT HERE]

4.2. Founder-CEO after IPO?

Figure 2 also reports the likelihood that a founder continues to be CEO at IPO+1 and IPO+3. (Again, control lasting through IPO+3 is considered "durable.") Of the 269 founder-CEOs at IPO, 60 are no longer CEO at IPO+1 (Table 4, Panel A). By IPO+3, 131 are no longer

[36] We identify startups funded by an elite (top 10) VC firm using rankings of VC firms prepared by CB Insights based on a poll of VC general partners conducted with the New York Times (https://www.cbinsights.com/blog/venture-capital-peer-rankings/). The top 10 ranked VC firms were: Sequoia, Benchmark, Accel Partners, Greylock Partners, Andreessen Horwitz, Union Square Ventures, First Round, Bessemer Venture Partners, KPCB, and NEA.

[37] A study of still-private VC-backed firms finds that the presence of an elite VC is associated with a higher likelihood of founder replacement in such firms as well (Conti & Graham 2016).

CEO. Thus, of the 269 founder-CEOs at IPO, only 138 had durable control. In the IPO research sample, moving from IPO to IPO+3 reduces the frequency of founder-CEO from 41.2% to 21.2%.

Figure 2 illustrates the likelihood of founder-CEO at IPO+1 with a dashed line, and at IPO+3 with a dotted line. While the likelihood of founder-CEO at IPO peaks in the late 1990s, the likelihood of founder-CEO at IPO+3, based on IPO vintage, is stable at around 20% over the entire sample period (Figure 2 – Panel A). Founder-CEOs who took their company public in the late 1990s had a very high attrition rate, as illustrated by the large gap between the curves for IPO and IPO+3 during this time period.

Table 4 highlights two factors that cause founders to lose the CEO position after IPO. First, consistent with Gill & Walz (2012), many IPO firms do not remain public. Panel B shows that by IPO+3 approximately 36% (235 out of 652) of firms in the IPO research sample were no longer public, with many (124) acquired shortly after IPO.

Panel C focuses on the subgroup of 269 firms with founder-CEO at IPO. We find that 197 (or 73%) of these firms remain public at IPO+3. Thus, 70 firms with founder-CEO at IPO were delisted within three years. Of these 70 firms, we can determine that 32 were acquired.[38] The remaining 38 firms were delisted for other reasons (such as bankruptcy).[39] Whether such firms are acquired or delisted for other reasons, the result is that IPO exits that create a public company for the long term (in which a founder *might* enjoy control) are even less common than suggested by the rate of IPOs reported in Table 1.

[38] To identify such firms, we matched firm names from the non-surviving group with public targets in the SDC Platinum mergers and acquisitions database. An inability to match names might have led to some omissions.

[39] Our sample thus appears similar to that of Kaplan et al. (2009), which finds in a sample of 50 VC-firms conducting an IPO that, within three years, 8 were acquired and 3 filed for bankruptcy.

Second, even if a firm in the IPO research sample does remain public for three years after IPO, many founders exit the CEO position before the three-year mark. Panel A of Table 4 shows that even for surviving firms, the frequency of founder-CEO drops from 41.2% at IPO to 33.1% at IPO+3. The fact that approximately 25% of founder-CEOs exit the CEO position while the firm remains public suggests, contra the "call option on control" theory, that the founder either did not have sufficient control to keep herself in the CEO position or, if the exit was voluntary, the founder did not value whatever control she enjoyed as CEO.[40]

5. Do Founder-CEOs Have (And Keep) Substantial Voting Power?

While being CEO gives one power in a public firm, it does not necessarily provide real control or even substantial insulation from a control challenge. This lack of control may well help explain why, in our IPO research sample, 50% of founder-CEOs at IPO are no longer CEO at IPO+3. "Strong" control comes from a founder-CEO, along with co-founders, having a large block of shares conferring substantial voting power.[41] There is little known about founder voting power.[42] We thus investigate founder voting power in our IPO research sample at IPO and thereafter, to determine whether founders reacquire strong control in the event of IPO.

5.1 Founder Voting Power at and after IPO

To determine founder voting power at close of IPO, we rely on the "Principal Stockholders" section of the IPO prospectus. This section lists the stock ownership, after the

[40] Our results are similar to Kaplan et al. (2009), which finds in a sample of 50 VC-backed IPOs that 58% have a founder-CEO at the IPO, but that of the 32 firms that remained public for three years (and for which data could be obtained) only 38% had a founder-CEO at IPO+3.

[41] Athough board seats might be seen as an indicator of founder control, directors can be replaced by shareholders. Thus, what matters is shareholder voting power. For completeness, however, we collect data on founder board seats at IPO and find that, on average, they occupy 15.3% of these seats.

[42] Kaplan et al. (2009) provides some information about founder equity ownership around IPO in two samples of VC-backed firms (one 106 firms, the other 32 firms) but one cannot determine founder-CEO voting power at IPO.

issuance of new IPO shares, of (i) each person who owns at least 5% of the common stock, (ii) each director, (iii) each named executive officer, and (iv) all stockholders selling shares in the IPO. We aggregate the voting power of any founders on this list.[43] If no founder is listed, we record founder voting power as zero.[44] After IPO (at IPO+1 and IPO+3), we rely on the "Security Ownership of Certain Beneficial Owners and Management" section of the annual proxy statement, which provides similar information.

We begin by describing *average* voting power in the full IPO research sample and then focus more closely on firms with founder-CEO at IPO. For the full IPO research sample, average founder voting power is 11.1% at IPO and 6.3% at IPO+3, with higher equity ownership by founder-CEOs (Table 5, Panel A).[45] Table 3 provides an overview of factors associated with founder voting power. We find that founder voting power is significantly higher in firms that (1) receive less pre-IPO financing, (2) receive fewer rounds of VC financing, (3) go from initial VC financing to IPO more quickly, and (4) are dual-class.

A firm may increase founder voting power by giving the founder shares of a special class of common stock that has multiple votes per share, and then issuing ordinary common stock (with a single or zero vote per share) to the public. This structure—referred to as a dual-class IPO—was famously used by Google, Facebook and, most recently, Snap. We find only 34 dual-class IPOs among the 652 firms in the IPO research sample, of which 41.2% have founder-CEO at IPO. Table 3 shows that founder voting power at IPO is significantly higher in dual-class IPOs than in other IPOs (24.1% vs. 10.4%), reflecting the effects of this

[43] In other words, we implicitly assume that all founders vote together to support the founder-CEO. If not, our methodology overstates founder voting power and thus founder-CEO voting power.

[44] There may well be stock-owning founders who are no longer officers or directors and own less than 5% of the outstanding equity. For such firms (and for the IPO research sample firms in aggregate), we understate average founder voting power. However, our main interest is the frequency with which founders have large or controlling stakes, and our ability to estimate this frequency is not impaired by our inability to identify founders owning stakes smaller than 5%.

[45] Our results are consistent with Kaplan et al. (2009), which reports that in a sample of 32 VC-backed firms, average founder ownership at IPO is 9% (not distinguishing between firms with founder-CEOs and those without).

structure. But even among dual-class firms, founder-CEOs do not typically have outright control (>50% voting power). Google (which is in our IPO research sample), Facebook, and Snap—three prominent dual-class firms in which the founders had voting control after the IPO—are outliers in this respect.[46]

5.2 Founder-CEO/Blockholder at and after IPO

We now consider the frequency with which a founder is CEO at IPO and (by herself or with other founders) has at least 30% voting power ("founder-CEO/blockholder"), which we define as "strong control".[47]

Of the 652 firms in the IPO research sample, 46 (7.1%) had a founder with strong control upon completion of IPO (Table 5, Panel B). [48] Figure 3 illustrates time trends in the percentage of IPOs with a founder-CEO/blockholder. Panel A reports results over IPO vintage. It shows a general decline in the likelihood of strong control for more recent IPOs despite the increased use of dual-class structures in recent years (Field & Lowry, 2017). This decline may be driven by the increased time to IPO over the past decade (Gao et al. 2013; Rose & Solomon 2016) because, as Table 3 shows, time to IPO negatively correlates with founder control. Consistent with this explanation, Panel B of Figure 3 shows little change in

[46] Interestingly, Google's founders controlled only about 38% of the votes at IPO [Google prospectus August 18, 2004]. One year later, their voting control had increased to 57% [Google proxy statement April 10, 2006]. We assume that other holders of high-vote B shares sold stock, and these sales caused their B shares to convert to low-vote A shares.

[47] Generally, voting power of at least 40% is needed to make control non-contestable. We chose a minimum of 30% voting power to be overinclusive. For completeness, however, we also report frequencies for founder blocks with at least 20% and at least 40% voting power. Of course, the degree of protection provided by a 20% or 30% block depends heavily on (a) the identities and sizes of other shareholders; (b) the presence of activist shareholders and potential hostile acquirers in the market; and (c) structural defenses in the corporation's charter (e.g., staggered board); and (d) the (often evolving) legal rules that would govern a control battle at a particular firm at a particular point in time.

[48] In another 20 firms, the founder group had at least 30% of the equity voting power but a non-founder served as CEO [Table 5 – compare the first column, second entry of Panels B and C]. In such firms, a founder might have been able to remain CEO had he or she so chosen, and thus it might be appropriate to include these firm as well. Panel C of Table 5 thus reports results for different amounts of founder voting power, without regard to whether a founder is in the CEO position.

the rate of founder-CEO/blockholders when sorted by financing vintage instead of IPO vintage.

Again, we consider not only the extent of founder control after IPO but also whether this control is durable. By IPO+3, the number of firms in the IPO research sample with a founder-CEO/blockholder falls to 16 (2.5%) [Table 5, Panel B] as (a) firms de-list, (b) founders quit or are removed from the CEO position, or (c) founder voting power is diluted by founder stock sales and/or firm equity issuances. Table 5 also reports the number and percentage of founder-CEOs with 20% and 40% holdings, showing a similar pattern regardless of the choice of blockholder threshold. The pattern of founders losing strong control post IPO is illustrated in Figure 3 by comparing the likelihood of founder-CEO/blockholder at IPO (solid line) to IPO+3 (dotted line). Indeed, of the 46 founder-CEO/blockholders at IPO, only 16 remain at IPO+3 (Table 5). This decay is inconsistent with the "call option on control" theory. It shows that many founder-CEO/blockholders cannot, or do not wish to, maintain strong control. To the extent founders anticipate not having durable control after IPO, they are likely to place less value *ex ante* on any call option on control.

[INSERT FIGURE 3 ABOUT HERE]

6. *Ex Ante* Likelihood of Control Reacquisition via IPO

The "call option on control theory" assumes that the prospect of a control-returning IPO induces a control-valuing founder to cede control to VCs in exchange for financing. To evaluate this assumption, we examine the *ex ante* likelihood that a founder receiving an initial round of VC financing later reacquires either weak or strong control via IPO.

As noted above, only about 10% of VC-backed firms in our VC-Backed Population even make it to IPO. However, this figure reflects truncation caused by inclusion of firms

from recent financing vintages. To minimize truncation, we limit our *ex ante* analysis to pre-2003 financing vintages (i.e. 1990-2002). Such firms had at least 10 years to reach IPO before data collection. For these financing vintages, we find that 14.7% reached IPO before 2013.[49] They constitute 566 firms of the 652 firms in the full IPO research sample.

6.1 Founder-CEO

In the pre-2003 financing vintages, we find—similar to the full IPO research sample—that 42.2% of IPO firms had a founder-CEO (that is, "weak" control) at completion of IPO. From an *ex ante* perspective, however, the founder must clear two hurdles: (i) take the firm public, and (ii) remain CEO at IPO. We find that only 6.2% of founders in the VC-backed population are able to clear both hurdles and obtain weak control at IPO (Table 6). The *ex ante* likelihood that a firm will conduct an IPO and have durable weak control (that is, lasting through IPO+3) is about half that (3.3%).

Within pre-2003 financing vintages, however, we find that the *ex ante* probability of founder reacquiring weak control declines over time. The primary reason is the declining rate of IPOs since the late 1990s. For example, Table 1 reports that 30-40% of startups with early 1990s financing vintages reached IPO. By contrast, only 5-9% of firms in financing vintages 1992-2005 reach IPO. So, even though the the *ex post* likelihood (that is, conditional on IPO) of founder-CEO at IPO remains relatively stable, we find a large decline in *ex ante* likelihood over time.

Figure 4 illustrates this trend. For each year, we take firms receiving initial VC financing and from this annual cohort determine the number of firms with a founder-CEO at IPO and IPO+3. After adjusting for sampling rate, we estimate for each year the percent of

[49] This result can be obtained from Table 1 (panel A) by dividing the aggregate number of IPOs of firms receiving initial VC financing during 1990-2002 (n=1,627) by the total number firms entering the VC-backed population during 1990-2002 (n=11,104).

the VC-backed population with both (i) an IPO and (ii) a founder holding the CEO position (at IPO and at IPO + 3). Panel A (Figure 4) shows a sharp decline over time in the *ex ante* likelihood of founder-CEO at IPO and IPO+3. Indeed, for firms initially financed during 1999-2002, Figure 4 suggests a 2% to 4% *ex ante* likelihood of founder-CEO at IPO, with a lower likelihood at IPO+3.

[INSERT TABLE 6 & FIGURE 4 ABOUT HERE]

6.2 Founder-CEO/Blockholder

Figure 4 (Panel B) also reports the annual *ex ante* likelihood that a startup will go public with a founder-CEO/blockholder (the founder will have strong control). Over the entire sample period, the *ex ante* likelihood of strong control is less than 5%; for post-1997 financing vintages, it is 1% or less. Table 6 shows that 1% of VC-backed startups from 1990 to 2002 will go public and have a founder-CEO/blockholder at IPO. This *ex ante* probability falls to 0.4% for durable strong control (control lasting through IPO+3). At the initial VC financing, the likelihood of founder reacquiring durable, meaningful control has always been low, including when Black & Gilson (1998) was published, casting doubt on the theory that the possibility of an IPO gives founders a valuable call option on control at the time of initial VC financing.

7. VC RETURNS AND FOUNDER CONTROL IN IPO FIRMS

According to the "call option on control" theory, VCs implicitly promise to return control to those founders who are the most successful from VCs' perspective—those who can achieve an IPO exit. Looking across *all* VC-backed firms, one would expect a correlation between (a) founders reacquiring control and (b) VC funds' returns upon exit. Indeed, IPO exits are on average more lucrative than M&A exits, some of which are essentially a mere

transfer of IP and human capital ("acqui-hires") rather than a sale of a going concern,[50] and founders *sometimes* retain control following an IPO but never retain control in M&A exits.[51]

But the "call option on control" theory might also predict that, among IPO firms, VC returns should correlate with founder control at IPO. If return of control is a carrot dangled in front of founders to induce them to generate returns for VCs, we would expect that carrot to be disproportionately given to those founders of IPO firms that generate the highest returns for VCs. We thus investigate whether founder control is correlated with VC profits across IPO firms.

Table 7 provides a list of the largest IPOs in our IPO research sample (the 27 firms with market caps exceeding $1.5 billion at IPO). Included are some familiar names, such as Google, Nextel, Groupon, and Zynga. The frequency of founder-CEO at IPO is 52%, slightly higher than the baseline rate (41%) in the full 652-firm sample. Also higher are average founder voting power at IPO (19% vs. 11%) and dual-class frequency (33% vs. 5.2%). All of this suggests some correlation between success and founder control. But even in these 27 large IPOs almost 50% lack founder-CEO at IPO, and the frequency of founder-CEO/blockholder at IPO is only 14.8% (vs. 7.1% in the entire IPO research sample).

To investigate the link between financial returns and founder control across the entire research sample in more depth, we consider two alternative (albeit crude) estimates for VCs' returns. The first is *VC Net Payout.* We start by computing VCs' gross payout upon

[50] See Broughman & Fried (2010).

[51] See Section 2.

exit: VCs' estimated aggregate share ownership at IPO,[52] multiplied by the IPO stock price.[53] We then obtain *VC Net Payout* by subtracting VCs' total investment from VCs' gross payout.

The second method of estimating VCs' returns is *VC IRR*. Using data provided by the VX database on the timing and amount of each financing round, and using the same assumptions about VCs' gross payouts that we use to estimate *VC Net Payout*, we calculate the IRR on VC investments in each firm.[54]

The advantage of *VC IRR* over *VC Net Payout* is that it adjusts (or discounts) for time value of money. The disadvantage is that *VC IRR* can overstate the magnitude of VC profits when VC investment is close in time to the IPO. Neither measure is ideal; we thus include both.

To reduce truncation bias, we use firms from pre-2003 financing vintages that IPO before 2013. Figure 5 sorts these firms into deciles based on *VC Net Payout* and *VC IRR* for each firm. We report the likelihood of founder-CEO at IPO for each decile. The right side of each graph represents the highest decile of *VC Net Payout* or *VC IRR* respectively, and the left side represents the lowest. Figure 5 suggests there is no relationship between founder-CEO at IPO and VC returns; the frequency of founder-CEO at IPO is around 40% in each decile.

[INSERT TABLE 7 and FIGURE 5 ABOUT HERE]

[52] We cannot directly observe the aggregate equity ownership of a firm's VC investors, as this amount is not disclosed on the IPO prospectus and is not provided by VX. Instead, for each firm, we assume that non-founder employees hold approximately 15% of pre-IPO equity. (VC-backed firms generally reserve 10% to 15% of their cap table for employee equity.) We then take the total number of outstanding shares upon completion of IPO and we subtract (i) the number of shares sold in the IPO; (ii) the number shares owned by the firm's founders; and (iii) the number of shares assumed held by non-founder employees. We assume the remaining shares are held by VC investors. Admittedly, our estimate is rather crude, as non-founder employees may hold more or less than the assumed 15%. Nonetheless, for making a relative comparison among firms, our assumption should provide a reasonable proxy.

[53] The actual timing of VC exit is generally delayed by lockups that prevent the VCs from registering and selling their shares until (typically) 180 days after the IPO. Unfortunately, we cannot observe the actual timing or price at which the VCs in each firm sell their shares. Instead, we use the IPO offering price as a rough proxy for exit price.

[54] We use the xirr function in Excel to generate values for *VC IRR.*

To investigate the connection between VC profits and founder control at IPO in a multivariate setting, we estimate the following equation:

$$Founder\ Control = \alpha + \beta_1 * VC\ Profits + \boldsymbol{\beta} * \boldsymbol{X} + \varepsilon$$

where ε is the error term and $\boldsymbol{X}$ is a vector of included control variables. *Founder Control* represents two different dependent variables used in the analysis below:

(i) *Founder-CEO* equals 1 if founder-CEO at IPO, and 0 otherwise;

(ii) *Founder-CEO/Blockholder* equals 1 if founder-CEO at IPO and founders (in aggregate) have voting power of least 30% at close of IPO, and 0 otherwise.

VC Profits represents the two explanatory variables—*VC Net Payout* and *VC IRR*—which we use as proxies for VC returns at each firm. In the regression context, *VC IRR* is winsorized at the 90% level to reduce the impact of extreme IRR values. All variables are observed at close of IPO.

We control for several explanatory variables that may impact founder control, including: (i) years from initial VC financing to IPO, (ii) amount of pre-IPO VC financing, (iii) number of VC rounds, (iv) number of VC firms, and (v) presence of an elite VC firm (as defined above). We also control for dual-class voting structure (whose use suggests an intent to preserve founder control), Delaware domicile, and California headquarters. Each model also includes dummies for business sector, headquarters location, and financing vintage year.

Results are reported in Table 8. In each model, our proxies for VC returns have an insignificant (or negative) impact on the likelihood of founder-control reacquisition in the event of IPO. For example, in model 1 we find an insignificant correlation between *VC Net Payout* and *Founder-CEO,* and in model 2 we find a negative correlation (significant at 10% level) between *VC IRR* and *Founder-CEO.* Similarly, we find a negative correlation between VC returns and (i) likelihood of founder-CEO/blockholder at IPO (models 3 and 4) and (ii)

likelihood of founder equity of at least 30% at IPO (models 5 and 6). If anything, the results in Table 8 suggest—contrary to the control-reacquisition theory—that founders of IPO firms that generate the most profits for VCs are *less* likely to reacquire control at IPO.[55]

[INSERT TABLE 8 ABOUT HERE]

8. Discussion

As discussed in Section 6, the *ex ante* likelihood that a founder receiving first-round VC financing will reacquire control at IPO is extremely low, whether weak (CEO-founder) or strong (CEO-founder/blockholder). Whether the control is weak or strong, the *ex ante* likelihood that it will be durable is even lower; about 50% of founders lose by IPO+3 whatever type of control they reacquire at IPO, as many IPO firms delist shortly after IPO, and many founders leave the CEO position even when the firm remains public. It seems very unlikely that most founders, in deciding whether to accept funding from VCs, would weigh such low-probability outcomes heavily.

Despite the low *ex ante* probability of reacquiring control via IPO, we cannot rule out the possibility that this prospect sways *some* founders to give up control to VCs, and *these* founders' willingness to accept VC financing drives the venture ecosystem. There could be many founders who (a) believe they are "above average" and thus very likely to reacquire durable control via IPO, and would turn down VC funding if such control reacquisition were not possible; or (b) accept VC financing only because they receive a call option on control, but then later *choose* not to exercise the option. And perhaps there are enough such founders to generate a large fraction of VC returns and underwrite the ecosystem's vitality. Thus, our

[55] This finding is consistent with evidence that VCs' replacement of founders can improve startup performance (Ewens & Marx 2018).

findings cannot disprove the "call option on control" theory linking VC and stock markets. All they can do is shed light on its plausibility.

However, current trends in VC investing and exits, taken as a whole, provide additional reason to be skeptical that the VC ecosystem is driven by VCs' ability to give founders a call option on control. As noted earlier, IPO frequency has declined dramatically over the last 15 years. Thus, the *ex ante* likelihood of control reacquisition is likely to be far lower now than in the past. After 2000, the IPO market essentially dried up (Bartlett et al. 2017; Gao et al. 2013; Rose & Solomon 2016) and returned to low, pre-1990 levels, in both dollar volume and number of exits. M&A exits, which at best make founders hired managers of the acquirer, appear to have become frequent and larger.[56] In theory, the decrease in IPOs could have been more than offset by an increase in the *ex post* frequency of founder control (i.e., conditional on IPO). But our data show that this *ex post* likelihood has been flat or declining over time.

If VCs' ability to give founders a valuable call option on control stimulates venture activity, we would expect VC activity to have declined in recent years as it became apparent to founders that the *ex ante* likelihood of IPO (as of initial VC financing) was starting to approach zero. However, VC investment, which hovered in the range of $25-$40 billion annually during 2001-2013, jumped to over $60 billion annually in 2014-2016, approaching late-1990s levels.[57] To be sure, if there were more IPOs and a greater likelihood of founder-control reacquisition, VC investment might have been even higher (or better targeted and more profitable). But the point is this: there can be robust venture activity in the United

[56] One of the largest M&A exits to date was Facebook's acquisition of WhatsApp for $19 billion in 2014 (Olson 2014). In 2016, there appears to have been at least 1 M&A exit over $10 billion (Stemcentrx, $10.2 billion), and at least 5 M&A exits between $1 and $10 billion (Acerta Pharma, $4 billion; Jet, $3.3 billion; Jasper, $1.4 billion; Afferent Pharmaceuticals, $1.25 billion; Cruise Automation, $1 billion)(Pitchbook, 2017; Bizjournals.com 2017).

[57] See: https://www.statista.com/statistics/277501/venture-capital-amount-invested-in-the-united-states-since-1995/.

States—indeed, more VC investment than the rest of the world combined—even if the *ex ante* likelihood of IPO exit has become extremely remote.

9. Conclusion

We have investigated the likelihood that founders of U.S. VC-backed startups reacquire control at IPO, in part to shed light on the plausibility of the claim that VCs' ability to use the prospect of an IPO exit as a means to give founders a call option on control can explain why a deep and liquid stock market is required to sustain a robust VC ecosystem.

Examining more than 18,000 U.S. startups that received initial VC financing between 1990 and 2012, we find that it is highly unlikely that any given founder will reacquire even weak control (founder is CEO) at IPO that is durable (lasts at least three years). The *ex ante* likelihood that any given founder receiving VC backing will reacquire durable weak control via IPO is approximately 3%. The *ex ante* likelihood of reacquiring durable strong control at IPO (founder is CEO and the founder group controls at least 30% of equity voting power) is much lower: about 0.4%.

Our results suggest that founders, who must decide years before a potential IPO whether to accept initial VC funding, are unlikely to put much weight on the possibility of reacquiring control in an IPO. Our findings, along with the fact that the IPO market has been moribund for the last 15 years even as VC financing in the U.S. is nearing peak levels, cast some doubt on the validity of the "call option on control" theory linking IPOs and venture investment, and thus call into question the more general proposition that deep and liquid stock markets are necessary for a robust VC ecosystem.

REFERENCES

Aghion, P., Bolton, P., 1992. An Incomplete Contracts Approach to Financial Contracting. Review of Economic Studies 59, 473-494.

Armour, J., Cumming, D., 2006. The Legislative Road to Silicon Valley. Oxford Economic Papers 58, 596-635.

Baker, M., Gompers, P., 2003. The Determinants of Board Structure at the Initial Public Offering. The Journal of Law and Economics 46, 569-598.

Bartlett III, R., Rose, P., Davidoff-Solomon, S., 2017. The small IPO and the investing preferences of mutual funds. Journal of Corporate Finance, 47, 151-173.

Becker, R.M., Hellmann, T.F., 2003. The Genesis of Venture Capital - Lessons from the German Experience. Working paper available at https://ssrn.com/abstract=386763.

Bengtsson, O., 2011. Covenants in venture capital contracts. Management Science, 57, 1926-1943.

Black, B.S., Gilson, R.J., 1998. Venture Capital and the Structure of Capital Markets: Banks Versus Stock Markets. Journal of Financial Economics 47, 243-277.

Black, B.S., Gilson, R.J., 1999. Does Venture Capital Require and Active Stock Market? Journal of Applied Corporate Finance 11, 36-48.

Broughman, B., Fried, J., 2010. Renegotiation of Cash Flow Rights in the Sale of VC-Backed Firms. Journal of Financial Economics 95, 384-399.

Broughman, B., Fried, J., 2013. Carrots and Sticks: How VCs Induce Entrepreneurial Teams to Sell Startups. Cornell Law Review 98, 1319.

Broughman, B., Fried, J., Ibrahim, D.M., 2014. Delaware Law as Lingua Franca: Theory and Evidence. Journal of Law and Economics 57, 865-895.

Broughman, B. 2010. Investor Opportunism and Governance in Venture Capital. Douglas Cumming (Ed.), Venture Capital: Investment Strategies, Structures and Policies, Wiley, Hoboken, N.J..

Conti, A., Graham, S.J.H., 2016. Prominent Investor Influence on Startup CEO Replacement and Performance. Working paper available at SSRN: https://ssrn.com/abstract=2738835.

Cummings, J.D., MacIntosh, G.J., 2003. A Cross-Country Comparison of Full and Partial Venture Capital Exits. Journal of Banking & Finance 27, 511-548.

Da Rin, M., Nicodano, G., Sembenelli, A., 2006. Public Policy and the Creation of Active Venture Capital Markets. Journal of Public Economics 90, 1699-1723.

Ewens, M., Farre-Mensa, J., 2017. The Evolution of the Private Equity Market and the Decline in IPOs. Working paper available at SSRN: https://ssrn.com/abstract=3017610.

Ewens, M., Marx, M. 2018. Founder Replacement and Startup Performance. Review of Financial Studies 31, 1533-1565.

Field, L.C., Hanka, G., 2001. The Expiration of IPO Share Lockups. Journal of Finance 56, 471-500.

Field, L.C., Lowry, M., 2017. Contrasts in Governance: Newly Public Firms versus Mature Firms.Working paper at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2889333.

Fried, J.M., Ganor, M., 2006. Agency Costs of Venture Capitalist Control in Startups. New York University Law Review 81, 967-1025.

Gao, N., Jain, B.A., 2012. Founder Management and the Market for Corporate Control for IPO Firms: The Moderating Effect of the Power Structure of the Firm. Journal of Business Venturing 27, 112-126.

Gill, A., Walz, U., 2012. Going Public—Going Private: The Case of VC-Backed Firms. Working paper available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1998281.

Gilson, R.J., 2003. Engineering a Venture Capital Market: Lessons from the American Experience. Stanford Law Review 55, 1067-1103.

Gompers, P.A., 1995. Optimal investment, monitoring, and the staging of venture capital. The journal of finance, 50, 1461-1489.

Gompers, P.A., 1996. Grandstanding in the Venture Capital Industry. Journal of Financial Economics, 42, 133-156.

Gompers, P., Lerner, J., 2001. The Venture Capital Revolution. The Journal of Economic Perspectives 15, 145-168.

Hellmann, T., Puri, M., 2002. Venture capital and the professionalization of start-up firms: Empirical evidence. The Journal of Finance, 57, 169-197.

Ibrahim, D., 2009. Financing the Next Silicon Valley. Wash. UL Rev., 87, 717-762.

Jain, B.A., Tabak, F., 2008. Factors Influencing the Choice between Founder versus non-Founder CEOs for IPO Firms. Journal of Business Venturing 23, 21-45.

Jeng, L.A., Wells, P.C., 2000. The Determinants of Venture Capital Funding: Evidence Across Countries. Journal of Corporate Finance 6, 241-289.

Jensen, M.C. Meckling, W.H., 1976. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. Journal of Financial Economics 3, 305-360.

Kaplan, S.N., Sensoy, B.A., Strömberg. P., 2009. Should Investors Bet on the Jockey or the Horse? Evidence from the Evolution of Firms from Early Business Plans to Public Companies. Journal of Finance 64, 75-115.

Kaplan, S.N., Strömberg, P., 2003. Financial Contracting Theory Meets the Real World: an Empirical Analysis of Venture Capital Contracts. Review of Economic Studies 70, 281–315.

Metzger, G., Bauer, A., 2013. Germany's private equity market lacks venture capital. KFW Research 98.

Lee, P.M.,Wahal, S., 2004. Grandstanding, certification and the underpricing of venture capital backed IPOs. Journal of Financial Economics, 73, 375-407.

Loughran, T., Ritter, J., 2004. Why Has IPO Underpricing Changed over Time? Financial Management 33, 5-37.

Marovac, N., 2017. Europe's venture capitalists are closing the gap with Silicon Valley. World Economnic Forum (https://www.weforum.org/agenda/2017/11/europe-venture-capitalists-silicon-valley/).

McKinsey & Company Global Institute. 2015. The Future of Japan: Reigniting Productivity and Growth.

Metrick, A., Yasuda, A., 2010. Venture Capital and the Finance of Innovation (2nd ed.). Wiley, Hoboken.

Michelacci, C., Suarez, J., 2004. Business Creation and the Stock Market. The Review of Economic Studies 71, 459-481.

Oehler, A., Pukthuanthong, K., Rummer, M., Walker, T. Venture Capital in Europe: Closing the gap to the U.S. in Gregoriou, G.N., Kooli, M., Kraeussl, R., (eds). 2007. Venture Capital in Europe. Butterworth-Heinemann, Burlington.

Olson, Parmy, 2014. Facebook Closes $19 Billion WhatsApp Deal. https://www.forbes.com/sites/parmyolson/2014/10/06/facebook-closes-19-billion-whatsapp-deal/#1053f8535c66

Pollock, T.G., Fund, B.R., Baker, T., 2009. Dance with the One that Brought You? Venture Capital Firms and the Retention of Founder-CEOs. Strategic Entrepreneurship Journal 3, 199-217.

Puri, M., Zarutskie, R., 2012. On the Life Cycle Dynamics of Venture-Capital-and non-Venture-Capital-Financed Firms. The Journal of Finance 67, 2247-2293.

Rock, E.B., 2001. Greenhorns, Yankees, and Cosmopolitans: Venture Capital, IPOs, Foreign Firms, and U.S. Markets. Theoretical Inquiries in Law 2, 711-744.

Rose, P., Davidoff Solomon, S., 2016. Where Have All the IPOs Gone? The Hard Life of the Small IPO. Harvard Business Law Review 6, 83-128.

Wasserman, N., 2003. Founder-CEO Succession and the Paradox of Entrepreneurial Success. Organization Science 14, 149-172.

Wasserman, N., 2012. The Founder's Dilemmas: Anticipating and Avoiding the Pitfalls That Can Sink a Startup. Princeton University Press , Princeton.

Table 1: Comparison: VC-Backed Population, Full IPO Subgroup, and IPO Research Sample

This table reports data for 18,809 US-based VC-backed firms receiving initial VC financing during the period 1990-2012 ("financing vintages" 1990-2012) and at least $5 million in total VC financing (the VC-backed population), the 1,961 of these firms that had an IPO (the full IPO subgroup) before 2013, and the 652 firms of the full IPO subgroup for which we have more detailed information (the IPO research sample). Data are sorted by year of initial VC investment (Panel A), business sector (Panel B), and headquarters state (Panel C). Columns report mean and median amounts of total VC financing separately for the VC-backed population (n=18,809), the full IPO subgroup (n=1,961), and the IPO research sample (n=652).

Panel A: Sorted by Financing Vintage

	VC-Backed Population			*Full IPO Subgroup*				*IPO Research Sample*		
		VC Funding ($M)			Percent of	VC Funding ($M)			VC Funding ($M)	
Year	# of Firms	Mean	Median	# of Firms	Population	Mean	Median	# of Firms	Mean	Median
1990	202	47.8	13.2	63	31.2%	112.2	24.9	18	54.7	31.4
1991	169	35.8	13.5	70	41.4%	42.6	17.1	29	29.6	17.4
1992	267	47.7	20.2	112	41.9%	68.2	26.7	35	35.4	29.0
1993	257	56.9	19.5	86	33.5%	66.2	23.0	37	54.7	28.2
1994	342	64.7	21.8	119	34.8%	112.0	26.3	47	63.3	41.1
1995	673	46.0	22.0	202	30.0%	74.4	47.1	81	84.6	49.6
1996	944	45.8	24.7	252	26.7%	67.8	40.2	83	70.5	48.5
1997	1,023	47.9	27.1	180	17.6%	84.8	48.6	65	85.5	46.9
1998	1,205	59.5	31.4	160	13.3%	111.5	57.5	44	105.3	54.6
1999	2,064	50.0	27.0	155	7.5%	108.3	60.0	48	98.9	70.2
2000	2,488	41.6	20.0	112	4.5%	158.4	74.3	36	121.9	69.4
2001	831	40.4	21.9	55	6.6%	94.4	64.9	21	105.4	64.9
2002	639	50.2	26.0	61	9.5%	146.8	89.8	22	136.7	100
2003	634	51.1	25.1	37	5.8%	142.9	106.8	11	189.5	97.3
2004	775	45.4	23.4	64	8.3%	120.0	83.5	17	143.6	85.6
2005	842	53.4	24.7	37	4.4%	252.1	103.8	10	200.4	101.4
2006	913	51.0	22.5	48	5.3%	121.6	103.3	14	115.1	47.5
2007	958	57.3	22.0	51	5.3%	188.6	98.2	11	246.2	93.2
2008	827	59.4	19.3	31	3.7%	136.6	120.0	7	134.2	119.6
2009	543	72.7	24.1	19	3.5%	233.5	124.1	4	354.6	295.3
2010	694	75.6	22.3	28	4.0%	170.1	105.4	7	298.4	93.2
2011	762	47.1	22.0	10	1.3%	222.7	103.2	3	180.7	163
2012	757	37.6	18.4	9	1.2%	142.9	94.0	3	76.2	90.8
All Years	**18,809**	**50.6**	**23.3**	**1,961**	**10.4%**	**98.7**	**55.6**	**652**	**94.1**	**51.8**

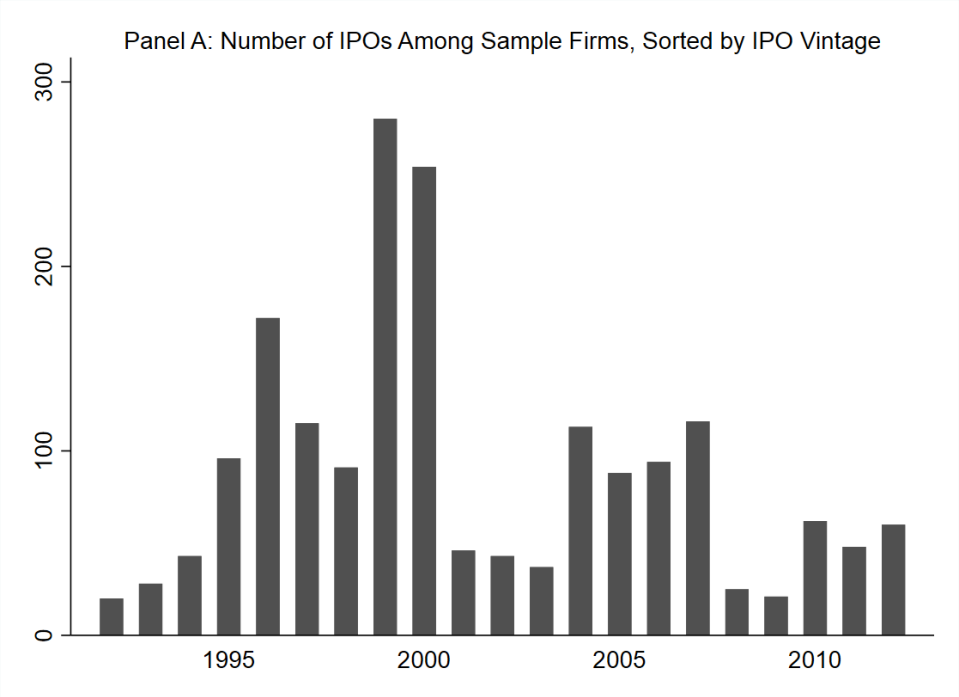
Panel B: Sorted by Sector

	VC-Backed Population			*Full IPO Subgroup*				*IPO Research Sample*		
		VC Funding ($M)			Percent of	VC Funding ($M)			VC Funding ($M)	
Sector	# of Firms	Mean	Median	# of Firms	Population	Mean	Median	# of Firms	Mean	Median
Biotechnology	1201	63.6	38.9	290	24.1%	103.5	93.8	95	100.8	81.7
Communications	1587	60.2	27	191	12.0%	117.2	54.4	54	120.3	49.7
Computer Hardware	622	38.3	20.4	62	10.0%	57.9	35.9	19	36.9	27.3
Computer Software	4407	42.1	21	318	7.2%	84.6	34.1	94	70.1	29
Consumer Related	860	50.9	18.6	110	12.8%	144.1	39	36	72.0	42.2
Industrial/Energy	830	60.2	22.3	82	9.9%	155.9	57.5	22	214.1	66.8
Internet Specific	4424	44.1	21.6	359	8.1%	112.5	50.4	117	96.0	54
Medical/Health	1945	47.8	26.7	295	15.2%	77.8	49.9	117	80.5	53
Other Products	1478	70.5	18.6	135	9.1%	194.3	50	36	132.7	64.9
Semiconductors	1082	46.9	28.1	107	9.9%	73.7	42.1	38	84.4	46.5
All Firms	**18,809**	**50.6**	**23.3**	**1,961**	**10.4%**	**98.7**	**55.6**	**652**	**94.1**	**51.8**

Panel C: Sorted by State of Headquarters

	VC-Backed Population			*Full IPO Subgroup*				*IPO Research Sample*		
		VC Funding ($M)			Percent of	VC Funding ($M)			VC Funding ($M)	
Sector	# of Firms	Mean	Median	# of Firms	Population	Mean	Median	# of Firms	Mean	Median
California	6981	51.3	26.2	734	10.5%	93.3	54.8	260	80.9	52.3
Massachusetts	1870	42.9	25.3	185	9.9%	84.2	61.2	69	76.3	45
Texas	1089	52.2	24.7	107	9.8%	112.0	47.9	28	89.7	50.2
New York	1284	44.2	20.4	114	8.9%	93.4	42.6	26	130.1	57.3
Other	7579	52.7	20.8	878	11.6%	134.2	48.1	269	108.5	53.8
All Firms	**18,809**	**50.6**	**23.3**	**1,961**	**10.4%**	**98.7**	**55.6**	**652**	**94.1**	**51.8**

Figure 1: Number and Frequency of IPO Exits in the VC-Backed Population



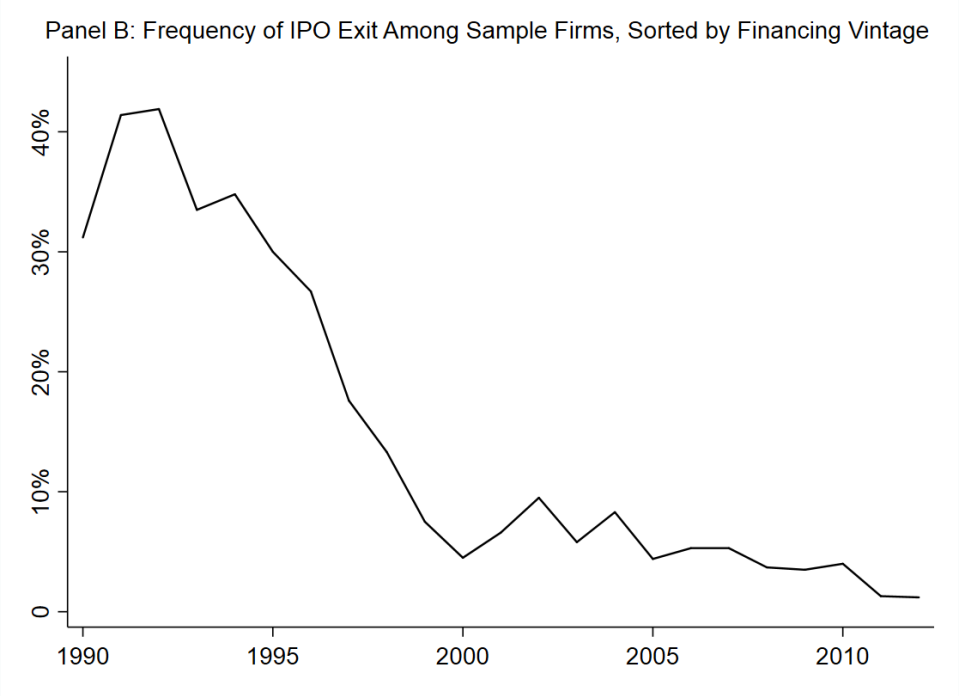


Table 2: Descriptive Statistics for IPO Research Sample

This table reports descriptive statistics for 652 US-based VC-backed IPO firms with initial VC financings during the period 1990-2012.

	All Years			*Split by Year of First VC Financing*				
	Mean	Med	SD	1990 - 1994	1995 - 1999	Mean 2000 - 2004	2005 - 2009	2010- 2012
Number of observations	652			166	320	107	46	13
Number of VC investors	8.6	8	5.3	8.7	8.8	8.2	7.6	6.9
Number of financing rounds	5.6	5	3.3	5.9	5.3	5.5	7.1	4
Years from first VC financing to IPO	4.2	3.7	2.9	4.2	4.2	5.1	2.5	.23
Amount of financing received ($M)	94.1	51.8	134.7	48.7	86.3	132.1	188.7	219.9
Market cap at IPO (in $M)	495	252	1,240	208	564	493	1,150	594
Dual class (%)	5.2%			3.6%	5.3	1.9	15.2	15.4
Financed by top VC firm (%)	24.3%			38.5%	19.7	15.1	31.8	7.6
State of Incorporation								
--Delaware	79.4%			67.5%	83.7	89.7	65.2	92.3
--California	8.3%			18.1%	6.9	1.9	0	0
--Other State	12.3%			14.4%	9.4	8.4	34.8	7.7

Table 3: Founder Control Right At IPO

For 652 US-based VC-backed IPO firms that receive initial VC financing during the period 1990-2012, this table reports data on measures of founder control right after ("at") IPO (Panel A) and difference-of-means tests correlating founder control with various firm characteristics (Panel B).

Panel A

	All Years	***Sorted by Year of First VC Financing***				
		1990 - 1994	1995 - 1999	2000 - 2004	2005 - 2009	2010-2012
Founder-CEO at IPO	41.2%	44.5%	44.4%	31.8%	32.6%	30.8%
Founder voting power (%) at IPO	11.1%	10.3%	12.4%	8.3%	12.7%	4.8%

Panel B

Amount of Pre-IPO Financing	**Obs.**	**Founder CEO**	**Founder Voting Power**
- *Above Median ($51.8m)*	326	37.7%	8.9%
- *Below Median*	326	44.7%	13.1%
Difference of Means		-.070*	-.042***
Number of Financing Rounds			
- *> 5*	287	39.4%	8.3%
- *5 or fewer*	365	42.7%	13.4%
Difference of Means		-.033	-.051***
Years from First Financing to IPO			
- *Above Median (3.7 years)*	315	36.8%	7.8%
- *Below Median*	337	45.4%	14.3%
Difference of Means		-.086**	-.065***
Dual Class IPO			
- *Yes*	34	41.2%	24.1%
- *No*	618	41.2%	10.4%
Difference of Means		.000	.137***
Financed by Top-10 VC Firm			
- *Yes*	158	36.1%	11.4%
- *No*	491	42.9%	10.9%
Difference of Means		-.068	.005

Table 4: Firm and Founder-CEO Survival At and After IPO

For 652 US-based VC-backed IPO firms that received initial VC financing during 1990-2012, this table reports firm and founder-CEO survival for 1 and 3 years post IPO.

Panel A: CEO Survival

	IPO	IPO+1	IPO+3
Surviving Firms	652	530	417
Founder CEO #	269	209	138
Founder CEO %			
- of surviving IPO research sample	41.2%	39.4%	33.1%
- of IPO research sample	41.2%	32.1%	21.2%

Panel B: Firm Survival (unconditional)

	At IPO	IPO+1	IPO+3
Surviving Firms	652	530	417
Non-Surviving Firms (cumulative total)		122	235
-- Non-survival due to merger-sale		*53*	*124*
-- Non-survival for other reasons		*69*	*111*

Panel C: Firm Survival (conditional on Founder-CEO at IPO)

	At IPO	IPO+1	IPO+3
Surviving Firms w/ Founder-CEO at IPO	269	235	197
Non-Surviving Firms (cumulative total)	.	34	70
-- Non-survival due to merger-sale	.	*9*	*32*
-- Non-survival for other reasons	.	*25*	*38*

Table 5: Founder Voting Power At and After IPO

This table reports data on founder voting power (at IPO, IPO+1, and IPO+3) in 652 US-based VC-backed IPO firms that received initial VC financing during 1990-2012.

Panel A

	IPO	IPO+1	IPO+3
Founder Voting Power % (unconditional)	11.1%	8.4%	6.3%
Founder Voting Power % (conditional on CEO)			
- founder-CEO at IPO	17.3%	13.1%	10.0%
- not founder-CEO at IPO	6.6%	4.7%	2.9%

Panel B

	IPO	IPO+1	IPO+3
F-CEO + ≥20% Voting Power	80	45	25
-- % of IPO Research Sample	*12.3%*	*6.9%*	*3.8%*
F-CEO + ≥30% Voting Power	46	25	16
-- % of IPO Research Sample	*7.1%*	*3.8%*	*2.5%*
F-CEO + ≥40% Voting Power	28	10	5
-- % of IPO Research Sample	*4.3%*	*1.5%*	*0.8%*

Panel C

	IPO	IPO+1	IPO+3
Founders with ≥20% Voting Power	133	78	47
-- % of IPO Research Sample	*20.4%*	*12.0%*	*7.2%*
Founders with ≥30% Voting Power	66	38	20
-- % of IPO Research Sample	*10.1%*	*5.8%*	*3.1%*
Founders with ≥40% Voting Power	42	24	10
-- % of IPO Research Sample	*6.4%*	*3.7%*	*1.5%*

Figure 2: *Ex Post* Likelihood of Founder-CEO At and After IPO

Using data from a sample of 652 US-based VC-backed IPO firms, the figures below plot Lowess curves illustrating the likelihood a sample firm has founder-CEO at IPO, IPO+1 and IPO+3. Data are separately displayed based on IPO vintage (Panel A) and financing vintage (Panel B).

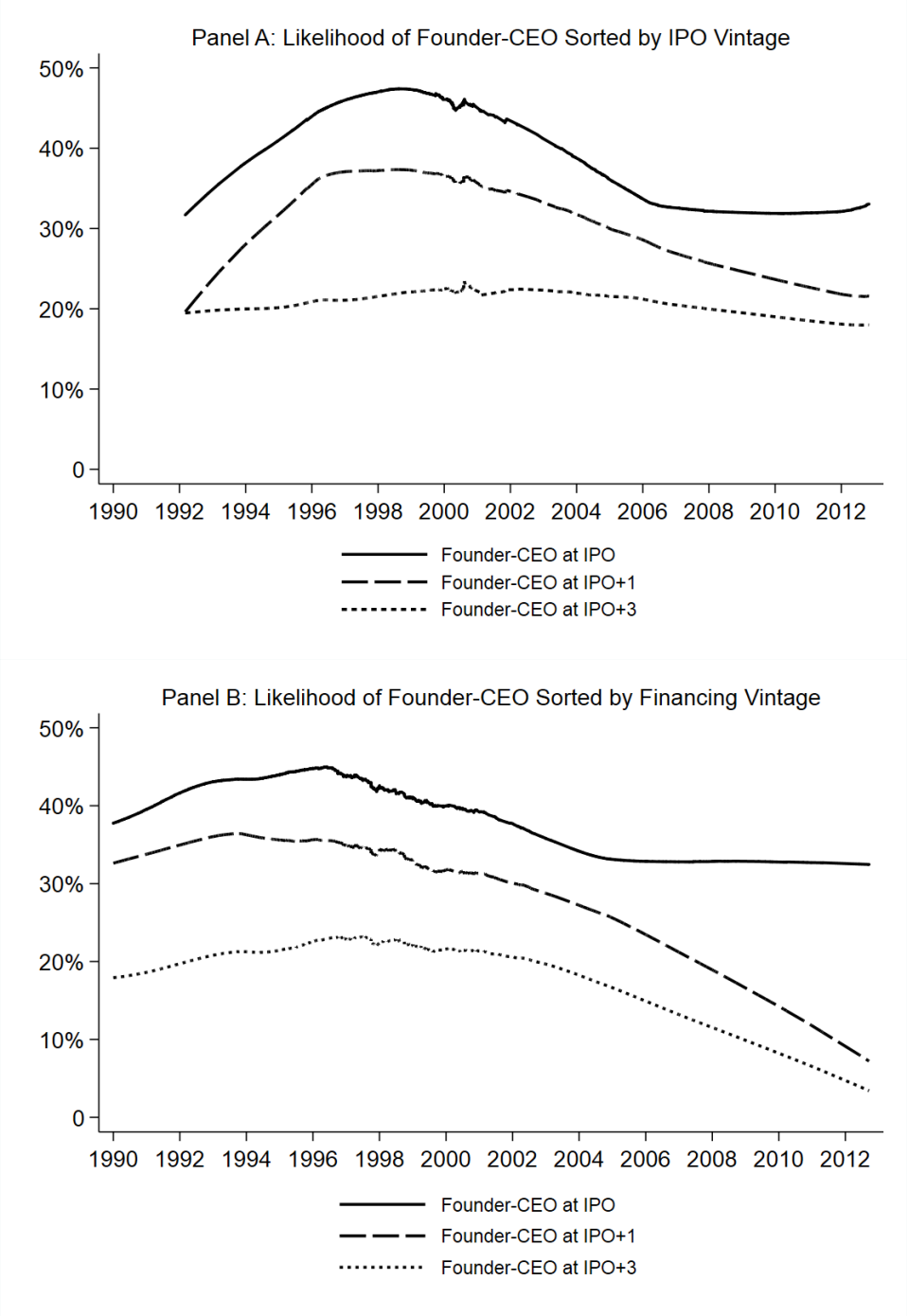
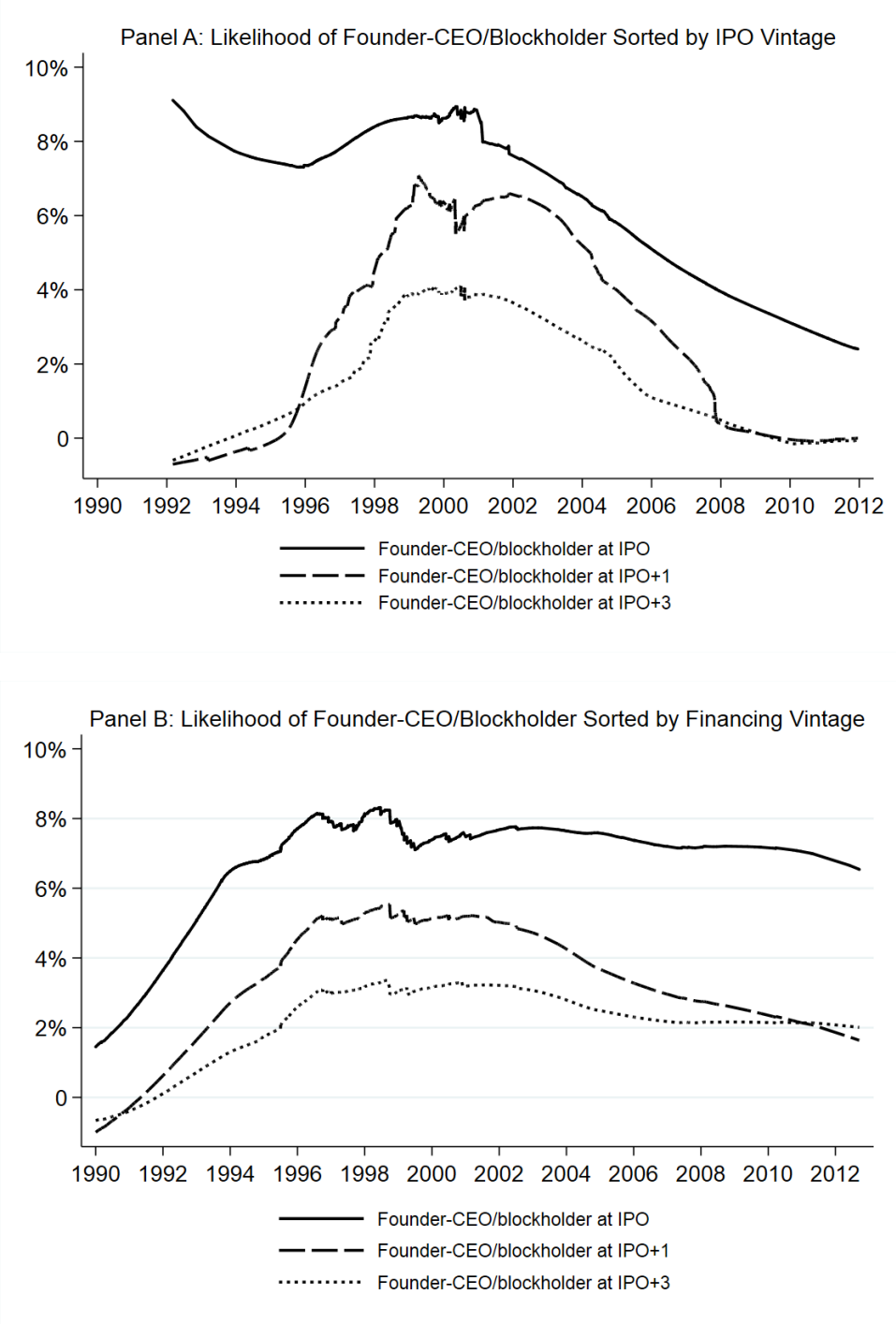


Figure 3: *Ex Post* Likelihood of Founder-CEO/Blockholder At and After IPO

Using data from a sample of 652 US-based VC-backed IPO firms, the figures below plot Lowess curves illustrating the likelihood that a sample firm has (at IPO, IPO+1, and IPO+3) both measures of founder control: (1) founder-CEO and (2) founders in aggregate holding at least 30% of voting rights. Data are separately displayed based on IPO vintage (Panel A) and financing vintage (Panel B).[58]



[58] Generally, the frequency of founder control at IPO+1 is higher than at IPO+3; the apparently opposite relationship over some periods is an artifact of the Lowess curve's smoothing function.

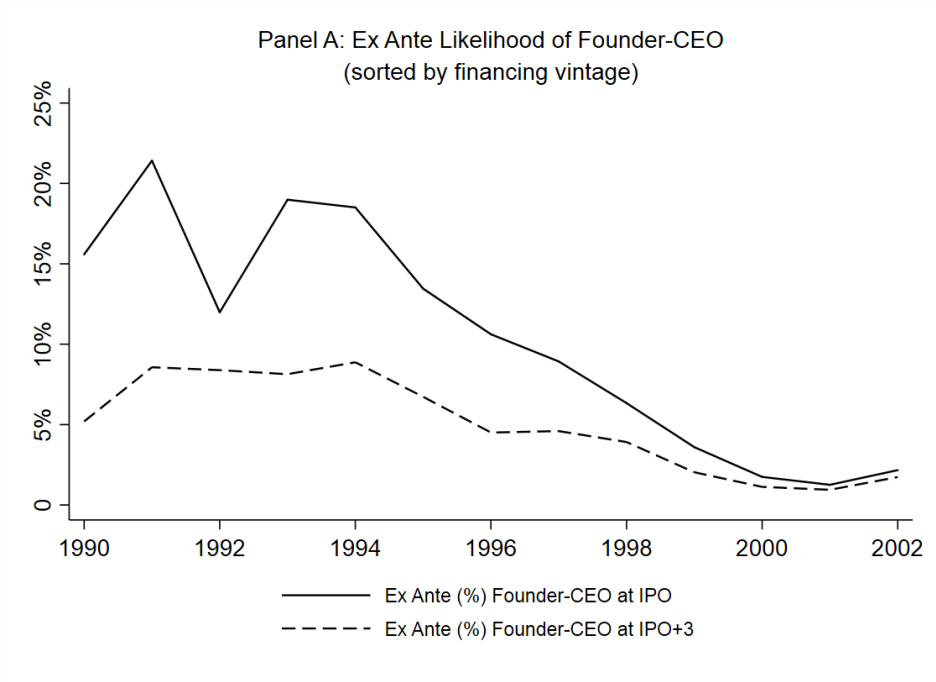
Table 6: *Ex Ante* Likelihood of Founder Control At and After IPO

Using data from a sample of 11,104 US-based VC-backed firms receiving initial VC financing during 1990-2002 (pre-2003 financing vintages of the VC-backed population), this table reports the number and percentage of firms that ultimately had an IPO exit with a founder-CEO (or with founder-CEO and various amounts of founder voting power), and the corresponding number and percentages for IPO+1 and IPO+3.

	IPO	IPO+1	IPO+3
Founder-CEO (F-CEO)	239	194	126
-- % of VC-backed population	*6.2%*	*5.0%*	*3.3%*
F-CEO + ≥20% voting power	71	41	21
-- % of VC-backed population	*1.8%*	*1.1%*	*0.5%*
F-CEO + ≥30% voting power	39	21	14
-- % of VC-backed population	*1.0%*	*0.5%*	*0.4%*
F-CEO + ≥40% voting power	23	9	4
-- % of VC-backed population	*0.6%*	*0.2%*	*0.1%*

Figure 4: *Ex Ante* Likelihood of Founder Control at IPO

Using data from a sample of 11,104 US-based VC-backed firms receiving initial VC financing during 1990-2002 (pre-2003 financing vintages of the VC-backed population), the figures below report the ex ante likelihood that these firms ultimately have founder-CEO at IPO and IPO+3 (Panel A) and founder-CEO/blockholder on those two dates (Panel B).



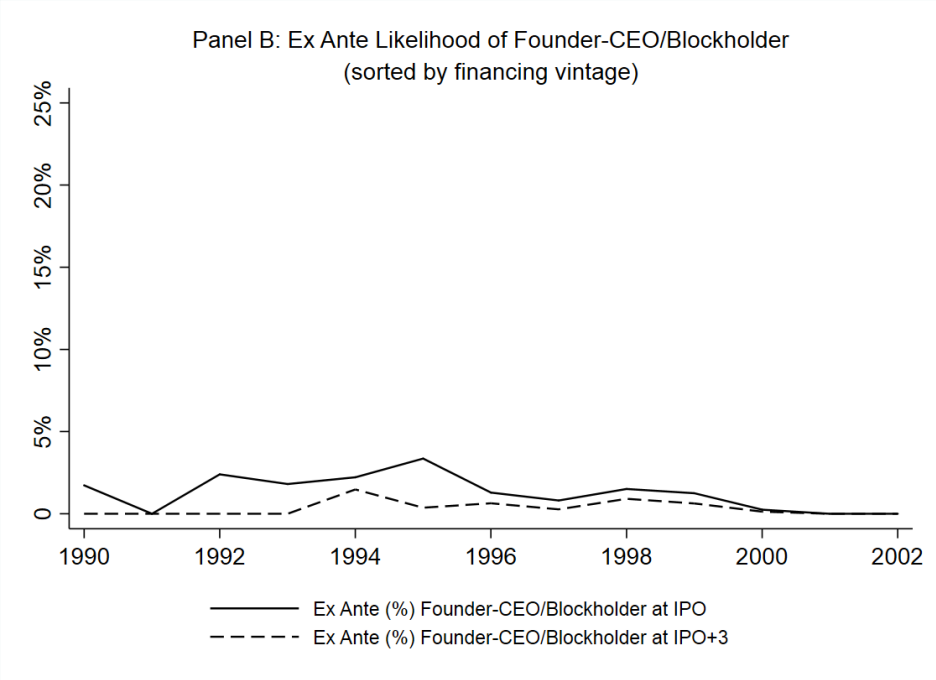


Table 7: Founder Control: Largest IPOs in IPO Research Sample

Company	IPO Year	Founder CEO	Founder Voting (%)	Dual Class Structure	Market Cap ($ billions)
Google, Inc.	2004	No	31.7%	1	23.0
Groupon Inc	2008	Yes	58.0%	1	12.0
360networks, Inc.	2000	No	7.0%	1	11.0
Zynga, Inc.	2011	Yes	37.4%	1	7.0
Nextel Partners Inc	2000	Yes	1.4%	1	4.7
Global Telesystems Inc	1998	No	1.1%	0	4.5
Workday, Inc.	2012	Yes	67.0%	1	4.5
LinkedIn Corp	2003	No	20.0%	1	4.3
Zayo Group LLC	2007	Yes	4.0%	0	3.8
NorthPoint Communications, Inc.	1999	Yes	6.2%	0	2.9
Vonage Holdings Corporation	2006	No	33.0%	0	2.6
Handspring, Inc.	2000	Yes	50.3%	0	2.5
Akamai Technologies, Inc.	1999	No	21.0%	0	2.4
Tritel, Inc.	1999	No	53.4%	1	2.3
Priceline.com, Inc.	1999	No	44.0%	0	2.3
FireEye Inc	2006	No	9.0%	0	2.3
CenturyLink Technology Solution	2000	No	0.0%	0	2.2
Nutanix Inc	2011	Yes	8.0%	1	2.2
Cinemark Holdings, Inc.	2007	No	12.3%	0	2.0
eToys, Inc.	1999	Yes	7.4%	0	2.0
Onvia, Inc.	2000	Yes	13.5%	0	1.7
VeraSun Energy Corporation	2006	No	0.0%	0	1.7
Utstarcom Inc	2000	Yes	3.7%	0	1.6
FreeMarkets, Inc.	1999	Yes	16.9%	0	1.6
Next Level Communications Inc	1999	Yes	2.0%	0	1.6
Rhythms Netconnections Inc	1999	No	0.0%	0	1.5
Niku Corporation	2000	Yes	18.9%	0	1.5
Average		**51.9%**	**19.5%**	**33.3%**	**4.13**

Figure 5: Non-Correlation Between VC Returns and Founder-CEO at IPO

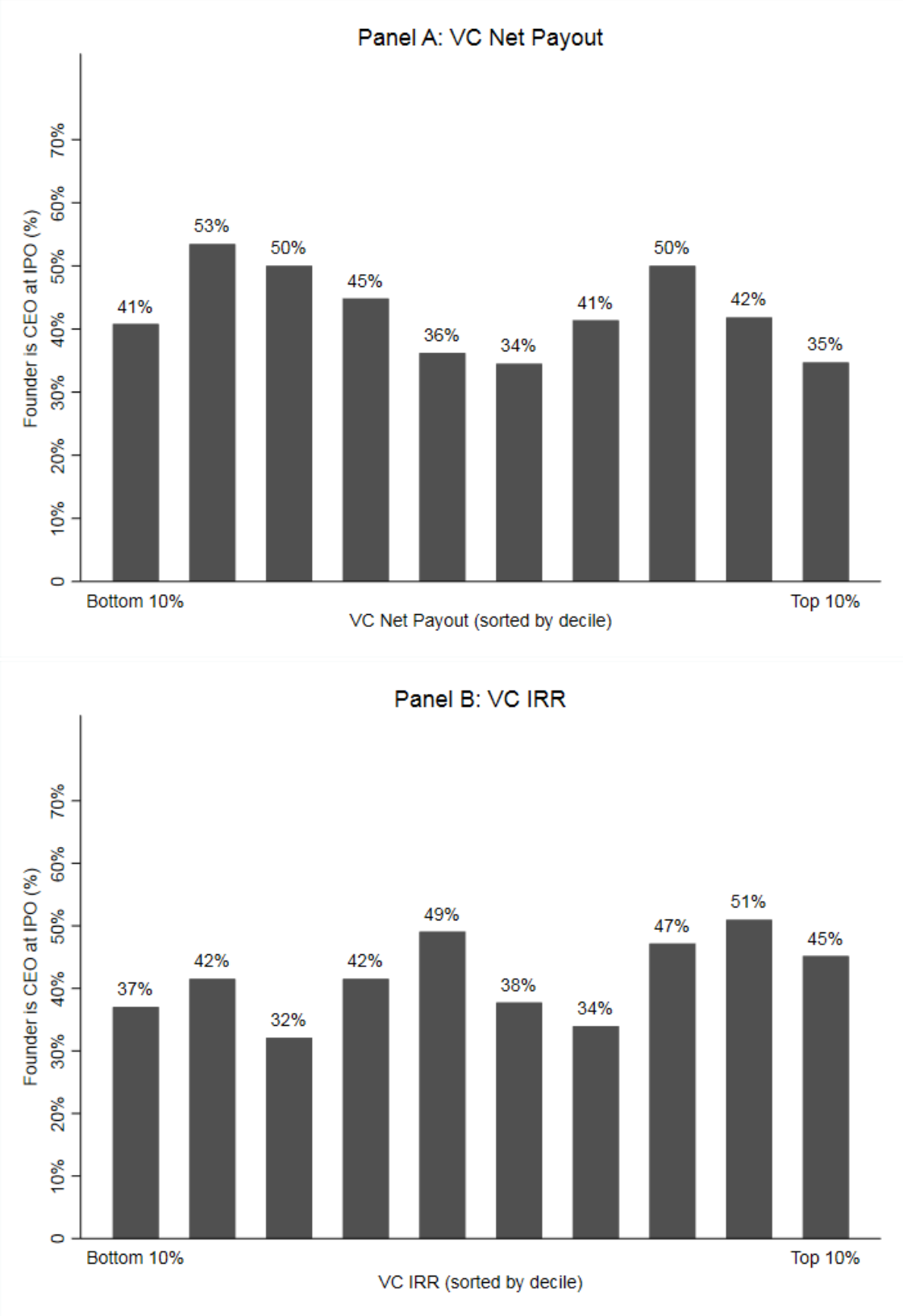


Table 8: Multivariate Analysis of Founder Control at IPO

Using data from 562 VC-backed firms that received initial financing during 1990-2002 and completed an IPO prior to 2013, this table reports marginal effects based on logit estimates evaluated at the mean of each variable. Depending on the model, the dependent variable is *Founder CEO* [models 1 & 2], *Founder CEO & Equity ≥ 30%* [models 3 & 4], or *Founder Equity ≥ 30%* [models 5 & 6]. All variables are defined as of the completion of IPO. Standard errors are reported below each coefficient estimate. We use a two-sided test for statistical significance (* = 10%; **= 5%; ***= 1% significance).

	--- Logit Marginal Effects ---					
	Founder CEO		Founder CEO & Equity ≥ 30%		Founder Equity ≥ 30%	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Explanatory Variable						
VC Net Payout	-.0001		-.0000*		-.0000	
	(.000)		(.000)		(.000)	
VC IRR		-.031*		-.002		-.010**
		(.018)		(.002)		(.004)
Years from VC financing to IPO	-.022**	-027**	-.002*	-.004*	-.009**	-.013***
	(.010)	(.012)	(.001)	(.002)	(.003)	(.004)
Amount of pre-IPO financing	-.0003	-.0005*	.0019	.0001	.012	.005
	(.000)	(.000)	(.002)	(.004)	(.015)	(.015)
Number of VC rounds	.005	.002	.000	.001	.001	.000
	(.011)	(.011)	(.000)	(.001)	(.003)	(.003)
Number of VC investors	-.008	-.006	-.002*	-.003**	-.009***	-.008***
	(.006)	(.006)	(.001)	(.001)	(.002)	(.002)
Financed by elite VC	-.046	-.053	.005	.004	.015	.016
	(.056)	(.056)	(.003)	(.005)	(.017)	(.016)
Dual class IPO	.061	.028	.009*	.012	.062**	.057**
	(.121)	(.116)	(.006)	(.008)	(.026)	(.023)
Delaware incorporation	-.027	-.013	-.001	-.004	-.011	-.011
	(.058)	(.059)	(.002)	(.005)	(.015)	(.014)
California headquarters	-.120**	-.124**	-.002	-.003	-.018	-.016
	(.051)	(.052)	(.002)	(.004)	(.014)	(.013)
State Headquarters Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year first VC financing Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	558	540	558	540	558	540
Pseudo R-squared	.074	.074	.456	.388	.258	.271

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