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Abstract

We examine the association of a venture capital (VC) firm's reputation with the post-IPO long-run performance of its portfolio firms. We find that VC reputation, as measured by the past market share of VC-backed IPOs, has significant positive associations with an array of long-run firm performance measures. While more reputable VCs initially select better quality firms, more reputable VCs continue to be associated with superior long-run performance even after controlling for VC selectivity. More reputable VCs exhibit more active post-IPO involvement in their portfolio firms, and continued VC involvement has a positive influence on post-IPO firm performance.

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I. Introduction

A firm's reputation gives potential customers valuable information when making their purchase decisions, while offering important competitive advantages to more reputable firms (see, e.g., Kreps and Wilson (1982), Shapiro (1983)). Prior research finds strong empirical evidence that reputation is a valuable asset, and this has led researchers to develop a number of theoretical models of reputation in the financial services industry.[1] For specialized financial intermediaries that face a large number of competitors, reputation can be particularly important. To further our understanding of how reputation is built, we study the reputation of venture capital (VC) firms, which are specialized financial intermediaries operating in a highly fragmented industry,[2] where reputation is particularly valuable not only to VCs and their investors but also to potential portfolio firms that rely heavily on VC advisory services and risk capital for their survival and growth.

Our primary goal is to examine the role of VC reputation in explaining long-run performance of venture-backed firms going public. Post-initial public offering (IPO) performance of these firms is important to IPO investors, to VCs that hold stock beyond the usual 180-day lock-up period (Field and Hanka (2001)), to entrepreneurs seeking VC funding, and to VC investors who frequently receive IPO shares when their funds ultimately exit from their investments in portfolio firms.

Our VC reputation measure is based on a venture investor's past market share of completed venture-backed IPOs, which we refer to as IPO Market Share. This measure is similar to the Megginson and Weiss (1991) underwriter reputation measure and captures a VC's IPO success rate relative to those of other VCs.[3] This measure is also related to a Cumulative IPO Market Share measure used by Nahata (2008), who shows that this measure is positively related to the probability of a VC-backed firm going public. However, unlike Nahata's measure, IPO Market Share is based on a 3-year moving window prior to the IPO, which makes our measure current and avoids the strong bias against younger VC firms that is inherent in the Cumulative IPO Market Share measure that does not adjust for the length of a VC's active life. More importantly, Nahata focuses on VC exits including IPOs, while we focus on post-IPO issuer performance and its causes.

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[1] Holmstrom and Tirole (1997) develop a model that emphasizes the importance of financial intermediary reputation. Also Titman and Trueman (1986) develop a model of auditor and investment banker reputation.

[2] As of 2002, for example, around 1,500 VC firms were active in the United States, with the top quintile managing about 80% of industry capital, according to Thomson Financial Venture Economics database and Boslet (2003).

[3] Beatty (1989) and Beatty and Welch (1996) use similar measures to rank auditors and law firms.

Because younger VCs can have strong incentives to "grandstand" by taking weak firms public too early (see Gompers (1996), Lee and Wahal (2004)), it is important not only to look at how VC reputation correlates with IPO frequency, but also to how well these firms perform after going public.

For IPO issuers with more than 1 VC investor, we focus on the lead VC's reputation measure, and following Lin and Smith (1998) and Hochberg et al. (2007) define a "lead" VC as having the largest venture investment in the portfolio firm as of the IPO date. We show that compared to nonleads, lead VCs are more apt to hold issuer shares and board seats at the IPO, and continue to hold them in the post-IPO period. Therefore, focusing on lead VCs enables us to capture the greater guidance and support that these influential VC syndicate members provide to portfolio firms.

We examine the associations of our VC reputation measure with portfolio company long-run performance measures after going public, using 4 well-known performance standards: i) industry-adjusted rate of return on assets (ROA), ii) market-to-book ratio, iii) long-run exchange listing survival, and iv) long-run abnormal stock returns (see, e.g., Moeller, Schlingemann, and Stulz (2004), Gompers, Ishii, and Metrick (2003), and Field and Karpoff (2002)). All the performance measures are based on the 3-year post-IPO period. Our VC reputation measure is based on data available at the start of the IPO year to reduce concerns about reverse causality between VC reputation and issuer post-IPO performance.

We find that our lead VC reputation measure consistently has a significant positive relation with all 4 post-IPO long-run performance metrics, after controlling for observable IPO characteristics that can be related to future issuer performance. However, superior long-run performance of firms backed by more reputable VCs can be attributable to superior venture investment selectivity or to superior post-IPO nurturing of portfolio firms. Consistent with the evidence in Sørensen (2007), we find that more reputable VCs select better-quality portfolio firms. However, even after controlling for VC selectivity, we find that more reputable VCs have a significant positive association with our long-run performance measures. Thus, we conclude that more reputable VCs provide more valuable advisory and monitoring services to their portfolio firms, in addition to initially selecting better-quality portfolio firms to invest in.

We also compare the associations of alternative VC reputation measures suggested in the existing literature with our 4 issuer long-run performance measures. Gompers (1996) proposes VC firm age as a VC reputation measure, Lee and Wahal (2004) use VC firm age and the number of

IPO firms a VC has previously backed, and Gompers and Lerner (1999) use capital under management. Nahata (2008) shows that a Cumulative IPO Market Share measure has the best association with future IPOs among the measures he considers. We show that IPO Market Share is the only reputation measure that consistently shows significant positive associations with all 4 standard issuer long-run performance measures we examine. Further, our IPO Market Share reputation measure has a significant positive association with 4 less conventional measures of long-run performance; specifically, the probability of subsequent acquisition, the expected acquisition takeover premium, and 2 forward-looking proxies of long-term firm growth. The alternative VC reputation measures again do not consistently have significant associations with these alternative long-run performance measures.

To investigate how VC reputation is related to portfolio firm advisory and monitoring services, we examine whether VC reputation is associated with stronger corporate governance and greater VC involvement in the post-IPO period, and whether this leads to superior portfolio firm performance. This line of inquiry expands on prior research that finds that some VCs tend to hold their equity stakes in portfolio firms well beyond the IPO lock-up period (usually lasting 180 days) (Gompers and Lerner (1998), Field and Hanka (2001)), and that some VCs are more likely to be associated with more independent boards and a non-chief executive officer (CEO) board chairman (Baker and Gompers (2003)). We advance the earlier Baker and Gompers evidence on VC reputation effects by adjusting for endogeneity and exploring the post-IPO governance activities of VCs by reputation, and we find interesting new results, which are described later.

We first establish that more reputable VCs hold shares and board seats in a significantly higher proportion of their portfolio firms, not only at the IPO date, but also in the first 3 years thereafter. More reputable VCs are also associated with portfolio firms employing better corporate governance structures, including fewer cases of dual CEO-COB (chairman of the board) and CEO-founders, both of which weaken board discipline over a CEO. However, after controlling for VC selectivity, we find that firms backed by more reputable VCs are significantly more likely to continue to benefit from VC shareholdings and directorships in the 3-year post-IPO period, while other internal corporate governance mechanisms are not significantly different from firms backed by less reputable VCs. We also establish links between both post-IPO VC shareholdings and directorships and superior issuer performance in this same 3-year period. After controlling for endogeneity of a VC's post-IPO shareholdings and directorships, we find evidence that the post-

IPO involvement of more reputable VCs in their portfolio firms is associated with superior long-run performance.

Nahata's (2008) evidence is complementary with our results in that we both find that a VC reputation measure based on past IPO market share is strongly related to both pre- and post-IPO performance of its portfolio firms. A reason why this reputation measure is so robust (compared to alternative reputation measures found in the extant literature) is that an IPO is generally the most profitable and publicly visible VC investment outcome, and hence it is a particularly relevant measure of VC success. Indeed, Brau, Francis, and Kohers (2003) report a "valuation premium" of 22% for IPOs over acquisition (trade sale) exits, while Cumming and MacIntosh (2003) report that, in partial exits, average annual rates of return to VCs are 84% in IPOs and only 20% in acquisitions. Megginson and Weiss (1991) observe that Kleiner Perkins came to the market with 10 different IPOs in their sample period (1983–1987), giving it great visibility in the marketplace.[4] Repeated IPO success can provide a VC with better access to attractive investment opportunities and the ability to negotiate more generous investment terms, as documented by Hsu (2004). We show that even after allowing for greater opportunity to be selective in their investments, more reputable VCs exhibit continued post-IPO involvement in their portfolio firms, which is associated with superior firm performance. In turn, superior post-IPO performance attracts investors to future IPOs backed by these VCs, increasing the probability of their backing successful future IPOs. This track record also attracts entrepreneurs with promising projects to more reputable VCs, enabling them to be more selective. Finally, a record of IPO success by more reputable VCs facilitates more frequent and larger future fundraising. Thus, past success helps facilitate future success for these talented and experienced VCs.

The remainder of this paper is organized as follows. Section II describes the data and methodology and provides descriptive statistics. Section III analyzes the link between VC reputation and post-IPO issuer performance measures. Section IV reexamines these relations after controlling for self-selection. Section V analyzes VC monitoring and support of portfolio firms in the post-IPO period as a reason for post-IPO issuer performance. Section VI concludes. Appendix A provides definitions of key variables used in our analysis. Appendix B reports on a robustness check.

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[4] Since its founding in 1972, Kleiner Perkins has invested in a number of very large IPOs, including America Online, Amazon, Compaq, Google, Netscape, and Sun. See its Web site (www.kpcb.com) for further details.

II. Data and Methodology

A. IPO Sample Construction

Our sample consists of U.S. IPOs completed in the 1993–2004 period. IPO issue characteristics and names of lead underwriters are taken from Thomson Financial's Securities Data Corporation (SDC) Platinum Global New Issues database. VC investors in IPO issuers are taken from this database and are compared to VC investment rounds reported in Thomson Financial's Venture Economics database.[5] Stock returns and exchange listing dates come from the Center for Research in Security Prices (CRSP) database. Financial data of IPO issuers are taken from Compustat. We exclude i) IPOs not listed on major exchanges or reported in the CRSP database within 1 month of their IPO dates; ii) IPOs of financial intermediaries, limited partnerships, foreign corporations, reverse LBOs, spinoffs, carve-outs, unit offerings, small offerings under $5 million in global proceeds and whose offering prices are under $5 per share; and iii) IPOs for which any important variable needed for our analysis is unavailable.

B. Post-IPO Issuer Performance Measures

Our 1st measure of long-run performance is ROA, the match-adjusted return on assets (defined as net income divided by book value of total assets). The industry match-adjustment process is described below. First, each IPO issuer in our sample is matched to a sample of nonequity issuers (in the 3 years before and after the IPO date) based on the issuer's industry, which is measured by its 4-digit Standard Industrial Classification (SIC) code if there are at least 5 other firms in the industry, or else it is based on its 3-digit (or 2-digit) SIC code so we can obtain at least 5 nonissuing firms. Then, the median ROA of the matched sample of nonissuers is subtracted from the ROA of the IPO firm (see Barber and Lyon (1996) for evidence supporting the use of median adjustments in such tests of accounting data).

Our 2nd measure of long-run performance is the market-to-book equity ratio (M/B), which often is used to value a firm's real options and is a proxy for Tobin's Q.[6] The market-to-book ratio is measured at the end of the 12th quarter following the IPO. To avoid inducing survivorship bias into our measures of long-run performance, we use the *n*-quarter (*n* < 12) ROA and M/B figures

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[5] For VCs with the largest IPO Market Share (top 25), we verify that the initial investment round is prior to the IPO date. For 2 VCs, Thomson Venture Economics reports that some of their initial investments occurred *after* the IPO date. After examining IPO prospectuses of these 2 VCs and cross-checking with Thomson Financial staff, we find that for 50 IPO-VC matches we cannot verify that initial VC investments occur before the IPO date. We exclude these VC-IPO matches and find our results to be robust (see Section III.B).

[6] Examples of well-known studies that use market-to-book ratio as a performance measure are Jain and Kini (1994), Gompers et al. (2003), and Moeller et al. (2004).

for IPO issuers that do not survive 3 calendar years beyond the IPO date, where n is the maximum number of quarters for which data are available in Compustat. We winsorize the ROA and M/B figures at the 1% and 99% levels to minimize the effects of outliers that can be induced by data errors.

Our 3rd measure of long-run performance is listing survival (Survival), which is an indicator variable that takes a value of 1 for firms that remain listed on the NYSE, AMEX, or NASDAQ (i.e., remain in the CRSP database) for 3 years following their IPOs or that are merged or acquired by listed firms (which themselves remain listed for the remainder of the 3 calendar years following the IPO dates), and 0 otherwise (firms that become bankrupt, defunct, are liquidated, or go private).[7] This is a measure of an issuer's long-run financial strength, and should capture the adverse consequences of pre-IPO accounting window dressing that attempts to raise IPO investor demand by either boosting a firm's pre-IPO earnings through creative accounting or reducing its expenditures on promising investments at the cost of its future profits. For example, Li, Zhang, and Zhou (2008) find that firms with more earnings management (window dressing) in the IPO year are more likely to delist, and are likely to delist sooner than other firms. Teoh, Welch, and Wong (1998) report that the well-documented poor post-IPO long-run stock performance of IPOs is associated with earnings reversals following window-dressing of pre-IPO earnings figures. We expect more established VCs with greater reputation capital at risk to actively discourage firms with weak long-term prospects to window-dress or defer profitable investment opportunities to boost current earnings.

We follow much of the existing IPO literature by reporting long-run abnormal stock returns (see, e.g., Brav and Gompers (1997)) as our 4th measure of long-run performance. It is defined as an issuer's factor-adjusted abnormal stock return (Return) measured over the 36 months after the issue month. The factors used to adjust returns are the 3 Fama and French (1992) factors and the Carhart (1997) momentum factor.[8] Fama (1998) advocates this approach for computing abnormal stock returns because it is less affected by skewness and other "bad model" problems than other popular methods. To avoid inducing survivorship bias, we compute long-run stock returns for IPO firms using monthly returns for the 36-month post-IPO period or until delisting, whichever comes

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[7] Delistings due to acquisitions and mergers are excluded since they are generally not due to financial distress. We examine them separately in Section III.D.

[8] We obtain all the factor returns from Ken French's Web site (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). The calendar time abnormal returns is a widely used measure of long-run stock performance (see, e.g., Gompers et al. (2003)).

first. Return is winsorized at the 1% and 99% levels to limit the effects of outliers on our results. We also check that our main results are robust if we do not winsorize ROA, M/B, and Return.

C. VC Reputation Measure

Our VC reputation measure, IPO Market Share, is computed as VC's dollar market share of all venture-backed IPOs in the preceding 3 calendar years. For instance, to analyze the long-run performance of an IPO completed in 1996, we first aggregate the dollar value of all IPOs backed by a VC during years 1993, 1994, and 1995 as a proportion of the total dollar size of all venture-backed IPOs in the same 3-year period. Following Ritter (1984) and Megginson and Weiss (1991), we define the dollar size of an IPO as its gross proceeds, exclusive of overallotment options. Each VC investor is given full credit for a completed IPO that it backs. IPO Market Share is based on information known prior to the IPO event under analysis and is thus free of look-ahead bias. The data are taken from Thomson Financial's SDC Platinum Global New Issues and Venture Economics databases.

Given our emphasis on the monitoring role of VCs in the post-IPO period, when there are multiple VC investors in an IPO issuer, we focus on the effects of a lead VC's reputation since we find that they tend to remain actively involved in their portfolio firms as shareholders and directors in the post-IPO period, unlike other syndicate members. When there are multiple leads, we equally weight their individual reputation measures. When there is only 1 VC investor in an IPO issuer, it is treated as the lead VC.

The mean and median IPO Market Share figures for our sample of VC-backed IPOs are 0.42% and 0.36%, respectively, which are close to each other, suggesting that outliers are not a serious concern for our VC reputation measure. Note that top VCs such as J.P. Morgan Partners, Kleiner Perkins, New Enterprises Associates, Sequoia Capital, and Integral Capital Partners all have annual market shares of VC-backed IPOs exceeding 1%, averaged over our full sample period.[9]

Overall, unlike the market share for IPO underwriters, where about 90% is controlled by the top 10 investment banks over our sample period,[10] VCs operate in a highly fragmented industry, and only 28 VCs have average annual market shares of VC-backed IPOs in excess of 0.5%

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[9] Nahata (2008) reports roughly similar figures for his average VC reputation measure. See Krishnan and Masulis (2011) for a list of 1000 VCs and their year-by-year *IPO Market Share* reputation measure.

[10] See Thomson Financial's SDC Global New Issues League tables.

over our full sample period. Many of the most reputable VCs, based on the IPO Market Share measure, are highly ranked by VC industry publications, such as the Top 100 Early Stage VCs list published by *Entrepreneur* magazine and the 100 Top VCs list published by *Forbes* magazine.

D. Alternative VC Reputation Measures

Because the extant literature has suggested many alternative candidates as VC reputation measures[11], we compare the associations of our 4 standard post-IPO issuer performance measures with the following alternative reputation measures.

i) IPO Frequency is defined as the number of completed IPOs in a VC's portfolio over the prior 3 calendar years, relative to the number of companies in its active investment portfolio (averaged over the beginning and end of the same 3 years). This reputation measure is not strongly influenced by a few large IPOs. Gompers (1996) finds a positive relationship between IPO Frequency and future VC fundraising (also see Lee and Wahal (2004)).

ii) VC Age is measured by the period between the IPO date and the VC firm's incorporation date or January 1, 1980, if the incorporation date is earlier. The reinterpretation of the Employee Retirement Income Security Act (ERISA) "prudent man" standard in 1979 is widely believed to mark the beginning of the modern VC market (see Gompers and Lerner (1999), Hellmann, Lindsey, and Puri (2008)). We therefore compute VC Age from January 1, 1980, for VCs incorporated before this date. Gompers (1996) uses VC Age as a VC reputation measure, while Hsu (2004) argues that VC Age captures venture investment experience.

iii) VC Capital represents a VC's capital under management, measured by total dollars invested or available for investment, based on capital commitments of limited partners at the pre-IPO year-end. It captures a VC's fundraising and investment management ability. Gompers and Lerner (1999) argue that VC Capital is indicative of a VC's future fund raising ability.

iv) Cumulative IPO Market Share is defined as the dollar market share of IPOs that the VC backed between 1993 and the year prior to the IPO. Nahata (2008) argues that VC reputation based on cumulative IPO market share is positively related to the probability of future IPOs by its portfolio firms.

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[11] See Krishnan, Masulis, and Singh (2006).

E. Control Variables

We control for the effects of other issue and issuer characteristics on issuer long-run performance to ensure that VC reputation is not a proxy for observable sample heterogeneity. Also, to the extent that these observable issue and issuer characteristics are used in a VC's venture investment selection process, the marginal effect of VC reputation on issuer performance should primarily capture VC advisory and development activities.

Several studies beginning with Megginson and Weiss (1991) find that VC-backed firms have relatively strong post-IPO performance. Thus, we include an indicator variable that is equal to 1 for VC backing, and 0 otherwise to ensure that our VC reputation measure is not capturing the average performance benefits of any VC backing, but instead represents the marginal effect of investment by more reputable VCs.

Previous studies find that lead underwriter reputation significantly affects post-IPO long-run returns (Carter, Dark, and Singh (1998)). To avoid falsely attributing underwriter reputation effects to VC reputation, underwriter reputation is also included in our regression analysis. We measure underwriter reputation by its Carter and Manaster (1990) ranking, Underwriter Reputation, as updated on Jay Ritter's Web site (http://bear.warrington.ufl.edu/ritter/ipodata.htm). The correlation between Underwriter Reputation and IPO Market Share is only 29.4%, which provides additional comfort that our VC reputation measure is not simply acting as a proxy for underwriter reputation.

The natural log of IPO gross proceeds (Ln Offer Size) is a common issue characteristic used in many well-known IPO studies. It is often argued that larger offers are typically made by more established and financially stronger IPO issuers (Carter et al. (1998)). Issuer age at the IPO, measured relative to the firm's first incorporation date, is another characteristic frequently used in the IPO literature (Barry, Muscarella, Peavy, and Vetsuypens (1990)). It is used as a proxy for more established firms, which have more tangible assets, a more seasoned management team, and more extensive and well-established customer base, all characteristics that imply a lower issuer growth profile. To reduce skewness, we follow prior research and measure issuer age by the natural logarithm of 1 + issuer age (Ln Issuer Age).

To control for differences in IPO demand or IPO firm quality, we include i) offer Price Revision, measured by the percentage increase in final offer price from the midpoint of the high and low prices in the initial filing (see Hanley (1993)); ii) IPO 1st-day return, termed Underpricing (see Welch (1989)); iii) IPO issuer market capitalization, measured by multiplying offer price by the

total number of post-IPO shares (including those retained by owner), termed Issuer Market Cap (see Brav and Gompers (1997), Loughran and Ritter (2004)); and iv) the issuer's market-to-book ratio, Issuer M/B, which is commonly used to measure firm growth opportunities (see Brav and Gompers). Finally, we include industry and year fixed effects in our regression analysis.[12] The data sources for these variables are Thomson Financial's SDC Platinum Global New Issues database and Compustat. SIC codes are taken from the CRSP database (see, e.g., Moskowitz and Grinblatt (1999)).

Finally, following Nahata (2008), we also control for VC Age, VC Syndication, and VC Network Centrality, where VC Age, described previously, proxies for VC experience, and VC Syndicate Size is measured by the number of VC syndicate members invested in an IPO issuer. Following Hochberg et al. (2007), VC Network Centrality is measured by Degree, the number of unique VC firms that syndicate with the VC firm in question over the past 5 years normalized by the number of unique VCs (excluding the one under consideration) that participate in any VC syndicate during that same time period. Nahata uses Degree as his measure of "VC Connectedness." Data for these measures come from Thomson Financial's Venture Economics database.

F. Corporate Governance Data

To examine the effects of VC monitoring and support of portfolio firms, we collect information on the following 5 corporate governance features of VC-backed IPO issuers: i) VC shareholdings, ii) VC directorships, iii) dual CEO-COBs, iv) CEO-founders, and v) staggered boards. We observe these 5 corporate governance characteristics at the IPO date, as well as over the 3 years thereafter. The data are hand collected from IPO prospectuses (for the year of the offering) and from annual proxy statements for each of the 3 years thereafter. If proxy statements are not available, we use information from annual reports and 10K filings. Corporate governance data are available for 813 VC-backed issuers at the IPO date, and 783, 690, and 590 VC-backed IPO issuers, respectively, for the 3 years thereafter. It must be noted that IPO prospectuses, annual proxy statements and 10K filings, which are our main information sources, are only required to list shareholdings of directors and beneficial owners of 5% or more. Thus, a VC investor who owns

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[12] We follow Gompers, Kovner, Lerner, and Scharfstein (2006) and use indicator variables for 8 industry groups having similarities in technology and management expertise that VCs specialize in. The industry groups are i) Internet and computers, ii) communications and electronics, iii) business and industrial, iv) consumer products, v) energy, vi) biotech and healthcare, vii) financial services, and viii) business services.

less than 5% of shares and has no board seat need not be reported. In other words, we primarily examine block ownership effects.

G. Descriptive Statistics

We start with all completed U.S. IPOs spanning the period 1993–2004 that meet our sample criteria, which includes 1,503 VC-backed IPOs. Of these VC-backed IPOs, we use the 378 VC-backed IPOs completed during the first 3 years of the sample period (1993–1995) to calculate a VC's initial reputation in year 1996. In later years, we update the VC reputation measure annually using a prior 3-year rolling window. In this way, VC reputation is measured at the start of every year with data taken from the prior 3 years, and then it is linked to the subsequent 3-year post-IPO issuer performance measures for IPOs made in the 1996–2002 period. In the 10-year (1993–2002) period, our sample contains 1,200 IPOs backed by 1,519 separate VCs and 1,302 IPOs without VC backing.

Examining post-IPO performance is only relevant when portfolio firms successfully go public in the first place. So we first assess whether our VC reputation measure is significantly associated with the probability of future IPOs. For this purpose, we link our VC reputation measure for each year in our sample period to the number of completed IPOs a VC backs in the following 3 years. For example, we relate 303 VC-backed IPOs made in the 2003–2004 period, plus the 19 VC-backed IPOs made in 2002, to our VC reputation measured at the start of 2002. Thus, all of our analysis is conducted without any look-ahead bias.

After excluding VC-backed IPOs made in the 1993–1995 period (used to construct each VC's initial reputation measure) and VC-backed IPOs made in the 2003–2004 period (used only to calculate the probability of future IPOs analysis), we examine VC reputation effects on the post-IPO long-run performance of 2,019 IPOs issued in the 1996–2002 period, of which 822 are VC-backed IPOs. Panel A of Table 1 presents yearly frequencies of VC-backed and non-VC-backed IPOs. While CRSP data are available for the Survival and Return performance measures for our entire IPO sample, Compustat-based ROA and M/B figures are only available for 787 VC-backed IPOs and 1,154 non-VC-backed IPOs, respectively.

Panel B of Table 1 compares the characteristics of completed IPOs with and without VC backing. Consistent with Gompers and Lerner (2000) and Lee and Wahal (2004), VC-backed IPO issuers tend to be younger, and consistent with Lee and Wahal, IPOs with VC backing typically are

underwritten by more prestigious lead investment banks. Both average offer price revision and 1st-day return are significantly higher for VC-backed IPOs.

Panel C of Table 1 reports the descriptive statistics for long-run performance measures of non-VC-backed and VC-backed IPOs. For all 4 standard long-run performance measures, firm performance is significantly higher for VC-backed IPOs than for non-VC-backed IPOs. This is consistent with findings in a number of earlier studies (see, e.g., Brav and Gompers (1997)) and highlights the need for a VC-backing indicator in our regression analysis.

In our sample of VC-backed IPOs, 17% are backed by a single VC. Of the remaining IPOs, 13% are backed by a syndicate of 2 VCs, 13% by 3 VCs, 10% by 4 VCs, 9% by 5 VCs, 25% by a syndicate of 6–10 VCs, and the remaining 13% of the IPOs by a syndicate of more than 10 VCs.

We find that lead VCs hold a significantly higher proportion of issuer shares and board seats than nonlead VCs, not only at the IPO date, but also in 1, 2, and 3 years thereafter.[13] Indeed, Lin and Smith (1998) report that shareholdings in portfolio firms are significantly higher for lead VCs than for nonlead VCs at the IPO, and in some firms the lead VC shareholdings do not drop substantially, even 3 years after the IPO. We also find that the average shareholdings of a lead VC is 9.4% at the IPO, and slowly drops to 8.05%, 7.70%, and 6.62%, respectively, 1, 2, and 3 years afterward. Field and Hanka (2001) report that, on average, VCs sell 29% of their stake in the 1st year after the IPO, similar to the number reported in Barry et al. (1990). Both of these studies examine all VC syndicate investors without distinguishing between lead and nonlead VCs. We find that the drop in shareholdings of lead VCs is roughly 1/2 as great, in line with Lin and Smith's argument that lead VCs tend to be more involved in their portfolio firms than nonlead VCs. Thus, our focus on lead VCs enables us to clearly capture the greater monitoring, advice, and support that lead VCs provide to portfolio firms after their IPOs.

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[13] Lead VCs, on average, are block shareholders in 97% IPO issuers they back at the time of the IPO, which decreases to 91%, 76%, and 67%, respectively, 1, 2, and 3 years after the IPO. These proportions are significantly higher (at the 5% level) than those for nonlead VC syndicate members who, on average, are blockholders in 90%, 83%, 65%, and 56% of IPO issuers they back, respectively, at the time of the IPO, and 1, 2, and 3 years thereafter. Lead VCs, on average, hold board positions in 93% of IPO issuers they back at the time of the IPO, which decreases to 90%, 83%, and 73%, respectively, 1, 2, and 3 years after the IPO. These proportions are significantly higher (also at the 5% level) than those for nonlead VC syndicate members who, on average, hold board positions in 82%, 79%, 75%, and 63% of IPO issuers they back, respectively, at the time of the IPO, and 1, 2, and 3 years thereafter.

III. Evidence on Post-IPO Performance

A. Multivariate Regression Analysis

The advice, monitoring, and support of reputable VCs should manifest itself in superior post-IPO long-run performance of their portfolio firms. We assess the power of VC reputation measures to explain long-run firm performance of IPO issuers by using the following regression specification across our sample of VC-backed and non-VC-backed IPOs:

(1) $\quad P = \quad \beta_Y + \beta_I + \beta_1$ IPO Market Share + β_2 VC Backed
$\qquad\qquad + \beta_3$ Underwriter Reputation + β_4 Ln Offer Size
$\qquad\qquad + \beta_5$ Ln Issuer Age + β_6 Issuer Market Cap + β_7 Issuer M/B
$\qquad\qquad + \beta_8$ Price Revision + β_9 Underpricing + ε,

where P is 1 of the post-IPO firm performance measures: ROA, M/B, Survival or Return; β_Y is a vector of year fixed effects to control for changing economic conditions; and β_I is the vector of the 8 Gompers et al. (2006) industry fixed effects to control for differences across industries where VC investment is concentrated.

Panel A of Table 2 focuses on IPO Market Share reputation and reports coefficient estimates and *t*-statistics based on standard errors robust to heteroskedasticity and adjusted for industry clustering.[14] IPO Market Share has statistically significant positive associations with all 4 measures of long-run performance (ROA, M/B, Survival or Return), even after controlling for the effect of VC backing. This is strong evidence that VC reputation is a statistically important characteristic of IPO issues. To measure the economic significance of IPO Market Share in explaining post-IPO long-run issuer performance, we take a 1-standard-deviation change in this VC reputation measure after controlling for other issue characteristics and find that it is associated with a 26% change in ROA, a 14% change in M/B, and a 24% change in Return. A 1-standard-deviation increase in VC reputation also raises the odds of firm survival by a factor of 1.3, after controlling for other issue characteristics. Thus, IPO Market Share associations with post-IPO issuer performance measures have clear economic as well as statistical significance.

In Panel B of Table 2, we include 3 additional control variables to regression specification (1): VC Age, VC Syndicate Size, and VC Network Centrality (measured in Hochberg et al. (2007) by their Degree variable). Nahata (2008) argues that VC Age measures a VC's industry experience, VC

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[14] In regressions of post-IPO issuer performance on VC reputation, the explanatory variables and residuals can be industry dependent, in which case White standard errors can be biased, while heteroskedasticity-robust standard errors adjusted for industry clustering are well specified (see Petersen (2009)).

Syndicate Size measures the benefits of syndication, and VC Network Centrality measures how networked a VC is. Because an argument can be made that these variables are correlated with our existing explanatory variables, we check our results with and without these 3 additional control variables (Panels A and B). IPO Market Share continues to have statistically significant positive associations with all 4 measures of long-run performance (ROA, M/B, Survival, or Return), even after controlling for these additional control variables.

The significant positive relation between IPO Market Share reputation and post-IPO issuer long-run abnormal stock returns warrants further discussion. One interpretation of this positive relation is that the stock market is inefficient in fully reflecting the benefits associated with more reputable VCs at the time of the IPO. Our alternative interpretation is that if IPO issuers backed by more reputable VCs continue to invest in risky growth options in the post-IPO period, thereby increasing their average risk level, then they would exhibit positive abnormal stock returns under a standard stationary risk adjustment procedure. Consistent with this interpretation, we find that, in the post-IPO period, more reputable VCs are associated with IPO firms having higher research and development (R&D) expense and capital expenditure ratios, which are commonly used proxies for investment in riskier long-term growth opportunities.

It is noteworthy that the VC indicator variable is statistically insignificant (significant) in regressions of all 4 standard firm performance measures when IPO Market Share is included (excluded) in the statistical model, which indicates that controlling for VC reputation is more informative than simply controlling for the existence of a VC investor (as is commonly done in much of the extant literature). The key implication is that the identity of a VC investor has a substantial bearing on post-IPO performance.

Examining the control variables, more reputable underwriters are also associated with superior ROA and Return performance, consistent with prior findings (see, e.g., Carter et al. (1998)). Larger IPO issues and older issuers are associated with significantly smaller M/B.[15] Firm survival increases for older IPO issuers and issues underwritten by more reputable investment bankers. In line with the grandstanding argument in Gompers (1996), VC Age is significantly and positively related to post-issue IPO issuer Survival, and in line with the benefits of having influential networks as argued by Hochberg et al. (2007), VC Network Centrality is significantly and positively related to post-IPO ROA.

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[15] We use nominal dollars to measure Offer Size and Issuer Market Cap in our primary analysis. However, when we instead adjust Offer Size and Issuer Market Cap to be in real dollars based on the Consumer Price Index (2002 dollars) (see, e.g., Bargeron, Schlingemann, Stulz, and Zutter (2008)), the results remain qualitatively unchanged.

B. Additional Robustness Analysis

First, we assess whether IPO Market Share continues to be significantly associated with ROA, M/B, and Return if we do not winsorize the issuer performance variables. In untabulated results, we find that IPO Market Share continues to have a significant positive association with ROA, M/B, and Return at the 1%, 5%, and 1% levels, respectively, using the same regression specification shown in Panel A of Table 2, and estimating the model over our VC-backed and non-VC-backed IPO samples. We conclude that mitigating the effects of outliers by winsorizing the firm performance measures does not qualitatively change the association of VC reputation with these performance measures.

Second, for a small number of VC-IPO matches in the Global New Issues database, we find that Venture Economics lists the 1st-round VC investment as an open market purchase made *after* the IPO date, and IPO prospectuses do not list them as VC investors. This occurs in 33 IPOs backed by Pilgrim Baxter and in 17 IPOs backed by Integrated Capital Partners. We found no other cases after carefully checking the remaining 25 top-ranked VC investors. To check the robustness of our results, we drop all 50 of these questionable VC-IPO matches. In all these cases, other VCs (often other well-known names, especially in the case of Pilgrim Baxter) are coinvestors in these IPO firms. Thus, it is not surprising that the lead VC's IPO Market Share changes only occasionally after this adjustment, and it continues to have significant positive associations with all 4 primary measures of issuer long-run performance.

Third, examining post-IPO performance is possible only when there are successful IPOs in the first place. Thus, we examine the association of a VC's reputation with the probability of future IPOs and find that IPO Market Share has a significant positive association with it. For each year in our sample period, we match IPO Market Share with a VC's Future IPO Frequency, defined as the number of completed IPOs by portfolio firms that a VC backs in the following 3 years, scaled by the average number of active portfolio companies the VC is funding at the beginning of the each of these 3 years. We regress Future IPO Frequency on IPO Market Share using a 2-boundary Tobit regression specification controlling for year and industry fixed effects, and we find a significant positive association (at the 1% significance level). This result is consistent with the findings by Nahata (2008), who uses a related reputation measure that is based on a VC's entire history of IPO successes.[16]

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[16] In untabulated results, we also find that Cumulative IPO Market Share and IPO Frequency are significantly related to Future IPO Frequency, but VC Age and VC Capital are not.

C. Alternative VC Reputation Measures

We reestimate the regression model in Panel A of Table 2 after replacing IPO Market Share with our alternative VC reputation measures, one by one, where we again focus on the lead VC. In untabulated results, we find that i) IPO Frequency is significantly and positively associated with Return at the 5% significance level, with ROA and M/B at the 10% significance level, and is not significantly related to Survival; ii) VC Age is significantly and positively associated with Survival at the 1% significance level, with M/B and Return at the 5% significance level, and is not significantly related to ROA; iii) VC Capital is significantly and positively associated with ROA and Return at the 5% significance level, and is not significantly related to M/B and Survival; and iv) Cumulative IPO Market Share is significantly and positively associated with Survival and Return at the 5% significance level, with ROA at the 10% significance level, and is not significantly related to M/B. Thus, unlike our primary reputation measure (IPO Market Share), none of these alternative VC reputation measures is consistently associated with all 4 measures of issuer long-run performance. In comparison, our primary VC reputation measure, IPO Market Share, is positively associated with ROA and Return, and with M/B and Survival at the 1% and 5% significance levels, respectively.

D. VC Reputation and Other Issuer Long-Run Performance Measures

As further evidence on the relation between our lead VC reputation measure, IPO Market Share, and issuer long-run performance, we examine 4 less conventional measures of issuer long-run performance, namely 2 forward-looking proxies for issuer long-term growth as well as the probability of subsequent acquisitions of IPO firms and expected takeover premia.

The 2 forward-looking ratios we examine are: i) R&D/Capex and ii) (R&D + Capex)/Total Assets (see Gompers (1995), Loughran and Ritter (1997)), averaged over the 3 fiscal years following the IPO month. Gompers (1995) argues that the 2 ratios capture the expected growth rate in firm asset value due to its investment in R&D and capital expenditures. The data are taken from the Compustat annual financial statement database. We have R&D expense and capital expenditure ratios for 560 VC-backed IPOs and 837 non-VC-backed IPOs completed in the 1996–2002 period.

Each growth measure is regressed against IPO Market Share and the control variables used in Panel A of Table 2. Tobit regressions are used, given that the 2 dependent variables are censored at 0. Panel A of Table 3 reports coefficient estimates and *t*-statistics based on standard errors robust to heteroskedasticity and adjusted for industry clustering. We find that IPO Market Share has a

significantly positive association at the 1% level with both growth ratios, R&D/Capex and (R&D + Capex)/Total Assets. This evidence that firms backed by more reputable VCs have higher post-IPO growth rates is consistent with our interpretation of the positive association of VC reputation with post-IPO abnormal stock returns reported in Table 2.[17]

Acquisitions (trade sales) of VC-backed firms provide another profitable exit opportunity for VCs, and they represent another measure of the long-term success of a VC's advice, monitoring, and support of its portfolio firms (see Dai, Anderson, and Bittlingmayer (2006)). Prior studies consider acquisitions of portfolio firms at attractive prices/premia as evidence of venture investment success (see, e.g., Gompers and Lerner (2000)). We collect data on acquisitions of share blocks of 5% or more in VC-backed IPO issuers within 3 years of the IPO month from the SDC Mergers and Acquisitions database. We exclude acquisitions withdrawn or missing a definite completion date. Target takeover premia data are also from this database and are defined as the ratio of target share purchase price divided by its closing stock price 1 day (or alternatively, 1 week, or 4 weeks) prior to the offer announcement. In our sample, there are 134 acquisitions of large blocks of shares of 105 separate VC-backed IPO issuers over the 3-year post-IPO period, for which data on variables needed for our analysis are available.[18]

In Panel B of Table 3 we estimate the relation between IPO Market Share and the probability of a completed acquisition. The dependent variable, Completed Acquisition, is an indicator variable for acquisition of a share block of a firm backed by a particular VC in the 3-year post-IPO period. The logit regressions employ the same control variables used in Panel A of Table 2 (except VC Backed) and are estimated over 822 VC-backed IPOs completed in the 1996–2002 period. Regressions are estimated with and without the 8 VC-intensive industry fixed effects, β_I. We find that IPO Market Share has a significant positive relation to the probability of acquisition of its publicly traded portfolio firms.

Panel C of Table 3 investigates the relation of IPO Market Share to acquisition takeover premia over the 3-year post-IPO period. When multiple share acquisitions involve the same target firm in the 3-year post-IPO period, an average target premium and averages of deal-related variables are used.

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[17] As a robustness check, we subtract the industry median ratios of nonissuers (similar to ROA) and find similar results.

[18] The median deal size is $84 million, the mean percent of shares acquired is 65%, and there are 37 pure cash deals. The average takeover premium for our sample when it is based on a target's preannouncement stock price 1 day, 1 week, and 4 weeks earlier is 32%, 40%, and 54%, respectively.

Ordinary least squares (OLS) regressions are used to estimate Takeover Premium's association to IPO Market Share and a set of control variables commonly used in studies of acquisition takeover premia. The regression specification is

(2)   Takeover Premium = β_I + β_1 IPO Market Share + β_2 Ln Asset
                 + β_3 Ln Deal Size + β_4 Shares Acquired + β_5 Cash
                 + β_6 Multiple Bidders + ε.

Deal-related control variables include i) Ln Deal Size, the natural log of a transaction's dollar value; ii) Shares Acquired, the target share block purchased; iii) Cash, an indicator variable for pure cash deals; and iv) Multiple Bidders, an indicator variable for deals with multiple bidders (see Stulz, Walkling, and Song (1990), Moeller et al. (2004)).

Panel C of Table 3 shows that IPO Market Share has a significant positive relation to the size of the expected acquisition premium. Moreover, differences in takeover defenses do not explain higher takeover premia in targets backed by more reputable VCs because i) the frequencies of staggered boards (a powerful antitakeover provision) in firms backed by more and less reputable VCs are not significantly different, as reported later in the last section of Panel A in Table 5; and ii) firms backed by more reputable VCs have a significantly higher acquisition frequency, suggesting weaker takeover defenses, rather than strong defenses. What does appear to explain higher acquisition premia is the higher post-IPO growth potential of firms backed by more reputable VCs reported in Panel A of Table 3.[19]

In untabulated results, we find that IPO Frequency is significantly related to expected growth measures, but not to the acquisition probability or premium. VC Age and Cumulative IPO Market Share are both significantly related to the 2 expected growth measures and to the acquisition probability (weakly, at the 10% significance level), but not to the acquisition premium. Finally, VC Capital is significantly related to the acquisition probability and its premium, but not to either expected growth measure. In summary, while IPO Market Share has a significant positive relation to all of our other long-run performance measures, none of our alternative VC reputation measures is significantly related to all 4 performance measures.

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[19] While an acquisition premium could reflect a higher expected growth rate in targets backed by more reputable VCs, it could also capture part of an acquirer's expected gains from synergies.

IV. Separating VC Selection from VC Development of Portfolio Firms

The relation between VC reputation and post-IPO firm performance measures can be the result of higher-ranked VCs having access to more promising business ventures, as argued by Hsu (2004) and Lee and Wahal (2004), or it can be due to a VC's development efforts, or both. To the extent that the control variables capture aspects of IPO issuer quality, the influence of VC self-selection is reduced, but it may not be completely eliminated.

To more completely separate a VC's portfolio firm selection effect from the impact of a VC's value-added activities in the post-IPO period, we implement a standard Heckman (1979) 2-step selection procedure. In the 1st step we estimate a probit model to predict the likelihood of an investment by a highly-ranked VC (see Nahata (2008), Juergens and Lindsey (2009)). An inverse Mills ratio for highly ranked VC investors is calculated from the 1st-step regression estimates and is then included as an added explanatory variable in the 2nd-step regression of IPO issuer performance on VC reputation. The inverse Mills ratio captures the probability that more reputable VCs invest in better-quality portfolio firms. To distinguish between the effects of VC selection and VC post-IPO development, we need a set of instrumental variables (IVs) that are significantly related to the lead VC's reputation and unrelated to the IPO firm's long-term performance measures.

The IVs we use are drawn from Thomson Financial's Venture Economics and Global New Issues databases, and are defined and motivated as follows:

i) Ln Asset is the natural logarithm of an issuer's asset size at the IPO, and it is a proxy for more developed, lower growth firms, which is an investment opportunity that VCs find unattractive. Thus, more reputable VCs, who see greater deal flow, can more easily avoid such issuers. We find that firm asset size is significantly related to VC reputation, but is unrelated to issuer long-run performance measures. Indeed, we are unaware of any major empirical study in this area that reports a significant relation between issuer asset size and post-IPO firm performance (see, e.g., Brav and Gompers (1997), Carter et al. (1998)).

ii) VC Syndicate Size, measured by the number of VC investors in the IPO firm, is linked to VC reputation, since more reputable VCs are better able to attract other VCs (Hochberg et al. (2007)). Panel B of Table 2 shows that VC syndicate size is not significantly related to post-IPO issuer performance. One reason for this lack of association is that nonlead VCs are less likely than lead VCs to be involved with portfolio firms well beyond the lock-up period (see, e.g., Field and Hanka (2001), fn. 12).

iii) We define Top Auditor as a big 4 or 5 accounting firm, and Top Law, as a law firm with a 1% or greater IPO market share, based on data from the SDC Global New Issues database. An IPO issuer's legal advisor and auditor reputations should be positively related to the probability of successful IPOs, since they help reduce the asymmetric information risk of IPO investors by certifying the validity of issuer disclosure documents. Thus, legal advisor and auditor reputations are likely to be positively correlated with VC reputation, which is also positively related to IPO success. Using logit regressions, we find that IPO Market Share is significantly related to Top Law and Top Auditor at the 1% and 5% significance levels. However, the reputations of these financial intermediaries do not have a significant incremental effect on post-IPO performance (see, e.g., Michaely and Shaw (1995), Beatty and Welch (1996)). One reason is that law firms and auditors can easily be replaced (e.g., to save on fees) once a firm is publicly listed, and they are only infrequently needed in the early post-IPO years.

(iv) Following Helwege and Liang (2004), we define a Hot IPO Market period as those months when the frequency of completed IPOs is abnormally high, and we use the calendar months that they report as hot IPO market periods. More reputable VCs may be better able than other VCs to time IPO exits to periods of strong market conditions, given their greater experience and superior networks of relationships. Such hot-market periods could be concentrated in a few industries where technological innovations or positive productivity shocks occur. On the other hand, hot-market periods might represent periods of high investor optimism and lead to lower VC standards for bringing firms public, resulting in poorer post-IPO long-run performance. Empirically, Helwege and Liang find little difference in long-run post-IPO profits or growth between hot-market and cold-market IPOs. Empirically, we also find that the Hot IPO Market indicator is not significantly related to any of our post-IPO issuer performance measures. Nevertheless, in robustness analysis when we exclude this IV, our results remain unchanged.

v) Early Stage Investor is an indicator for an early stage investment by the IPO issuer's lead VC, and is based on data taken from the Venture Economics database. It captures a VC's strong early interest in a portfolio firm's proprietary technology, products, and market growth potential, which could increase the likelihood of completing an IPO (see, e.g., Elango, Fried, Hisrich, and Polonchek (1995)). Importantly, we find that a VC's early stage entry, per se, does not have a significant effect on post-IPO long-run performance. This may reflect the substantial dilution of VC ownership and control rights at the IPO, which combined with a VC fund's limited life and its

expertise in early stage investing reduces its incentives to continue actively monitoring an IPO issuer after it goes public.

vi) Nearby Firm is an indicator for an IPO firm whose headquarters is located in the same state as that of its lead VC. VCs have strong preferences to limit general partners' time commitment to a portfolio firm by reducing partner travel time. More reputable VCs should have greater ability to select venture investments located nearby and to require more distant portfolio firms to move nearby. On the other hand, VC ownership and control rights are substantially reduced at the IPO date, when their convertible securities are forced to convert to ordinary common stock, which should substantially weaken VC post-IPO influence over portfolio firm performance.

Consistent with our economic arguments, when we regress the above IVs, along with VC reputation and the control variables used in Panel A of Table 2 on subsequent issuer long-run performance measures, we find that none of the IVs is significantly related to any of our long-run performance measures. In short, they pass the IV exclusion requirement.

Turning to the IV validity requirement, we estimate a 1st-step probit model using Reputable VC as the dependent variable. It is defined as an indicator variable for highly ranked lead VCs, and takes a value of 1 for issuers backed by a VC with an IPO Market Share above the median of all VCs, and 0 otherwise. As is standard, all control variables in the 2nd-step equation are also included in the 1st step, except for the VC Backed indicator, which is highly correlated with the dependent variable in this sample of VC- and non-VC-backed IPOs. As Table 4 reports, each of our 7 IVs is significantly related to the Reputable VC indicator: Ln Asset is negatively related, while VC Syndicate Size, Top Auditor, Top Law, Hot IPO Market, Early Stage Investor, and Nearby Firm are all positively related to Reputable VC. The explanatory power of the 1st-stage models is high, as indicated by pseudo R^2 statistics close to 50%. The 1st-stage inverse Mills ratio is included in the following 2nd-stage regression:

(3) $\quad P \quad = \quad \beta_Y + \beta_I + \beta_1$ IPO Market Share + β_2 VC Backed
$\qquad\qquad\qquad + \beta_3$ Underwriter Reputation + β_4 Ln Offer Size
$\qquad\qquad\qquad + \beta_5$ Ln Issuer Age + β_6 Issuer Market Cap + β_7 Issuer M/B
$\qquad\qquad\qquad + \beta_8$ Price Revision + β_9 Underpricing + β_{10} Inverse Mills + $\varepsilon,$

where P represents 1 of the issuer performance measures (ROA, M/B, Survival, or Return) and where IPO Market Share is the endogenous covariate. The regressions are estimated over both VC-backed and non-VC-backed IPOs. IPO Market Share continues to have significant positive

associations with all 4 long-run performance measures. The 2nd-step regressions also indicate the importance of VC selectivity, since the inverse Mills ratio is statistically significant in all the issuer long-term performance regressions. Thus, we conclude that more reputable VCs are associated with superior issuer long-run performance, even after taking into account their selectivity in making venture investments.[20] This raises an important question. Why are more reputable VCs associated with better long-term performance? We examine this question in the next section.

V. VC Support and Development of Portfolio Firms

A. VC Reputation and Issuer Corporate Governance

Can the relation between VC reputation and portfolio firm governance characteristics (including VC shareholdings and board positions) explain superior post-IPO performance of issuers backed by more reputable VC firms? Theoretical studies have suggested that large blockholders can effectively monitor top management (see, e.g., Shleifer and Vishny (1986), Burkart, Gromb, and Panunzi (1997)), and empirical studies such as Cronqvist and Fahlenbrach (2009) find that large blockholders (including private equity investors) significantly improve firm performance. Superior corporate governance structures can also enhance shareholder value (see, e.g., Gompers et al. (2003), Masulis, Wang, and Xie (2007),(2009)).

We examine 5 post-IPO issuer governance characteristics using indicator variables for: i) lead VC shareholdings, ii) lead VC directorships, iii) CEO-COBs, iv) CEO-Founders, and v) staggered boards, measured at the IPO date, as well as 1, 2, and 3 years thereafter. VC shareholdings and directorships in the post-IPO period continue to motivate and enable VCs to support and influence the further development of their portfolio firms. Separation of CEO and chairman roles strengthens board independence and increases board oversight of senior management. Similarly, a non CEO-founder is less likely to be entrenched and, as a result, is subject to greater board oversight. A staggered board is an important antitakeover provision

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[20] We perform 3 additional robustness checks. First, we drop VC Backed as an explanatory variable in the 2nd-step specification in case it is not exogenous to VC selectivity. We find in untabulated results that IPO Market Share again has significantly positive associations with ROA, M/B, and Return at a 1% significance level, and with Survival at a 10% significance level, after controlling for VC selectivity. Second, following Juergens and Lindsey (2009), we estimate an IV model using the limited information maximum likelihood (LIML) estimation approach. The results are qualitatively similar to those based on a standard Heckman (1979) 2-step selection procedure. Formally testing the relevance of the IVs, we find that the F-statistic for their joint significance in explaining VC reputation is above the critical value recommended in Staiger and Stock (1997). Finally, some valuable information about VC reputation may be lost by using a binary variable for high reputation in the 1st-stage regression (see Wooldridge (2002)). Therefore, as a 3rd robustness check, we estimate a double-boundary Tobit model in our 1st-step equation since IPO Market Share is bounded to between 0% and 100%. The results are qualitatively similar to those based on the Heckman 2-step procedure.

(Bebchuk, Cohen, and Ferrell (2009)), which reduces the disciplinary threat of the market for corporate control, thus raising CEO-shareholder agency costs.

In order to examine governance characteristics in IPO issuers backed by lead VCs of different reputations, we first divide our VCs into quartiles based on our VC reputation measure, IPO Market Share. We then focus on lead VCs in the top and bottom quartiles to assess the associations between VC reputation and the governance characteristics of their portfolio firms. We define VC Shareholdings, VC Directorships, CEO-COB, CEO-Founder, and Staggered Board as indicator variables that equal 1 if the lead VC holds shares in the IPO issuer, if the lead VC holds an issuer board seat, if the issuer's CEO is also chairman of the board, if the issuer's CEO is a founder, and if the issuer has a staggered board, respectively, and is 0 otherwise. These indicator variables are measured at the IPO date, as well as over the 3 years thereafter.

Panel A of Table 5 reports the proportion of IPO issuers (reported as percentages) having each of 5 governance characteristics at the IPO date and the 3 years thereafter for firms with lead VCs in the top and bottom reputation quartiles. The 2nd part of Panel A, for example, gives the proportion of IPO issuers backed by VCs in the highest reputation quartile versus the lowest quartile, in which VCs hold board seats at the IPO, and continue to do so over the next 3 years. The 1st row of the 2nd part shows that VCs in the highest reputation quartile hold directorships in 96% of issuers they back at the IPO date, which is significantly different from VCs in the lowest reputation quartile that hold directorships in only 83% of IPO issuers they back. In the 1st, 2nd, and 3rd years after the IPO, VCs in the highest reputation quartile hold a significantly higher proportion of directorships in firms they back relative to VCs in the lowest reputation quartile. It is noteworthy that VCs in the lowest reputation quartile hold shares and directorships in less than 100% of issuers they back at the IPO date, which implies that the least reputable VCs had invested early on, but in some cases sold out prior to the IPO.

In summary, Panel A of Table 5 shows that more reputable VCs hold shares and directorships in a significantly higher proportion of the issuers they back, not only at the IPO date, but also over the following 3 years. More reputable VCs are also associated with significantly lower proportions of firms with CEO-Founders and CEO-COBs at the IPO, and over the next 3 years.[21]

While suggestive, the above univariate analysis does not control for differences in issuer

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[21] By way of comparison, Ivanov and Masulis (2009) find 90% of their sample of 276 VC-backed IPOs made over the 1993–1999 period had VC shareholdings, 89% had VC directors, 49% had dual CEO-chairman 1 year after IPO, and 41% had CEO-founders. All of these figures are close to the figures we find. Pompilio (2007) reports 60% of his sample of 420 VC-backed IPOs made in the 1996–2006 period had dual CEO-COB positions at the IPO. Our sample period is somewhat different, and our sample of VC-backed IPOs is larger than those in these other 2 studies.

characteristics or for VC selectivity. To address these concerns, Panel B of Table 5 examines the relations between VC reputation and the governance characteristics of portfolio firms in a multivariate regression setting, where we control for differences in issuer characteristics and for VC selectivity.

We again estimate a standard Heckman (1979) 2-step selection procedure. In the 1st step, we estimate a probit model to predict the likelihood of an investment by a higher-ranked VC investor. In the 1st-stage equation, we employ Ln Asset, VC Syndicate Size, Top Auditor, Top Law, Hot IPO Market, Early Stage Investor, and Nearby Firm as IVs to predict more reputable VC investors as we do in Section IV. The 2nd stage relates post-IPO corporate governance characteristics to VC reputation. The dependent variables are indicator variables for issuer governance characteristics, while VC reputation is the covariate. The other control variables are the same as in Panel A of Table 2.

To meet the exclusion requirement, an IV needs to be unrelated to the issuer governance measures examined in the 2nd-step equations. We address this question both economically and statistically. Economically, there is no obvious reason for issuer asset size, measured by Ln Asset, to be related to post-IPO issuer corporate governance measures. While larger firms may have smaller insider shareholdings, they are also likely to have larger institutional investor shareholdings (see Cronqvist and Fahlenbrach (2009)). Thus, VC percentage shareholdings are not necessarily larger, even if VC dollar investment is larger, which is to be expected in larger portfolio firms.

At the IPO, more reputable lawyers and auditors are primarily concerned with meeting security regulations and disclosure requirements, rather than improving post-IPO issuer governance characteristics. Likewise, VC Syndicate Size is not directly linked to more VC shareholdings or directorships. An indirect link is possible because larger syndicates are associated with more reputable VCs, who are more likely to remain shareholders and directors in the post-IPO period as indicated in Panel A of Table 5, but this does not violate the exclusion requirement since it is directly related to VC reputation. Hot IPO Market has no obvious reason to be correlated to our issuer corporate governance characteristics. It could be argued that it is easier for poorly governed firms to go public in hot markets, but more well-governed firms are also more likely to go public then. Likewise, Early Stage Investor and Nearby Firm are related to which VCs invest in a portfolio firm, but appear unrelated to a firm's post-IPO governance characteristics. For example, more reputable VCs are more likely to invest in local deals, so they can be positively correlated

with Nearby Firm. More reputable VCs could also push for better governance, though their closer monitoring could substitute for other governance measures.

Statistically, we find that when we regress the IVs, along with VC reputation and the control variables from Panel A of Table 2 on the post-IPO corporate governance measures, none of the IVs is significantly related to any of the internal governance measures, though in the 1st-stage equation they are significantly related to our VC reputation measure, IPO Market Share. The 2nd-step equation we estimate is specified below:

$$(4) \quad G \quad = \quad \beta_Y + \beta_t + \beta_1 \text{ IPO Market Share} + \beta_2 \text{ VC Backed}$$
$$+ \beta_3 \text{ Underwriter Reputation} + \beta_4 \text{ Ln Offer Size}$$
$$+ \beta_5 \text{ Ln Issuer Age} + \beta_6 \text{ Issuer Market Cap} + \beta_7 \text{ Issuer M/B}$$
$$+ \beta_8 \text{ Price Revision} + \beta_9 \text{ Underpricing} + \beta_{10} \text{ Inverse Mills} + \varepsilon,$$

where G represents 1 of the issuer's 5 corporate governance characteristics at the IPO date or one of the 3 years thereafter. Panel B of Table 5 reports regression estimates for the 2nd-step equation, while the 1st-stage results are presented in Section IV. Regressions are estimated for 813, 783, 690, and 590 VC-backed firms where the requisite corporate governance data are available at the IPO date and the following 3 years, respectively. Only VC reputation coefficients are reported to conserve space, although we discuss significant control variables below.

The 1st and 2nd parts of Panel B in Table 5 shows that VC reputation has significant positive associations with VC shareholdings and directorships at the IPO and in each of the following 3 years. That is to say, the probability of retaining equity investments and board seats in the IPO issuers they back is significantly higher for more reputable VCs than for other lower ranked VCs. Thus, more reputable VCs tend to have stronger incentives to monitor CEO performance and they have significant influence over their portfolio companies in this post-IPO period.

The 3rd and 4th parts of Panel B in Table 5 show that VC reputation has (weakly) significantly negative associations with the probability of an issuer having a dual CEO-COB and CEO-Founder, but only at the IPO date. The 5th part shows that VC reputation is not significantly associated with the likelihood of firms having staggered boards at the IPO dates or thereafter, consistent with the finding of Field and Karpoff (2002).

Examining the control variables in these untabulated results, we find that Underpricing has a significant positive association with a VC's post-IPO shareholdings and directorships. This finding indicates that VCs tend to continue to be shareholders and board members in firms

experiencing high IPO initial returns. Issuer Market Cap has a significant negative association with post-IPO VC shareholdings, indicating that VC shareholdings are more diluted in better capitalized firms. Underwriter Reputation has a significant positive association with VC directorships, reinforcing the VC networking effect: More reputable lead underwriters are associated with IPOs in which VCs continue to hold board seats (which Panel A of Table 5 indicates are more frequently highly reputable VCs).

Since the only governance mechanisms that VC reputation is significantly related to at the IPO date and the 3 years thereafter are VC shareholdings and directorships, we conclude that a VC's continued participation in its portfolio firms after they go public is the only significant difference in corporate governance between firms backed by more and less reputable VCs. This is also the conclusion from Panel A of Table 5. Therefore, in the next section we focus on these 2 governance features as we further analyze the importance of post-IPO VC involvement in their portfolio firms in explaining long-term performance differences among firms backed by more and less reputable VCs.

B. VC Involvement and Long-Run Issuer Performance

We first classify firms on whether they are backed by VCs with higher reputations (IPO Market Share greater than 0.50%)[22] and then on whether they continue to hold shares over the following 3 years. In untabulated results, we compare firms with and without continued VC involvement in the 3 post-IPO years, and conclude from a difference in means *t*-test that ROA, M/B, Survival, and Return are all significantly greater for firms backed by more reputable VCs at the 1%, 5%, 1%, and 5% significance levels, respectively. In contrast, when more reputable VCs liquidate their share holdings within 3 years of the IPO, there are smaller differences in long-run performance metrics between firms backed by VCs with higher reputations versus other lead VCs: A difference in means *t*-test shows that long-run performance measures of firms backed by more reputable VCs are only significantly greater at the 10% level for ROA, Survival, and Return, while M/B is not significantly different relative to those backed by other lead VCs. This evidence suggests that continued VC monitoring and support in the post-IPO period, which is provided by more reputable VCs, is one credible reason for their portfolio firms to exhibit superior post-IPO performance.

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[22] The top 25 VCs all have IPO Market Share of more than 0.50% on average.

Analyzing the associations between continued post-IPO involvement in portfolio firms (in terms of VC shareholdings and directorships) by more reputable VCs and measures of long-term performance can be complicated by a VC's unobserved investment criteria for continued involvement in its publicly listed portfolio firms. Thus, we examine the relation between a VC's post-IPO involvement in a portfolio firm and the firm's long-run performance measures, after controlling for endogeneity of VC involvement, using IV LIML estimation as described later.

The 1st equation examines the likelihood 3 years after an IPO of continued VC shareholdings or alternatively directorships. The set of explanatory variables in the 1st equation includes IVs and the other control variables used in Panel A of Table 2, with the exception of the VC Backed indicator, which is highly correlated with the dependent variable.

To control for endogeneity of a VC's long-term shareholdings and directorships, we use the following IVs: i) VC Fund Age measured from a VC fund's date of incorporation to the IPO date, which is meant to capture the pressure on a VC to liquidate its investments; ii) a VC's other board of director commitments, Directorship Commitments, to capture the pressure faced by VCs to relinquish some of their directorships; iii) a VC's average post-IPO shareholding period, based on its prior experience, VC Avg Shareholding Period, which is meant to capture a VC's typical post-IPO investment pattern; and iv) a VC's average post-IPO directorship period based on its prior experience, VC Avg Directorship Period, which is meant to capture a VC's typical post-IPO directorship duration. The last two variables are based on data between 1992 and the IPO year. These data are hand collected from IPO prospectuses and proxy statements, and taken from the Venture Economics database.

To be valid, IVs must be significantly related to the likelihood of a VC having long-term post-IPO shareholdings and directorships, while being economically unrelated to an issuer's long-run performance measures. The economic justifications for why each of the IVs meets the latter exclusion requirement follow. While VC Fund Age captures the fact that older funds face stronger pressure to liquidate their investments, which encourages more rapid sales of their shares once a portfolio firm goes public, this fund characteristic is unrelated to VC firm characteristics and does not appear to have a direct relationship to issuer long-run performance. A VC's Directorship Commitments in other firms has no direct bearing on an issuer's long-term performance, except through its correlation with VC reputation and the VC's direct monitoring of the IPO issuer. Finally, the average duration of a VC's shareholdings and directorships is based on prior VC activity in other portfolio firms and as such captures VC policies that are exogenous to a

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subsequent IPO issuer long-run performance. Indeed, when we regress these IVs, along with VC reputation and the control variables from Panel A of Table 2, on subsequent issuer long-run performance measures, we find that none of the IVs is significantly related to any of the long-run performance measures.

The 2nd equation in the IV LIML model examines the relations between the 4 long-run performance measures, ROA, M/B, Survival, or Return, denoted by *P*, with VC corporate governance activity in the portfolio firm, where the same control variables are included as before. The statistical model is

(5) $P = \beta_Y + \beta_I + \beta_1$ VC Shareholdings/VC Directorships
 $+ \beta_2$ VC Backed $+ \beta_3$ Underwriter Reputation $+ \beta_4$ Ln Offer Size
 $+ \beta_5$ Ln Issuer Age $+ \beta_6$ Issuer Market Cap $+ \beta_7$ Issuer M/B
 $+ \beta_8$ Price Revision $+ \beta_9$ Underpricing $+ \varepsilon,$

where VC Shareholdings, or alternatively, VC Directorships, is the endogenous explanatory indicator variable for a VC's governance activity in the portfolio firm 3 years after the IPO. Given their high correlation (79%, 75%, 72%, and 71%, respectively, at the IPO and in the next 3 years), we analyze the effects of VC Shareholdings and VC Directorships in separate regressions. However, a high correlation also means that these 2 sets of results cannot be viewed as strictly independent pieces of evidence. Regressions of ROA, M/B, Survival, and Return are, respectively, estimated for 1,941, 1,941, 2,019, and 2,019 observations representing VC-backed and non-VC-backed IPOs completed in the 1996–2002 period.

Panels A and B of Tables 6 report 1st- and 2nd-step regression estimates and associated *t*-statistics (or *z*-statistics) based on standard errors robust to heteroskedasticity and adjusted for industry clustering. The 1st-step regressions are consistent with our prior findings and show that Ln VC Fund Age and Directorship Commitments have significantly negative relations and VC Avg Shareholding Period and VC Avg Directorship Period have significantly positive relations to VC shareholdings and directorships 3 years after the IPO.

The 2nd-step regressions show that the indicator variables, VC Shareholdings and VC Directorships, have significant positive associations with all 4 measures of issuer long-run performance. As an alternative approach, we assess the effects of continued VC shareholdings using a continuous variable, rather than the VC Shareholdings indicator variable. For this purpose, we use an IV LIML model, in which the 2nd equation is the same as equation (5) except that VC Percentage Shareholding is now the covariate. Table A1 in Appendix B shows that a VC's

percentage shareholdings is significantly related to ROA, M/B, and Survival at a 10% significance level, while it is not significantly related to Return. Thus, the fact that more reputable VCs continue to be shareholders in the post-IPO period appears to improve issuer performance more than the size of their shareholdings.[23] In summary, this section presents further evidence that continued post-IPO involvement of more reputable VCs in portfolio firms leads to stronger firm performance.

VI. Conclusion

We study venture capital (VC) investors, who operate in a fragmented industry where even the largest VC firms have small market shares. We investigate the usefulness of distinguishing VCs by reputation by examining whether more reputable VCs have differential effects on post-IPO performance of their portfolio firms, and if so, how. Because younger VCs can have incentives to grandstand by bringing weaker IPOs to market too early, it is important for investors to assess how well these portfolio firms perform in the long run after their IPOs. Such post-IPO performance is not only important to IPO investors and VC fund investors, but also to entrepreneurs considering future relationships with these VC investors.

Of the various VC reputation measures that we investigate, we find that a VC's past market share of VC-backed IPOs, termed IPO Market Share, consistently exhibits a significant positive relation with all the issuer long-run performance measures we investigate, even after controlling for VC backing, issue characteristics, and underwriter reputation. It is noteworthy that Nahata's (2008) results and our results are complementary in that a VC reputation measure based on past IPO market share is strongly related to both pre- and post-IPO performance of portfolio firms. Consistent with Sørensen's (2007) conclusions using a very different methodology, we conclude that more reputable VCs select stronger portfolio firms. However, after controlling for VC selectivity, we find more reputable VCs continue to have significant positive associations with a number of post-IPO long-run performance measures. We interpret this evidence as indicating that continued post-IPO support and development of portfolio firms by more reputable VCs positively affects their long-term performance. The key question then is how this occurs.

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[23] We also investigate whether using a continuous variable, the actual percentage of board seats held by a VC 3 years after the IPO (termed VC Board Seat Percentage), rather than the indicator variable for a VC directorship, affects our main findings. We use IV LIML estimation, wherein the 2nd equation uses the VC Board Seat Percentage 3 years after the IPO as the covariate. In untabulated results, we find that the actual percentage of board seats held by a VC is not significantly related to the long-run performance measures we examine. Thus, having more reputable VCs continue to serve on the board in the post-IPO period appears sufficient to improve issuer performance; while there is no discernable benefit from a VC holding a larger percentage of board seats.

Examining VC corporate governance activities in newly public firms, we find that more reputable VCs have a higher probability of retaining their shares and board seats for up to 3 years after an IPO. Moreover, continued VC shareholdings and directorships have significant positive associations with issuer long-run performance measures. These relations continue to hold after controlling for endogeneity of VC shareholdings and VC directorships in the 3-year post-IPO period. In sum, we find a persuasive body of evidence that more reputable VCs exhibit superior venture investment selectivity and provide stronger long-run post-IPO support for portfolio firms, especially in terms of their continued involvement through shareholdings and board directorships, which leads to superior long-term firm performance.

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Appendix A. Definitions of Key Variables

IPO Long Run Performance Measures	Description
ROA	The match-adjusted return on assets (defined as net income divided by book value of total assets). The industry match-adjustment process is described below. First, each IPO issuer in our sample is matched to a sample of nonequity issuers (in the 3 years before and after the IPO date) based on the issuer's industry, which is measured by its 4-digit Standard Industrial Classification (SIC) code if there are at least 5 other firms in the industry, or else it is based on its 3-digit (or 2-digit) SIC code so we can obtain at least 5 nonissuing firms. Then, the median ROA of the matched sample of nonissuers is subtracted from the ROA of the IPO firm. ROA is winsorized at the 1% and 99% levels to minimize the effects of outliers that can be induced by data errors.
M/B	The market-to-book equity ratio (M/B), which often is used to value a firm's real options and is a proxy for Tobin's Q. The market-to-book ratio is measured at the end of the 12th quarter following the IPO. To avoid inducing survivorship bias into our measures of long-run performance, we use the n-quarter ($n < 12$) ROA and M/B figures for IPO issuers that do not survive 3 calendar years beyond the IPO date, where n is the maximum number of quarters for which data are available in Compustat. M/B is winsorized at the 1% and 99% levels to minimize the effects of outliers that can be induced by data errors.
Survival	An indicator variable that takes a value of 1 for firms that remain listed on the NYSE, AMEX, or NASDAQ (i.e., remain in the CRSP database) for 3 years following their IPOs or that are merged or acquired by listed firms (which themselves remain listed for the remainder of the 3 calendar years following the IPO dates), and 0 otherwise (firms that become bankrupt, defunct, or are liquidated).
Return	An issuer's factor-adjusted abnormal stock return (Return) measured over the 36 months after the issue month. The factors used to adjust returns are the 3 Fama and French (1992) factors and the Carhart (1997) momentum factor. To avoid inducing survivorship bias, we compute long-run stock returns for IPO firms using monthly returns for the 36-month post-IPO period or until delisting, whichever comes first. Return is winsorized at the 1% and 99% levels to limit the effects of outliers on our results.
R&D/CapEx	The ratio of research and development expenditures (R&D) to capital expenditures averaged over the 3 fiscal years following the IPO month, computed using the Compustat annual financial statement database.
(R&D + CapEx) / Total Assets	The ratio of research and development expenditures (R&D) plus capital expenditures to total assets averaged over the 3 fiscal years following the IPO month and scaled by the firm's total assets, computed using the Compustat annual financial statement database.

VC Reputation Measure	Description **Sources: Thomson Financial's Venture Economics and Global New Issues databases.**
IPO Market Share	A VC's dollar market share of all venture-backed IPOs in the preceding 3 calendar years. For instance, to analyze the long-run performance of an IPO completed in 1996, the dollar value of all IPOs backed by a VC during years 1993, 1994, and 1995 is aggregated as a proportion of the total dollar size of all venture-backed IPOs in the same 3-year period. The dollar size of an IPO is defined as its gross proceeds, exclusive of overallotment options. Each VC investor is given full credit for a completed IPO that it backs.
Reputable VC	An indicator variable for highly ranked lead VCs, and takes a value of 1 for issuers backed by a VC with an IPO Market Share above the median of all VCs, and 0 otherwise.

Control Variables	Description **Sources: Compustat, Global New Issues and Venture Economics databases**
VC-backed	An indicator variable that takes the value of 1 for VC-backed IPOs and 0 otherwise.
Ln Offer Size	The natural log of the size of the IPO: gross proceeds from the offering, exclusive of overallotment options.
Ln Issuer Age	The natural log of 1+ the age (in years) of the issuer at the time of the offering, as computed from the firm's first incorporation to the date of the offering. This data is taken from Jay Ritter's web site.
Underwriter Reputation	The lead underwriter reputation score measured by the Carter-Manaster score, as modified by Ritter and made available on his web site: *http://bear.cba.ufl.edu/ritter/rank.xls*
Issuer Market Cap	The implied market capitalization of the IPO issuer obtained by multiplying offer price by the total number of post-IPO shares (including those retained by owner).
Issuer M/B	The market to book ratio of the IPO issuer as at time of the IPO, computed following Brav and Gompers (1997).
Price Revision	The percentage increase in final IPO offer price from the midpoint of the high and low prices in the initial filing
Underpricing	The first-day raw stock return for IPO issuers
β_Y	A vector of year fixed effects

β_I	A vector of indicator variables for 8 industry groups capturing industry fixed effects. The industry groups are i) Internet and computers, ii) communications and electronics, iii) business and industrial, iv) consumer products, v) energy, vi) biotech and healthcare, vii) financial services, and viii) business services.

Corporate Governance Variables	*Description* **Sources: Prospectuses, proxy statements and annual reports after May 1996 come from SEC's Edgar website (http://www.sec.gov/edgar.shtml). Prospectuses, proxy statements and annual reports prior to May 1996 come from Thomson Financial's Disclosure database.**
VC Shareholdings	An indicator variable equal to 1 if the lead VC has shareholdings in the IPO issuer in the IPO year, or 1, 2 and 3 years after the IPO
VC Percentage Shareholding	The lead VC's percentage shareholdings in the IPO issuer 3 years after the IPO
VC Directorships	An indicator variable equal to 1 if the lead VC has directors on the board of the IPO issuer in the IPO year, or 1, 2 and 3 years after the IPO
CEO-COB	An indicator variable equal to 1 if the IPO issuer has a CEO who also holds the board chairmanship
CEO-Founder	An indicator variable equal to 1 if the CEO is also a founder
Staggered Board	An indicator variable equal to 1 if the IPO issuer has a staggered board.

Acquisition Analysis Variables	*Description* Source: SDC Mergers & Acquisitions database.
Completed Acquisition	An indicator variable equal to 1 if a VC-backed issuer is acquired in the 3-year post-IPO period
Takeover Premium	Stock price premium paid by the acquirer for the target relative to the target's pre-offer announcement stock price 1 day earlier
Shares Acquired	Percentage of target shares purchased in the transaction
Ln Deal Size	The natural logarithm of the M&A transaction's dollar value.
Cash	An indicator variable equal to 1 for a pure cash financed acquisition

Multiple Bidders	An indicator variable equal to 1 if there are competing bidders

Instrumental Variables	**Description** **Sources: Venture Economics and Global New Issues databases, IPO prospectuses and Proxy Statements**
Ln Asset	Natural log of the IPO issuer's total assets at the end of the quarter immediately prior to the IPO date.
VC Syndicate Size	Number of VC co-investors in the IPO issuer at the time of the IPO
Early Stage Investor	An indicator variable that takes the value of 1 if the lead VC made the first investment in the issuer firm when it was an early stage firm, and 0 otherwise
Nearby Firm	An indicator variable that takes the value of 1 if the lead VC is headquartered in the same state as the issuer, and 0 otherwise
Top Law	An indicator variable equal to 1 for IPO issuers with a top tier legal advisor. We classify law firms with more than 1 percent market share in a year as a top tier legal advisor. A law firm's market share of IPOs is defined as total gross proceeds of IPOs where they are an issuer legal advisor in the 3 calendar years immediately preceding the IPO as a proportion of the aggregate dollar value of all IPOs that named an issuer legal advisor in the same period, which we obtain from the SDC Global New Issues database (see Beatty and Welch (1996) for a similar approach). Each law firm named an IPO issuer legal advisor is given full credit for an IPO.
Top Auditor	An indicator variable equal to 1 for IPO issuers with a top 4 or 5 accounting firm
Hot IPO Market	An indicator variable equal to 1if the IPO is made in the Helwege and Liang (2004) hot issue market periods
Ln VC Fund Age	The natural log of the age of the investing VC funds in our VC-backed IPO sample measured from the date of incorporation to the IPO date.
Competing Directorships	The number of public firms in which a VC holds a directorship position minus 1 for every year in our sample period scaled by the cumulative number of IPOs the VC has been associated with in the previous years from 1992, or, alternatively, the cumulative number of IPOs the VC was the lead VC to (the biggest VC investor in) in the previous years from 1992
VC Avg Shareholding Period	The average post-IPO shareholding period for a VC from 1993 to the pre-IPO year
VC Avg Directorship Period	The average post-IPO directorship period for a VC from 1993 to the pre-IPO year

Appendix B. VC Shareholdings and Issuer Long-Run Performance after Controlling for Endogeneity

Table A1 reports on the associations of VC percentage shareholdings with the long-run IPO issuer performance measures, after controlling for endogeneity.

VC Percentage Shareholdings and Long-Run IPO Issuer Performance after Controlling for Endogeneity

Table A1 presents IV LIML estimation coefficients and in parentheses associated *t*-statistics (or *z*-statistics in the case of logit regressions) based on standard errors robust to heteroskedasticity and adjusted for industry clustering, where VC Percentage Shareholdings is the covariate in the 2nd equation. The instrumental variables used in the 1st equation are Ln VC Fund Age, Competing Directorships, VC Avg Shareholding Period, and VC Avg Directorship Period. The 2nd equation of the model is

$$P = \beta_Y + \beta_I + \beta_1 \text{ VC Percentage Shareholdings} + \beta_2 \text{ VC Backed} + \beta_3 \text{ Underwriter Reputation} + \beta_4 \text{ Ln Offer Size} + \beta_5 \text{ Ln Issuer Age}$$
$$+ \beta_6 \text{ Issuer Market Cap} + \beta_7 \text{ Issuer M/B} + \beta_8 \text{ Price Revision} + \beta_9 \text{ Underpricing} + \varepsilon,$$

where *P* is 1 of the issuer performance measures (ROA, M/B, Survival, Return). The variables are defined in Appendix A. *, **, and *** denote coefficient estimates significantly different from 0 at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable				
	VC PERCENTAGE SHAREHOLDINGS	ROA	M/B	SURVIVAL	RETURN
VC Percentage Shareholdings		0.03*	0.15*	0.05*	0.08
		(1.73)	(1.71)	(1.67)	(1.28)
Ln VC Fund Age	–0.79**				
	(–2.33)				
Competing Directorships	–0.98				
	(–1.39)				
VC Avg Shareholding Period	0.76**				
	(1.98)				
VC Avg Directorship Period	0.82*				
	(1.67)				
VC Backed		0.06	1.11*	0.21	1.34*
		(1.02)	(1.71)	(1.59)	(1.89)
Underwriter Reputation	0.09	0.03	0.25	0.24***	0.43***
	(1.56)	(1.22)	(1.45)	(2.89)	(2.65)
Ln Offer Size	0.68	–0.04	–0.67*	0.32	–0.88*
	(1.48)	(–0.60)	(–1.77)	(1.60)	(–1.75)
Ln Issuer Age	–0.12	0.03	–0.56*	0.47***	0.28
	(–1.53)	(0.48)	(–1.69)	(2.68)	(1.12)
Issuer Market Cap	–0.08	–0.01	0.02***	0.03	0.03**
	(–1.22)	(–0.17)	(2.89)	(0.73)	(2.35)
Issuer M/B	0.07	–0.03	0.02	0.03	0.03
	(1.12)	(–1.47)	(0.98)	(0.60)	(0.71)
Price Revision	1.01***	0.70**	–1.31	0.42	0.37
	(2.88)	(2.39)	(–1.00)	(0.87)	(0.19)
Underpricing	0.10***	0.02	–0.02	0.04	–0.03
	(2.58)	(0.19)	(–0.81)	(1.11)	(–0.57)
Adjusted/pseudo R^2	27.56%	4.98%	6.29%	7.66%	5.02%
N		1,724	1,724	1,787	1,787

TABLE 1
Descriptive Statistics of IPO Sample

Panel A of Table 1 reports the number of non-VC-backed and VC-backed IPOs by year in our sample of 2,019 IPOs completed in the 1996–2002 period. Panel B reports the mean issue and issuer characteristics for our non-VC-backed and VC-backed IPO samples. Panel C reports the mean long-term performance measures for our non-VC-backed and VC-backed IPO samples. The variables are defined in Appendix A. Also reported are the significance of the differences in means between the 2 samples. *N* denotes the number of observations analyzed. *, **, and *** denote significant difference in the means of the 2 groups at the 10%, 5%, and 1% levels, respectively.

Panel A. IPO Frequencies by Year

Year	Non-VC-Backed IPOs	VC-Backed IPOs
1996	343	209
1997	262	112
1998	182	60
1999	229	201
2000	112	204
2001	39	17
2002	30	19
Total	1,197	822

Panel B. Mean IPO Characteristics

Variable	Non-VC-Backed IPOs (*N* = 1,197) Mean	VC-Backed IPOs (*N* = 822) Mean
Offer Size ($million)	57.54	58.11
Issuer Age (years)	11.49	7.68**
Underwriter Reputation	6.57	8.14*
Issuer Market Cap ($million)	198.73	199.77
Issuer M/B	44.67	46.15
Price Revision (%)	–0.91	8.60***
Underpricing (%)	17.83	42.97***

Panel C. Mean IPO Issuer Long-Run Performance Measures

Variable	Non-VC-Backed IPOs N	Mean	VC-Backed IPOs N	Mean
ROA	1,154	0.29	787	0.56***
M/B	1,154	2.95	787	4.43***
Survival (%)	1,197	84.46	822	88.08*
Return (%)	1,197	–0.90	822	0.85***

TABLE 2
Cross-Sectional Regressions of Issuer Long-Run Performance Measures and VC Reputation

Table 2 presents coefficient estimates and associated t-statistics (z-statistics in the case of logit regression) in parentheses, based on standard errors that are robust to heteroskedasticity and adjusted for industry clustering. Each post-IPO performance measure is regressed on the lead VC reputation measure, IPO Market Share, computed as a VC's dollar market share of all venture-backed IPOs in the prior 3 calendar years and a set of control variables. Regressions are based on OLS when the dependent variable is ROA, M/B, or Return and a logit model in the case of Survival, using 1,941, 1,941, 2,019, and 2,019 VC-backed and non-VC-backed IPOs completed in the 1996–2002 period. Adjusted R^2 values are reported for OLS regressions, and a pseudo R^2 value for the logit regression. $*$, $**$, and $***$ denote coefficient estimates significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Panel A uses the following regression model:

$$P = \beta_Y + \beta_I + \beta_1 \text{ IPO Market Share} + \beta_2 \text{ VC Backed} + \beta_3 \text{ Underwriter Reputation} + \beta_4 \text{ Ln Offer Size} + \beta_5 \text{ Ln Issuer Age}$$
$$+ \beta_6 \text{ Issuer Market Cap} + \beta_7 \text{ Issuer M/B} + \beta_8 \text{ Price Revision}$$
$$+ \beta_9 \text{ Underpricing} + \varepsilon,$$

where P is 1 of the issuer performance measures (ROA, M/B, Survival, Return) and all the variables are defined in Appendix A. Panel B uses the following expanded regression model with three additional controls:

$$P = \beta_Y + \beta_I + \beta_1 \text{ IPO Market Share} + \beta_2 \text{ VC Backed} + \beta_3 \text{ Underwriter Reputation} + \beta_4 \text{ Ln Offer Size}$$
$$+ \beta_5 \text{ Ln Issuer Age} + \beta_6 \text{ Issuer Market Cap} + \beta_7 \text{ Issuer M/B} + \beta_8 \text{ Price Revision} + \beta_9 \text{ Underpricing}$$
$$+ \beta_{10} \text{ VC Age} + \beta_{11} \text{ VC Syndicate Size} + \beta_{12} \text{ VC Network Centrality} + \varepsilon,$$

Panel A. Issuer Long-Run Performance and IPO MARKET SHARE, Controlling for Issue Characteristics

	Dependent Variable			
	ROA	M/B	SURVIVAL	RETURN
IPO Market Share	0.27***	0.96**	0.33**	2.04***
	(3.42)	(2.07)	(1.97)	(4.02)
VC Backed	–0.19	0.98	–0.03	0.90
	(–1.44)	(1.53)	(–0.13)	(1.19)
Underwriter Reputation	0.03**	0.09	0.19***	0.20***
	(2.26)	(1.16)	(3.99)	(2.58)
Ln Offer Size	–0.03	–0.47**	0.13	–0.16
	(–0.48)	(–2.14)	(1.07)	(–0.82)
Ln Issuer Age	0.04	–0.22**	0.30***	0.16
	(1.10)	(–2.12)	(4.53)	(1.30)
Issuer Market Cap	–0.04	0.01**	0.01	0.02
	(–0.45)	(2.38)	(0.66)	(0.98)
Issuer M/B	–0.04	0.01	0.01	0.15
	(–1.39)	(1.12)	(0.74)	(1.45)
Price Revision	0.56***	–0.51	0.40	0.44
	(3.03)	(–0.87)	(1.15)	(0.68)
Underpricing	–0.03	–0.02	0.02	0.02
	(–0.43)	(–1.01)	(0.18)	(0.40)
Adjusted/pseudo R^2	6.10%	4.66%	12.22%	9.95%

Panel B. Issuer Long-Run Performance and IPO MARKET SHARE, Controlling for Additional VC Characteristics

	Dependent Variable			
	ROA	M/B	SURVIVAL	RETURN
IPO Market Share	0.22***	0.89**	0.32**	1.52***
	(2.94)	(2.01)	(1.96)	(2.62)
VC Backed	–0.18	1.01	–0.06	0.10
	(–1.50)	(1.58)	(–0.62)	(0.14)
Underwriter Reputation	0.03**	0.06	0.21***	0.20***
	(2.04)	(0.96)	(4.04)	(2.40)
Ln Offer Size	–0.03	–0.45**	0.13	–0.15
	(–0.62)	(–2.15)	(1.03)	(–0.62)
Ln Issuer Age	0.04	–0.21**	0.39***	0.15
	(1.06)	(–2.25)	(4.20)	(1.16)
Issuer Market Cap	–0.04	0.01**	0.01	0.03
	(–1.12)	(2.49)	(0.62)	(1.05)
Issuer M/B	–0.05	0.01	0.02	0.15
	(–1.58)	(1.29)	(0.62)	(1.44)
Price Revision	0.55*	–0.53	0.36	0.37
	(1.95)	(–0.88)	(1.03)	(0.59)
Underpricing	–0.01	–0.03	0.01	0.01
	(–0.10)	(–1.28)	(0.64)	(0.36)
VC Age	0.02	0.06	0.05***	0.07*
	(1.37)	(1.33)	(3.29)	(1.76)
VC Syndicate Size	–0.04	0.01	–0.08	–0.06
	(–1.04)	(0.01)	(–1.56)	(–0.99)
VC Network Centrality	1.11**	6.36	0.71	3.29
	(1.97)	(1.19)	(0.26)	(0.77)
Adjusted/pseudo R^2	6.69%	4.41%	13.19%	9.93%

TABLE 3

Cross-Sectional Regressions of Alternative Issuer Long-Run Performance Measures and VC Reputation

Table 3 presents regression estimates and in parentheses associated *z*-statistics based on standard errors that are robust to heteroskedasticity and adjusted for industry clustering. Each post-IPO performance measure is regressed on the lead VC reputation measure, IPO Market Share, computed as a VC's dollar market share of all venture-backed IPOs in the prior 3 calendar years and a set of control variables. All the variables are defined in Appendix A. *, **, and *** denote coefficient estimates significantly different from 0 at the 10%, 5%, and 1% levels, respectively. In Panel A, we use 2 forward-looking financial ratios as long-run performance measures, namely R&D/Capex and (R&D + Capex)/Total Assets. Tobit regressions are estimated given that the 2 dependent variables are censored at 0. R&D expense and capital expenditure ratios data are taken from the Compustat annual financial statement database and are available for 560 VC-backed IPOs and 837 non-VC-backed IPOs completed in the 1996–2002 period. In Panel B, the performance measure is Completed Acquisition, which is an indicator variable for an acquisition of a VC-backed issuer share block in the 3-year post-IPO period. A logit regression model is used given the binary nature of the dependent variable. The regression models use the same control variables as above (except VC Backed) and are estimated over 822 VC-backed IPOs completed in the 1996–2002 period. We examine regression specification with and without the vector of 8 industry groups, β_I. Acquisition data are taken from the SDC Mergers & Acquisitions database. In Panel C, the firm performance measure is Takeover Premium is regressed on lead VC reputation measure, IPO Market Share, Ln Asset, the natural logarithm of issuer (target) asset size, and deal-related control variables. The variables are defined in Appendix A. When there are multiple acquisitions of blocks of shares involving the same target firm in the 3-year post-IPO period, an average target premium and average deal-related variables are used. The regression specification is

$$\text{Takeover Premium} = \beta_I + \beta_1 \text{ IPO Market Share} + \beta_2 \text{ Ln Asset} + \beta_3 \text{ Ln Deal Size}$$
$$+ \beta_4 \text{ Shares Acquired} + \beta_5 \text{ Cash} + \beta_6 \text{ Multiple Bidders} + \varepsilon.$$

OLS regressions are estimated over 105 VC-backed IPO issuers from our sample that were acquired in the following 3-year post-IPO period in 134 acquisitions of large blocks of shares, for which data on all the above variables are available.

	Dependent Variable	
	R&D/CAPEX	(R&D + CAPEX)/ TOTAL ASSETS
IPO Market Share	2.84***	0.05***
	(3.00)	(3.09)
VC Backed	1.07**	0.06
	(2.12)	(1.35)
Underwriter Reputation	0.35	0.01
	(1.33)	(1.56)
Ln Offer Size	–2.67**	–0.03**
	(–1.99)	(–2.02)
Ln Issuer Age	1.71	0.01
	(0.88)	(0.43)
Issuer Market Cap	–0.01	–0.00
	(–1.00)	(–1.12)
Issuer M/B	0.01	–0.00
	(0.55)	(–0.75)
Price Revision	–0.35	–0.03
	(–0.14)	(–0.94)
Underpricing	0.02	0.01
	(0.44)	(1.59)
Adjusted R^2	3.33%	37.27%
N	1,397	1,397

Panel B. IPO MARKET SHARE and Probability of Acquisition

	Dependent Variable: COMPLETED ACQUISITION	
IPO Market Share	0.18**	0.13**
	(2.35)	(2.01)
Underwriter Reputation	0.05	0.06
	(1.51)	(1.57)
Ln Offer Size	0.17	0.18
	(1.37)	(1.40)
Ln Issuer Age	–0.27***	–0.20***
	(–3.01)	(–2.66)
Issuer Market Cap	–0.02**	–0.02**
	(–1.99)	(–1.90)
Issuer M/B	0.02	0.02
	(0.28)	(0.27)
Price Revision	–0.32	–0.33
	(–1.58)	(–1.62)
Underpricing	–0.04	–0.05
	(–1.10)	(–1.17)
β_I vector	No	Yes
Pseudo R^2	9.13%	9.42%
N	822	822

Panel C. IPO MARKET SHARE and TAKEOVER PREMIUM

	Dependent Variable: TAKEOVER PREMIUM		
	1 Day before Offer Announcement	1 Week before Offer Announcement	4 Weeks before Offer Announcement
IPO Market Share	11.61***	5.68***	12.93**
	(3.12)	(2.56)	(2.15)
Ln Asset	1.13	8.64***	9.39
	(0.55)	(9.26)	(0.52)
Ln Deal Size	3.55**	4.20	6.88
	(2.43)	(1.63)	(1.05)
Shares Acquired	0.37***	0.33**	0.92***
	(2.67)	(2.27)	(4.62)
Cash	3.05	20.97**	17.88
	(0.17)	(2.38)	(1.43)
Multiple Bidders	3.02***	3.84***	0.55
	(3.62)	(2.80)	(0.32)
Adjusted R^2	27.58%	18.37%	21.16%
N	105	105	105

TABLE 4
Issuer Long-Run Performance and VC Reputation, Controlling for Issue Traits and Self-Selection

Table 4 presents 2-step Heckman (1979) regression coefficients and in parentheses associated *t*-statistics (or *z*-statistics in the case of probit or logit regressions) based on standard errors that are robust to heteroskedasticity and adjusted for industry clustering. In a 1st step, a probit regression is estimated for the likelihood of firm receiving backing from a more reputable VC, Reputable VC, defined as an indicator that takes a value of one when the VC has an IPO Market Share of all VC-backed IPOs above the median, where IPO Market Share is computed as a VC's dollar market share of all venture-backed IPOs in the prior 3 calendar years. The instrumental variables are Ln Asset, VC Syndicate Size, Top Auditor, Top Law, Hot IPO Market, Early Stage Investor, and Nearby Firm. All the variables are defined in Appendix A. The inverse Mills ratio estimated from the 1st-step regression is used in the following 2nd-step regression model:

$$P = \beta_Y + \beta_I + \beta_1 \text{ IPO Market Share} + \beta_2 \text{ VC Backed} + \beta_3 \text{ Underwriter Reputation} + \beta_4 \text{ Ln Offer Size}$$
$$+ \beta_5 \text{ Ln Issuer Age} + \beta_6 \text{ Issuer Market Cap} + \beta_7 \text{ Issuer M/B} + \beta_8 \text{ Price Revision}$$
$$+ \beta_9 \text{ Underpricing} + \beta_{10} \text{ Inverse Mills} + \varepsilon,$$

where *P* is 1 of the standard long-run performance measures, and the IPO Market Share is the endogenous covariate. When the dependent variable is one of the following long-run performance measures: ROA, M/B, or Return, regressions are based on OLS, while for the last performance measure, Survival, regressions are based on a logit model, where the estimates are based on 1,941, 1,941, 2,019, and 2,019 IPOs (including both VC-backed and non-VC-backed) completed in the 1996–2002 period, respectively. *, **, and *** denote coefficient estimates significantly different from 0 at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable				
	Pr(REPUTABLE VC = 1)	ROA	M/B	SURVIVAL	RETURN
IPO Market Share		0.19***	1.02**	0.32*	1.86***
		(3.09)	(2.44)	(1.88)	(3.77)
Ln Asset	–0.10*				
	(–1.66)				
VC Syndicate Size	0.05***				
	(3.09)				
Top Auditor	0.71***				
	(3.20)				
Top Law	0.32**				
	(2.42)				
Hot Ipo Market	0.49**				
	(2.44)				
Early Stage Investor	0.53***				
	(3.11)				
Nearby Firm	0.44***				
	(3.99)				
VC Backed		–0.01	0.67	0.22	0.49
		(–0.14)	(1.18)	(0.52)	(0.78)
Underwriter Reputation	0.18***	0.03**	0.08	0.18***	0.19**
	(3.74)	(2.29)	(0.97)	(3.55)	(2.48)
Ln Offer Size	0.17	–0.02	–0.61**	0.12	–0.20
	(1.53)	(–0.33)	(–2.49)	(0.93)	(–1.04)
Ln Issuer Age	–0.10	0.03	–0.19**	0.22***	0.15
	(–1.37)	(1.02)	(–1.99)	(3.47)	(1.13)
Issuer Market Cap	0.01	–0.03	0.01**	0.02	0.02
	(0.19)	(–0.47)	(2.42)	(0.79)	(1.07)
Issuer M/B	0.10**	–0.04	0.01	0.03	0.13
	(2.12)	(–1.33)	(1.09)	(0.68)	(1.16)
Price Revision	–0.35	0.55***	–0.39	0.58	0.18
	(–1.09)	(2.57)	(–0.69)	(1.49)	(0.22)
Underpricing	0.10*	–0.02	–0.04*	0.07	0.02
	(1.74)	(–0.25)	(–1.77)	(0.49)	(0.59)
Inverse Mills		0.11**	0.86***	0.30**	0.25**
		(2.27)	(2.57)	(2.21)	(1.98)
Adjusted/pseudo R^2	49.18%	6.28%	5.61%	11.39%	8.18%

TABLE 5
Cross Sectional Regressions of IPO Firm Governance Characteristics and VC Reputation

Panel A of Table 5 reports the proportion of IPO issuers (in %) with each of 5 governance characteristics for lead VCs in the top and bottom reputation quartiles (where IPO Market Share is computed as its dollar market share of all venture-backed IPOs in the preceding 3 calendar years). The 5 governance characteristics are i) lead VC block-holdings, ii) lead VC directorships, iii) CEOs also hold board chairmanship (COB), iv) CEOs who are also founders, and v) staggered boards. Indicator variables are used to indicate the presence of each of these governance characteristics. We track these 5 governance characteristics at the IPO date and 1, 2, and 3 years after the IPO. Corporate governance data are available for 813 VC-backed issuers at the IPO date, and 783, 690, and 590 VC-backed IPO issuers respectively for the 3 years thereafter. *, **, and *** denote significantly different from the other cohort at the 10%, 5%, and 1% levels, respectively. Panel B presents 2-step Heckman (1979) regression coefficients and in parentheses associated t-statistics (or z-statistics in the case of probit or logit regressions) based on standard errors that are robust to heteroskedasticity and adjusted for industry clustering. In a 1st step, a probit regression is estimated for the likelihood of observing a firm backed by a more reputable VC, based on IPO Market Share being above the median IPO Market Share in VC-backed deals. The dependent variable is Reputable VC, defined as an indicator that takes a value of 1 when the lead VC's IPO market share is above the median. The instrumental variables used are Ln Asset, VC Syndicate Size, Top Auditor, Top Law, Hot IPO Market, Early Stage Investor, and Nearby Firm. The inverse Mills ratio estimated from the 1st-step regression is used in the following 2nd-step regression:

$$G = \beta_\gamma + \beta_I + \beta_1 \text{ IPO Market Share} + \beta_2 \text{ Underwriter Reputation} + \beta_3 \text{ Ln Offer Size}$$
$$+ \beta_4 \text{ Ln Issuer Age} + \beta_5 \text{ Issuer Market Cap} + \beta_6 \text{ Issuer M/B}$$
$$+ \beta_7 \text{ Price Revision} + \beta_8 \text{ Underpricing} + \beta_9 \text{ Inverse Mills} + \varepsilon,$$

where G is an indicator variable for 1 of the 5 governance characteristics being present in VC-backed IPO issue; VC Shareholdings, VC Directorships, CEO-COB, CEO-Founder, and Staggered Board, measured at the IPO and in the 3 years thereafter: All the variables are defined in Appendix A. The regressions are estimated over 813, 783, 690, and 590 VC-backed IPOs completed in the 1996–2002 period, measured at IPO and the 3 following years, respectively, for which we have the requisite corporate governance data, and the IPO Market Share is the endogenous covariate. *, **, and *** denote coefficient estimates significantly different from 0 at the 10%, 5%, and 1% levels, respectively.

	Date of Governance Measure	Top Quartile IPO MARKET SHARE	Bottom Quartile IPO MARKET SHARE
VC Shareholdings	IPO year	100%	92%**
	1 year after IPO	94%	85%**
	2 years after IPO	79%	71%**
	3 years after IPO	71%	63%**
VC Directorships	IPO year	96%	83%***
	1 year after IPO	93%	78%***
	2 years after IPO	86%	77%**
	3 years after IPO	77%	68%**
CEO-COB	IPO year	44%	50%*
	1 year after IPO	44%	48%*
	2 years after IPO	40%	47%**
	3 years after IPO	36%	41%*
CEO-Founder	IPO year	39%	48%**
	1 year after IPO	38%	45%**
	2 years after IPO	33%	40%**
	3 years after IPO	28%	34%*
Staggered Board	IPO year	56%	55%
	1 year after IPO	69%	69%
	2 years after IPO	72%	70%
	3 years after IPO	75%	71%

Panel B. Multivariate Analysis

Key Explanatory Variable		Dependent Variable				
		VC SHAREHOLDINGS	VC DIRECTORSHIPS	CEO-COB	CEO-FOUNDER	STAGGERED BOARD
	IPO year	0.28** (2.17)	0.31*** (2.95)	–0.27* (–1.65)	–0.26* (–1.71)	–0.17 (–0.55)
IPO Market Share	1 year after IPO	0.37** (2.19)	0.23** (2.44)	–0.23 (–1.07)	–0.21 (–1.30)	–0.18 (–0.41)
	2 years after IPO	0.12** (2.23)	0.24** (2.49)	–0.27 (–1.41)	–0.22 (–1.56)	–0.03 (–0.03)
	3 years after IPO	0.17** (2.27)	0.23** (2.20)	–0.22 (–1.09)	–0.22 (–1.47)	–0.15 (–0.49)

TABLE 6
Issuer Long-Run Performance Measures and VC Governance Activity, Controlling for Endogeneity

Panels A and B of Table 6 present the IV LIML estimation coefficients and in parentheses associated t-statistics (or z-statistics in the case of logit regression) based on standard errors that are robust to heteroskedasticity and adjusted for industry clustering. The 1st equation models the likelihood of VC Shareholdings or, alternatively, of VC Directorships 3 years after the IPO. The instrumental variables are Ln VC Fund Age, Directorship Commitments, VC Avg Shareholding Period, and VC Avg Directorship Period. The 2nd issuer long-run performance equation is

$$P = \beta_Y + \beta_I + \beta_1 \text{ VC Shareholdings/VC Directorships} + \beta_2 \text{ VC Backed} + \beta_3 \text{ Underwriter Reputation}$$
$$+ \beta_4 \text{ Ln Offer Size} + \beta_5 \text{ Ln Issuer Age} + \beta_6 \text{ Issuer Market Cap} + \beta_7 \text{ Issuer M/B}$$
$$+ \beta_8 \text{ Price Revision} + \beta_9 \text{ Underpricing} + \varepsilon,$$

where P is ROA, M/B, Survival, or Return. All the variables are defined in Appendix A. VC Shareholdings or VC Directorships is the endogenous indicator variable capturing the lead VC's continued involvement in its portfolio firm's corporate governan ce, measured by an indicator for VC shareholdings or directorships in the portfolio firm 3 years after the IPO. Estimates of the 2nd equations are based on 1,724, 1,724, 1,787, and 1,787 IPOs (including both VC-backed and non-VC-backed) completed in the 1996–2002 period, respectively. *, **, and *** denote coefficient estimates significantly different from 0 at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable				
	VC SHAREHOLDINGS	ROA	M/B	SURVIVAL	RETURN
VC Shareholdings		0.20**	1.03**	0.53**	0.88**
		(2.32)	(2.16)	(2.43)	(1.97)
Ln VC Fund Age	–0.18**				
	(–2.03)				
Competing Directorships	–0.44*				
	(–1.75)				
VC Avg Shareholding Period	0.13**				
	(2.10)				
VC Avg Directorship Period	0.16**				
	(2.33)				
VC Backed		0.01	0.88	0.11	0.61
		(0.03)	(1.37)	(0.26)	(1.43)
Underwriter Reputation	0.01	0.02	0.22	0.23***	0.45***
	(0.20)	(0.82)	(1.31)	(2.97)	(2.70)
Ln Offer Size	0.15	–0.05	–0.66*	0.26	–0.87*
	(1.52)	(–0.68)	(–1.65)	(1.37)	(–1.68)
Ln Issuer Age	–0.04	0.02	–0.57*	0.46***	0.27
	(–1.48)	(0.41)	(–1.69)	(2.59)	(1.01)
Issuer Market Cap	–0.01	–0.01	0.01***	0.02	0.03**
	(–1.34)	(–0.12)	(2.79)	(0.60)	(2.41)
Issuer M/B	0.02	–0.03	0.01	0.03	0.04
	(0.59)	(–1.49)	(0.76)	(0.67)	(0.83)
Price Revision	0.48**	0.69**	–1.32	0.41	0.36
	(2.49)	(2.42)	(–1.07)	(0.87)	(0.19)
Underpricing	0.01**	0.01	–0.02	0.04	–0.02
	(2.11)	(0.08)	(–0.74)	(0.97)	(–0.41)
Adjusted/pseudo R^2	31.50%	5.19%	6.67%	8.11%	6.01%

	Dependent Variable				
	VC DIRECTORSHIPS	ROA	M/B	SURVIVAL	RETURN
VC Directorships		0.25***	0.89**	0.82***	1.07**
		(2.61)	(1.97)	(3.68)	(2.36)
Ln VC Fund Age	–0.15***				
	(–2.66)				
Directorship Commitments	–0.25**				
	(–2.44)				
VC Avg Shareholding Period	0.13**				
	(2.38)				
VC Avg Directorship Period	0.17**				
	(2.07)				
VC Backed		–0.01	0.88	0.24	0.10
		(–0.05)	(1.12)	(0.51)	(0.24)
Underwriter Reputation	0.13**	0.03	0.16	0.22***	0.45***
	(2.49)	(0.88)	(1.07)	(3.19)	(2.63)
Ln Offer Size	0.11	–0.07	–0.69	0.31	–0.79*
	(1.33)	(–0.64)	(–1.41)	(1.59)	(–1.78)
Ln Issuer Age	–0.05	0.04	–0.47*	0.42***	0.27
	(–1.56)	(0.52)	(–1.73)	(2.66)	(1.16)
Issuer Market Cap	–0.01	–0.01	0.01**	–0.01	0.02***
	(–1.28)	(–0.55)	(2.44)	(–0.43)	(2.63)
Issuer M/B	0.02	–0.03	0.01	0.02*	0.03
	(0.28)	(–1.22)	(0.62)	(1.67)	(0.71)
Price Revision	0.25	0.70**	–1.52*	0.53	0.52
	(1.33)	(2.43)	(–1.64)	(1.17)	(0.63)
Underpricing	0.01*	0.02	–0.03	0.03	–0.01
	(1.88)	(0.21)	(–0.79)	(0.76)	(–0.10)
Adjusted/pseudo R^2	36.81%	5.22%	6.12%	10.32%	5.99%