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Venture Capital Conflicts of Interest: Evidence from Acquisitions of Venture-Backed Firms

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Abstract

We analyze the effects of venture capital (VC) backing on profitability of private firm acquisitions. We find that VC backing leads to significantly higher acquirer announcement returns, averaging 3%, even after controlling for deal characteristics and endogeneity of venture funding. This leads us to investigate whether some VCs have interests that conflict with those of other investors. We show that such conflicts arise from VCs having financial relationships with both acquirers and targets, corporate VCs having a dominant strategic focus, and VC funds nearing maturity experiencing pressure to liquidate. Our conclusions follow from examinations of target takeover premia and acquirer announcement returns.

I. Introduction

Early agency theory research concentrated on conflicts of interest across debt and equity security classes. More recent work has begun to explore the conflicts of interest among investors within major classes of securities. Researchers have studied conflicts of interest among debt holders of different seniority or maturities, especially around periods of financial distress, and also among equity investors, such as majority and minority shareholders or holders of superior and inferior classes of stock.[1] In more recent work, Harford, Jenter, and Li (2008), Bodnaruk,

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[1] We briefly survey studies of conflicts of interest among major securities classes in the next section.

Massa, and Simonov (2008), and Matvos and Ostrovsky (2008) explore conflicts of interest in mergers and acquisitions (M&As) that arise among institutional shareholders, when some institutional investors hold shares in both bidders and targets. In this study we extend this line of research by exploring the conflicts of interest that exist among equity investors in privately held venture-backed companies, and in particular the conflicts of interest that arise in acquisitions of these firms. We investigate how conflicts among venture capitalists (VCs) and other investors affect acquisition profitability and target purchase prices.

Investigating the generally higher announcement effects observed in acquisitions of private firms relative to those in public firm acquisitions, we first show that acquirers of VC-backed private firms realize a higher mean announcement return than acquirers of non-VC-backed private firms. This finding, which is statistically and economically significant, continues to hold after controlling for both the acquisition financing choice and the endogeneity of VC backing. Given the body of evidence that VCs certify the quality of their portfolio firms around initial public offerings (IPOs) by reducing the information asymmetry faced by IPO investors, this is an intriguing result.[2] Similarly, if VCs reduce the information asymmetry faced by acquirers of private firms, then we would expect to observe higher purchase prices and thus, lower acquirer announcement returns. Yet, the empirical evidence we uncover runs counter to this *VC certification* hypothesis. This finding is especially surprising since VCs' extensive contacts with potential buyers should result in more competitive bidding and hence lower acquirer announcement effects.

The higher acquirer announcement returns associated with VC-backed targets lead us to examine the importance of an alternative set of hypotheses that focus on the possible conflicts of interest between VCs and other target investors, including entrepreneurs. To complement our investigation, we also examine target purchase prices relative to the book values of target assets, a measure of the premium paid by acquirers above target book values. We also refer to this measure as the "takeover premium."[3] Three VC conflicts of interest are examined, each associated with a particular class of VC investors.

To briefly preview our results, first we find that targets backed by VC funds closer to liquidation receive significantly lower takeover premia. This is consistent with VC funds closer to maturity exerting substantial pressure on target management to accept lower sale prices so as to ensure a profitable exit in a timely manner. Also, acquisition of targets backed by VC funds closer to liquidation

[2]For instance, Megginson and Weiss (1991), Brav and Gompers (1997), and Li and Masulis (2008) provide evidence on VC certification in IPOs, while Poulsen and Stegemoller (2008) show that VC backing is an important positive predictor of companies going public in a sample of IPOs and acquisitions. In a similar vein, Hellmann and Puri (2000) show that VC monitoring and certification are associated with a significant reduction in time taken by young companies to bring their products to the market.

[3]Note that for private firms, a takeover premium based on market value is clearly unavailable. Furthermore, several major acquisition valuation methods use market or deal multiples of a target's book value. In robustness checks, we normalize the purchase-price-to-book-value ratio by the target industry's median market-to-book ratio, and we obtain similar qualitative results.

lead to slightly higher acquirer returns, although the difference is not statistically significant.

Second, we find strong support for *self-dealing behavior* by a particular class of VCs. Specifically, acquisitions of targets backed by VC firms with direct financial ties to acquirers exhibit significantly higher acquirer announcement returns, and this announcement effect increases with VC shareholdings in acquiring firms. Furthermore, when such relationships exist, target takeover premia are on average significantly lower. This evidence is consistent with a VC conflict of interest with other portfolio company investors, which compromises a VC's incentives to support aggressive target negotiations to obtain a higher acquisition price.

Third, we show that acquisitions of corporate VC- (CVC-) backed targets lead to significantly higher acquirer announcement returns relative to traditional VC- (TVC-) backed targets. This result is consistent with CVC principals having weaker financial incentives, which makes them more risk averse and more anxious to exit their investments. It is also consistent with CVCs having dual objectives due to their parent corporations' strategic goals, such as rapid commercialization of complementary target products that financially benefit CVC parents. Either of these motives emanating from a *CVC strategic focus* leads to increased CVC pressure on their portfolio companies to sell out to interested acquirers. In summary, we document a large body of evidence that is consistent with a range of VCs having conflicts of interest with entrepreneurs and other portfolio company investors. These conflicts appear to enhance acquirer profitability and reduce target shareholder gains.

The contributions of this study are 4-fold. First, it is well known that VCs generally realize higher returns on their investments when their portfolio companies either undertake IPOs or are acquired. However, the extant literature has largely focused on the IPO exit, which on average occurs in about 10% of VC investments, whereas acquisitions of portfolio companies comprise approximately 20% of VC investments.[4] We help fill this gap by studying acquisitions of VC-backed private firms in the U.S. Second, we shed new light on the private firm acquisition market, which in recent years represents nearly 70% of total U.S. acquisition activity (Source: Securities Data Company (SDC) Platinum's M&A Database). Third, after controlling for the endogeneity in venture funding, we document that purchases of VC-backed companies are associated with significantly higher acquirer announcement returns relative to purchases of similar non-VC-backed firms. Fourth, we analyze several conflicts of interest between VCs and other private firm investors and test for their effects on acquisition profitability and pricing. Consistent with a number of VC conflicts of interest, we uncover distinctly different acquirer and target wealth effects, conditional on the characteristics of VC investors involved. Our findings thus add to the literature examining conflicts of interest among investors and financial intermediaries.

The remainder of the paper is organized as follows. Section II gives a brief background of the literature and develops testable hypotheses. Section III

[4]See Barry, Muscarella, Peavy, and Vetsuypens (1990), Brav and Gompers (1997), Gompers and Lerner (2001), Hochberg (2008), Lerner (1994b), and Megginson and Weiss (1991) for studies on VC-backed IPOs. Cochrane (2005) and Peng (2002) present statistics on VC investments.

describes the sample selection criteria and the matching technique, and presents descriptive statistics contrasting VC-backed and non-VC-backed targets. Multivariate analysis of cumulative abnormal returns (CARs) to the acquirers of VC-backed and non-VC-backed targets follows in Section IV. Section V details a more in-depth investigation of VC-specific characteristics of venture-backed targets and presents a further analysis explaining the higher acquirer announcement returns associated with these acquisitions. Section VI describes various robustness analyses. Section VII concludes.

II. Background and Hypotheses

Our primary objective is to investigate the potential conflicts of interest among VCs and other investors when privately held firms are acquired. While a number of studies investigate the impact of VCs on the IPO process, and report evidence of certification benefits and occasionally of agency costs (Gompers (1996), Lee and Wahal (2004)), a similar analysis of VC impacts on acquisitions of privately held firms is lacking. This is an important omission given that acquisitions are twice as likely to occur as IPOs. Furthermore, while IPOs are generally viewed as the most profitable VC exit, acquisitions can also be very profitable, and can be the only profitable exits in periods when the IPO market is weak or effectively closed. The impact of VCs on the acquisition process is especially interesting because VCs serve an important role as monitors of private firms that generally lack detailed and reliable financial information.

As financial information producers, VCs can help raise the purchase prices these target firms receive by certifying their quality. On the other hand, VC investors face divergent incentives from other private firm investors as explained below, which can create conflicts of interest and lead to significantly lower acquisition prices paid to target firm owners.[5] This is a particular concern given that VCs generally have strong control rights in their portfolio firms. Which of these 2 effects dominates is an important unanswered question that we explore in depth by differentiating among several categories of VC investors and analyzing how their differing incentives affect acquisition profitability and target purchase prices.

Our study is primarily related to a large literature examining conflicts of interest among financial intermediaries and investors. Early agency theory research concentrated on conflicts of interest across debt and equity security classes. More recent work has begun to explore the conflicts of interest among investors within major classes of securities. Researchers have studied conflicts of interest among debt holders of different seniority or maturities, especially around periods of financial distress, and also among equity investors, such as majority and minority shareholders or holders of superior and inferior classes of stock. For example,

[5]For example, the strategic objectives of CVCs are likely to be in conflict with both the TVCs and the start-up founders (Hellmann (2002)), and this may have an impact on the start-ups' development, direction, valuation, and exit strategy. More generally, VCs often acquire senior equity claims by investing in convertible preferred stock. This can also create strong conflicts of interest across portfolio company investors, and even among VCs.

Gilson, John, and Lang (1990), Ayotte and Morrison (2008), and Brunner and Krahnen (2008) present empirical evidence of conflicts of interest among distressed firm creditors, and Hotchkiss and Mooradian (1997) provide some examples of purported "bondmail," a tactic to seek control of strategic blocks of bonds so as to obtain better deal terms in corporate restructurings at the expense of other claimants. In a slightly different vein, Asquith, Gertner, and Scharfstein (1994) and Welch (1997) analyze conflicts among creditors in the presence of bank debt. Hotchkiss, John, Mooradian, and Thorburn (2008) provide a survey of the extensive research that analyzes conflicts of interest arising from the presence of multiple creditors and multiple layers of debt.

Recent evidence on conflicts among shareholders is provided by Gompers, Ishii, and Metrick (2010) and Masulis, Wang, and Xie (2009), who analyze conflicts of interest between holders of superior voting shares and inferior voting shares in dual class firms. An extensive survey on corporate governance research by Shleifer and Vishny (1997) also provides an analysis of conflicts of interest among shareholders, focusing particular attention on majority and minority stockholders. In a related M&A setting, Harford et al. (2008), Bodnaruk et al. (2008), and Matvos and Ostrovsky (2008) explore conflicts of interest among institutional shareholders when institutional investors hold shares in both bidders and targets.

Matvos and Ostrovsky (2008) show that most institutional shareholders of acquiring companies do not lose money around acquisition announcements because they frequently own shares in targets, which realize sizable takeover premia. While Bodnaruk et al. (2008) show that bidder advisors often have (and take new) equity positions in target firms, which directly affect the outcomes of the proposed deals, Harford et al. (2008) find no appreciable effect of cross-holdings on acquirer bidding strategies. These studies focus on public acquisitions, whereas we explore the differences among equity investors in privately held venture-backed companies and focus on the conflicts of interest that arise around their acquisitions. We investigate how conflicts among VCs and other investors affect acquisition profitability and target purchase prices. Three VC conflicts of interest are examined, each associated with a particular class of VC investors.

First, VCs face increased liquidity pressure to exit investments as their *funds* mature. This reflects a VC fund's fixed capital level, fixed maturity date, and the required payout of all realized proceeds from prior investments to receive favorable tax treatment, which precludes reinvestment of realized profits into the fund's remaining portfolio companies. These requirements imply that over time a VC fund has less capital to support the continuing financing needs of its remaining portfolio firms, while facing growing pressure to exit from its remaining investments. This effect is reinforced by VC incentives to liquidate their investments earlier to lower their high cost of capital and realize higher internal rates of return (IRR), which is how their investment returns are generally evaluated. Thus, VCs in more *mature funds* nearing liquidation can experience greater incentives to complete acquisitions to eliminate any further funding needs of these portfolio firms and exit from their illiquid investments. This liquidity pressure can lead VCs to pressure target managers to sell their firms more quickly, even at the cost of a lower purchase price. Since acquirers are aware of these pressures, they are likely to lower their bids accordingly, enabling acquirer stockholders to realize higher

acquisition gains. This yields the prediction that liquidity pressure on maturing VC funds leads to lower target purchase prices and higher acquirer announcement returns. In contrast, targets backed by *younger funds* facing less liquidity pressure should realize higher acquisition prices and lower acquirer announcement returns**.** We label this H1: the "VC liquidity" hypothesis.

Second, because of extensive syndication of investments (Lerner (1994a)), VCs develop widespread professional and social networks encompassing other VCs, public and private companies, commercial and investment banks, auditors, lawyers, etc. In addition to the beneficial impact of VC connections for the development of their portfolio companies (Lindsey (2008), Hochberg, Ljungqvist, and Lu (2007)), an extensive network of private equity contacts can be very helpful in locating potential acquirers. However, a self-dealing problem can arise when a VC has financial relationships with both acquirer and target firms. This is especially worrisome because VCs typically have strong control rights in their portfolio companies relative to cash flow rights, which enables them to pressure the management to acquiesce to the terms of an acquisition offer. Since an acquirer is made financially better off by a lower purchase price, and a typical VC holds a small fraction of its portfolio company's equity, a conflicted VC can realize financial gains by supporting an acquirer in negotiations with its portfolio company, even though the VC realizes a lower gain on its target investment. This situation can cause a VC to pressure its portfolio firms to sell more quickly, thereby undermining target managements' efforts to realize higher purchase prices. Obviously, a potential acquirer is likely to lower its bid and negotiate more aggressively when a VC has a dual financial relationship. It follows then that a financial relationship between a VC and an acquirer lowers the expected target purchase price and raises the expected acquirer announcement return. We call this H2: the "VC self-dealing" hypothesis.

Third, we consider the distinct investment objectives of CVCs, observing that CVCs have both strategic and financial goals. In a survey of CVCs, Yost and Devlin (1993) report that 93% of respondents considered realizing strategic benefits a major goal of their investment decisions and achieving synergies with their parents' core businesses as their prime objective. Gompers and Lerner (2000) also note that CVCs often make venture investments to understand or acquire new technologies and to nurture rapid commercialization of products and technologies complementary to those of its corporate parents. The pursuit of twin investment objectives by CVCs creates conflicts of interest with other portfolio company investors such as TVCs, who invest primarily to reap direct financial benefits. Thus, while corporate venture investments add strategic value to their parent corporations, CVCs generally have strong incentives to support acquisitions of their portfolio companies, which may not maximize the CVC's financial returns from these investments. For example, CVCs can favor acquisition bids by firms that have complementary products to CVC parents, even when the bids are relatively low. The strategic and technological relationships between a CVC parent and a target firm are also likely to diminish the interest of other potential acquirers. This can adversely affect the likelihood of competitive bidding, leading to discounted prices offered by bidders relative to other VC-backed target firms.

The performance of CVC managers is often measured on multiple dimensions and not simply on the financial returns they generate for their parent corporations. Moreover, CVC managers often receive lower performance-based compensation than TVC general partners (Dushnitsky and Shapira (2008)). One stylized fact about CVCs is that their managers are often not rewarded in the same fashion as TVCs, particularly in the case of success, while failure leads to disproportionate financial penalties. Furthermore, CVCs are often subject to parent-specific concerns such as weakening corporate performance, top management turnover, shifts in strategic objectives, and unexpected shocks to the corporate parent's economic outlook.[6] Thus, due to weaker CVC financial incentives, and because many CVCs are controlled by more risk-averse parent corporations compared to TVCs, CVC managers are more apt to support less aggressive acquisition negotiations if this can reduce the expected duration of the negotiation process and increase the probability of a successful transaction.[7] Conflicts with other target investors can also arise when corporate parents compete with target firms or want to absorb the targets into themselves at less than their market values. Acquirer awareness of these conflicts, which are rooted in a CVC's strategic objectives, is likely to lead them to negotiate more aggressively, which can translate into lower target purchase prices and higher acquirer announcement returns. We label these incentive effects H3: the "CVC strategic focus" hypothesis.

A key property of VCs that reinforces the importance of these potential VC conflicts of interest is that VCs typically have strong control rights in their portfolio companies (Kaplan and Stromberg (2003)). In fact, VCs generally demand and receive disproportionately large control rights relative to their cash flow rights, and they receive senior equity claims in the form of convertible preferred stock. In addition, VCs generally have board seats, rights to approve outside board members, approval rights for major portfolio firm decisions, and rights to force the repurchase of their shares. Moreover, VCs make investments over multiple rounds, which are often critical to the continued survival and growth of early stage firms. Thus, VCs typically have strong control rights and leverage over their portfolio firms, which can allow them to put strong pressure on management to sell their firms and can affect the terms under which these sales occur. This exacerbates the VC conflicts of interest with other private firm investors. The conflicts of interest that we examine are different from the types of conflicts represented in lawsuits

[6]Several articles in the popular press refer to a growing number of corporations abandoning or severely curtailing the CVC investments that emerged in the late 1990s. For example, "Venture Capital, Without the Risk" reports relatively recent closures of corporate venturing activity at prominent companies such as Boeing, Dell, and Applied Materials, who follow the likes of Electronic Data Systems (EDS), Hewlett-Packard, Bechtel, British Airways, Quantum, and AT&T, all companies that exited the market after their bubble-era investments failed to yield the expected financial or strategic returns (Source: *Red Herring Magazine* (Mar. 28, 2005)). See Burgelman and Välikangas (2005), Dushnitsky and Lenox (2006), and Gompers and Lerner (2000) for further discussion of the reasons for the abrupt changes in corporate strategies and policies toward VC investing.

[7]CVCs often syndicate their investments with TVCs who could oppose CVC actions that reduce the financial returns of TVCs. However, CVC parent corporations often offer valuable strategic assistance to start-ups, which increases the likelihood of VC investment success, so TVCs are likely to support the CVCs to preserve their ongoing relationships.

filed against VCs analyzed by Atanasov, Ivanov, and Litvak (2008), but are similar to some of the conflicts examined by Bartlett (2006).

III. Data, Sample Selection, and Descriptive Statistics

A. Data

We obtain a sample of completed acquisitions involving domestic private targets for whom initial bids were announced between January 1, 1991 and December 31, 2006, from Thomson Financial's M&A and VentureXpert databases. To be included in the sample, the following conditions must be satisfied:

i) Acquirers are U.S. headquartered, and their stock is publicly listed on the AMEX, NASDAQ, or NYSE.

ii) The target is a privately held U.S. incorporated company.

iii) Neither acquirer nor target is a regulated utility or a financial institution.

iv) An acquisition must be completed, the buyer has no publicly known toehold position prior to the deal announcement, and the buyer acquires 100% of target firm shares.

v) The target purchase price is at least $1,000,000, and the relative deal size (target purchase price divided by acquirer equity market value 1 month prior to the deal announcement) is at least 10%.

vi) Acquirer stock returns are available in the Center for Research in Security Prices (CRSP) database, and its daily returns are available for the 5 trading days surrounding the acquisition announcement date (event days –2 to 2).

vii) Acquirer stock prices must be at least $2 as of the acquisition announcement date (event day 0).

viii) VC-backed targets must have information available on the investment positions of 1 or more of their VC investors.

ix) Clustered acquisitions (of 2 or more) by a single acquirer within 5 days are excluded.

In our analysis we exclude acquisitions of subsidiaries and public firms, since our primary interest is in analyzing the impact of VC backing on acquisitions of private companies. According to the VentureXpert database, in the 1991–2006 period more than 97% of acquisitions of privately held VC-backed targets involve acquirers purchasing 100% of a target's equity where no prior toeholds existed. Since market anticipation can reduce observed announcement effects, we exclude toeholds from our sample to minimize the anticipatory effects on acquisition wealth gains (or losses). Acharya (1988), (1993) and Eckbo, Maksimovic, and Williams (1990) argue that it is the unexpected portion of a news release that should determine the stock price reaction to an event. Thus, we exclude partial acquisitions because the economic benefits of these acquisitions are more difficult to determine given the high level of market anticipation.

Estimating bidder announcement returns presents several difficulties (see Eckbo et al. (1990) for further details). In particular, targets may be small relative

to buyer equity values, so even very profitable acquisitions can have little impact on buyer stock prices. To raise the signal-to-noise ratio and enable the announcement effects to be measured more accurately, we require a minimum relative deal size of at least 10%.[8] We exclude acquisitions by a single bidder closely clustered in calendar time, since we cannot isolate the announcement effects of individual acquisitions. To limit bid-ask bias in announcement period abnormal returns, we also exclude deals where an acquirer's stock price is below $2 (the results remain unchanged if we impose a $5 stock price requirement). These sample criteria result in a VC-backed target sample of 337 completed deals and a non-VC-backed sample of 2,452 completed deals.

Table 1 reports descriptive statistics for our acquisition samples of VC-backed and non-VC-backed target firms. Panel A reports the differences in firm characteristics across the 2 acquisition samples using a standard *t*-test for a difference in means as well as a Wilcoxon test for difference in medians. In general, VC-backed targets are twice as large as non-VC-backed targets, and the difference is statistically significant at the 1% level. A similar pattern is observed for acquirers as well; the mean (median) size of acquirers of VC-backed targets is $715 ($208) million, which is significantly larger than the mean (median) size of acquirers for non-VC-backed targets of $345 ($102) million. This indicates that targets and their acquirers are substantially different across the 2 samples.

Panel B of Table 1 reports the frequency of acquisition financing methods for the 2 samples. Acquisitions of VC-backed targets are predominantly (76%) financed with stock or a mixture of cash and stock. In contrast, only 49% of non-VC-backed acquisitions involve stock as the acquisition currency. As reported in Panel C, nearly 72% of VC-backed targets belong to technology-intensive industries such as biological products, pharmaceuticals, genetics, high-technology communications, communication services, software services, electronic equipment, and computers. In stark contrast, only 31% of non-VC-backed targets are in the technology-intensive sectors. Thus, deals involving VC-backed targets have substantially different properties from other private firm acquisitions in terms of target and acquirer size, type of financing, and industries. This raises some important concerns about selection bias that need to be addressed in any statistical analysis.

Panel D of Table 1 reports mean and median CARs for the entire sample of acquisitions of privately held firms and the subsamples of VC-backed and non-VC-backed targets. We observe that the CARs involving acquisitions of VC-backed targets are significantly larger than when the targets have no VC backing. This is a surprising result that appears to contradict the VC certification hypothesis. However, this finding could reflect major differences in deal characteristics between the 2 samples. It is also important to observe that the average profitability of acquisitions of targets without VC backing continues to be positive and

[8]Most acquisitions are reported to the Securities and Exchange Commission (SEC) in 8K filings. SEC rules do not require target financials to be reported unless the acquisition is at least 10% of an acquirer's value. Since we collect target-specific information from SEC filings, we impose this same requirement on our acquisition sample. Other studies of private firm acquisitions (Poulsen and Stegemoller (2008)) also impose this cutoff when analyzing financial information.

TABLE 1

Descriptive Statistics for Private Firm Acquisitions Classified by VC Backing

The acquisition sample period is 1991–2006. Acquisitions must have a relative deal size (deal size divided by acquirer's market value of equity 1 month prior to the acquisition announcement) of at least 10%. Panels A–D of Table 1 compare VC-backed to non-VC-backed targets. Acquirer size is measured by the market value of acquirer equity 1 month prior to acquisition announcement. Target size is the price paid for acquisition of the target. High-technology industries are classified as belonging to SIC codes 283 (biological products, genetics, and pharmaceuticals), 481 (high-technology communications), 365–369 (electronic equipment), 482–489 (communication services), 357 (computers), and 737 (software services). A standard *t*-test for a difference in means and Wilcoxon test for a difference in medians are used to compare VC-backed and non-VC-backed targets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	VC-Backed Targets		Non-VC-Backed Targets		Tests of Equality (*p*-values)	
	Mean	Median	Mean	Median	Mean	Median
Panel A. Comparison of Acquirer and Target Sizes						
Acquirer size ($M)	715	208	345	102	0.00***	0.00***
Target size ($M)	182	59	91	26	0.00***	0.00***
Target size relative to acquirer size	0.45	0.24	0.41	0.22	0.89	0.53
No. of obs.	337		2,452			
	VC-Backed Targets		Non-VC-Backed Targets		Tests of Equality (*p*-values)	
	No.	%	No.	%		
Panel B. Frequency of Deal Financing Methods						
Involve stock	257	76%	1,197	49%	0.00***	
Do not involve stock	80	24%	1,255	51%	0.00***	
Total	337	100%	2,452	100%		
Panel C. Frequency of High-Technology Targets						
High-technology industry	241	72%	760	31%	0.00***	
	VC-Backed Targets		Non-VC-Backed Targets		Tests of Equality (*p*-values)	
	Mean	Median	Mean	Median	Mean	Median
Panel D. Acquirer CARs Distinguished by VC Backing Status						
CAR (–2,2)	6.16%	4.21%	3.99%	2.26%	0.01***	0.02**

statistically significant. However, the average profitability is much smaller than that for VC-backed acquisitions. The average positive announcement return for acquirers buying private targets is consistent with prior research by Moeller, Schlingemann, and Stulz (2004), (2007), Officer, Poulsen, and Stegemoller (2009), Faccio, McConnell, and Stolin (2006), Fuller, Netter, and Stegemoller (2002), Chang (1998), and Hansen and Lott (1996).

B. Sample Matching and Selection

To better evaluate the profitability of VC-backed acquisitions, we create a comparable sample of non-VC-backed acquisitions using propensity score matching on multiple deal characteristics. In this approach, propensity scores are used to select "control" units that are most like the "treatment" units across a variety of characteristics considered important to the analysis (Dehejia and Wahba (2002)). The "treatment" and "control" units for the purpose of this analysis and the

subsequent discussion are VC-backed and non-VC-backed targets, respectively. A notable feature of the method is that once the samples are matched, the remaining unmatched comparison sample is discarded, and is not directly used in estimating the treatment impact. The more comparable the 2 samples are across the relevant characteristics, the less biased are the estimates based on ordinary least squares (OLS) or 2-stage least squares estimation. Given the need to control for several characteristics, the propensity score matching method has attractive properties for selecting the most relevant comparison group based on multiple characteristics and is employed in several recent studies in corporate finance. For example, Lee and Wahal (2004) examine the role VC backing plays in the underpricing of IPOs. They use propensity score matching to control for endogeneity in the receipt of venture funding and find that VC-backed IPOs experience larger first-day returns than comparable nonventure-backed IPOs. Hogan and Lewis (2005), Lee and Masulis (2011), Li and Zhao (2006), and Villalonga (2004) also apply propensity score matching in their recent studies.

We use a propensity score matching method, since acquisitions of VC-backed targets are likely to have characteristics atypical of the population of private firm acquisitions. For example, VCs concentrate their investments in firms with high growth potential, and they seek to exit from their investment within 3–5 years, ideally ending with an IPO or an acquisition. Among different propensity score matching techniques, we use the nearest-neighbor method because it allows us to exclude observations with certain deal characteristics that may bias or induce spurious results. For instance, we exclude deals where the acquirer makes other contemporaneous major announcements within the event period that could otherwise contaminate the acquisition announcement effect. Thus, to obtain an uncontaminated matched control sample of acquisition announcements, nearest-neighbor propensity score matching is required.

Alternative propensity score matching approaches often use the full sample of control firms to estimate treatment effects, such as Heckman, Ichimura, and Todd's (1997) kernel-based matching estimator. The Heckman (1979) 2-stage model also uses the full set of control firms, but these full sample approaches can result in biased estimates of treatment impacts when noncomparable control firms are included. The extent of this bias depends on the comparability of "treatment" and "control" firms. Of course these approaches have the advantage of using much larger samples of events. Encouragingly, our results are robust to using the Heckman selection model, which uses the population of non-VC-backed private firm acquisitions for our sample period, including acquisition announcements contaminated by other nearby major firm-specific news events (see Section VI).

The first step in propensity score matching is to estimate a logistic regression predicting whether a deal involves a VC-backed or a non-VC-backed target. The dependent variable is equal to 1 if the target is VC backed, and is 0 otherwise. The explanatory variables used in the matching criteria are: a high-technology indicator (software services, electronic equipment, computers, communication services, high-technology communications, biological products, pharmaceuticals, and genetics are classified as high-technology industries), a method-of-payment

indicator (common stock as acquisition currency), deal size (target purchase price), and relative deal size (target purchase price divided by acquirer's equity capitalization).

The high-technology indicator controls for important industry patterns in VC investing, since VCs focus largely on technology-rich firms in selective industries. The method-of-payment indicator controls for the fact that bidder announcement returns in acquisitions of privately held firms are on average higher when they are stock financed. Chang (1998) reports that announcements of *stock-financed* acquisitions of private companies generate positive acquirer stock returns as favorable information about acquirer stock values can be inferred when targets accept acquirer stock as M&A consideration after their due diligence investigations. Chang (1998) and Barclay, Holderness, and Sheehan (2007) also argue that the creation of active block holdings can lead to improved firm valuation, since concentrated equity owners have stronger incentives to carefully monitor and take action against ineffective management. In a similar vein, Hertzel and Smith (1993) report a positive stock price reaction averaging 4.4% to announcements of private placements of stock, which they argue reflects favorable inside information about these firms. Inclusion of deal size ensures that target firms are matched as closely as possible in terms of their purchase prices. Finally, relative deal size attempts to account for the impact of a target's relative size and the economic significance of the acquisition on the acquirer share value. Fuller et al. (2002) document a significant positive relation between relative deal size and acquirer announcement returns. Taken together, the deal size and relative deal size also account for the size of the acquiring firm, which significantly affects acquirer returns (Moeller et al. (2004)).

We estimate a logistic model predicting whether a deal involves a VC-backed or a non-VC-backed target. The estimated likelihood based on the sample of acquisitions of all VC-backed and non-VC-backed targets is as follows, where *p*-values are reported in parentheses:

$$\begin{aligned}\text{Prob. (Acquisition of a VC-Backed Target)} \quad = \\ \underset{(<0.01)}{-3.2379} + \underset{(<0.01)}{1.2057}\ \text{(High-Tech)} + \underset{(<0.01)}{0.9202}\ \text{(Stock)} + \underset{(<0.01)}{0.0005}\ \text{(Deal Size)} \\ \underset{(0.64)}{-0.0345}\ \text{(Relative Deal Size)}.\end{aligned}$$

The results indicate that deals involving VC-backed targets are likely to be larger in size and to come from technology-intensive industries. VC-backed targets are also more likely to use stock financing, which may be capturing an added nonlinear target size effect, since the frequency of stock financing rises with target size. On the other hand, relative deal size is insignificantly different across the 2 samples.

To match the "treatment" and "control" samples of acquisitions, we first estimate the propensity scores for deals involving VC-backed and non-VC-backed targets. The propensity scores are derived from the logistic model estimates combined with each deal's 4 regressor values. Next, we stratify all targets into blocks defined by quantiles (e.g., quartiles or deciles) of the propensity score distribution, and perform balancing tests for each variable specified in the logistic regression

model as well as for the propensity scores themselves. These balancing tests are based on differences in means *t*-tests between VC-backed and non-VC-backed targets within each block.

If all blocks are well balanced (i.e., the *t*-tests are not significant), then the algorithm ends. If a block is not well balanced, then it can be divided into finer blocks and the process is repeated. In our analysis of the balancing tests, the resultant 6 blocks are all well balanced, which ensures that even though both groups of targets are different in a number of characteristics, they are comparable within the defined blocks. After balancing the blocks, we rank all targets in each block (in both the samples) based on their propensity scores. Finally, for each "treatment" observation, we seek the nearest match from the "control" sample without replacement based on the following 3 criteria:

i) No evidence of confounding major news announcements (earnings, dividends, strategic alliances, stock splits, etc.) by the acquirer in the 5-day trading period (event days –2 though 2) surrounding the announcement date of acquisition of the target firm.

ii) Industry matching based on 3-digit Standard Industrial Classification (SIC) codes if possible, otherwise by 2-digit SIC codes (if 3-digit SIC codes do not match), and finally by single-digit SIC codes (when both 3- and 2-digit SIC code matches are unavailable).[9]

iii) Choose the minimal absolute difference in propensity scores of "treatment" and "control" firms.

After eliminating contaminated acquisition announcements and matching VC-backed and non-VC-backed targets, our data set consists of 245 completed deals in each of the 2 samples.

As an additional robustness check, we adjust for potential self-selection using a Heckman (1979) 2-step procedure. Our qualitative results remain robust, as explained in more detail in Section VI. A major limitation of analyzing the entire sample of 2,452 non-VC-backed targets is that data on target takeover premia (target purchase price to book value), which enable us to analyze the impact of VC backing from the target's perspective, are not available in the SDC databases for a large majority of cases. By matching VC-backed and non-VC-backed targets following Dehejia and Wahba (2002), we are able to hand-collect the target-specific financial data from SEC filings for this smaller matched sample. Thus, we primarily report all our analyses for matched samples that are an outcome of the propensity score matching technique.

C. Descriptive Statistics

Table 2 lists the number of VC-backed and non-VC-backed targets in our matched sample by industry groups. As noted earlier, over 71% of VC-backed

[9]If no industry match is found, we match based on the other 2 criteria only. In an alternate logistic regression, we include indicator variables for all 2-digit SIC codes along with the other 4 predictive variables and year fixed effects. While the industry indicators control for the target firm's industry, the year fixed effects control for the timing of acquisitions. The results of this analysis are qualitatively similar.

targets belong to technology-intensive industries. Propensity score matching across both industry and technology-intensive sectors appear to produce reasonable matches, since nearly 70% of non-VC-backed targets are also drawn from technology-intensive sectors.

TABLE 2

Acquisitions by Industry for VC-Backed Targets and a Matched Sample

The sample period is 1991–2006. Acquisitions must have a relative deal size (deal size divided by acquirer's market value of equity 1 month prior to the acquisition announcement) of at least 10%. Non-VC-backed targets are selected based on propensity score matching, which is undertaken across the following deal characteristics: deal size, method of payment, relative deal size, and target technology status. A firm's industry is classified by its primary 3-digit SIC code. High-technology industries are classified as belonging to SIC codes 283 (biological products, genetics, and pharmaceuticals), 481 (high-technology communications), 365–369 (electronic equipment), 482–489 (communication services), 357 (computers), and 737 (software services).

	Target Industry	Number of VC-Backed Targets	Number of Non-VC-Backed Targets
1	Oil, gas, and energy	8	8
2	Food	2	2
3	Textiles and clothing	2	1
4	Wood and paper products	1	1
5	Rubber and plastics	1	1
6	Manufacturing	13	16
7	Biological products, genetics, and pharmaceuticals	28	26
8	Health services	18	18
9	High-technology communications	18	17
10	Electronics, computers, and communication services	33	34
11	Software services	96	94
12	Transportation	1	2
13	Trade (retail and wholesale)	8	8
14	Business services	8	9
15	Other miscellaneous services	8	8
	Total	245	245
	High-technology (includes 7, 9, 10, and 11)	175 71.43%	171 69.80%
	Non-high-technology	70 28.57%	74 30.20%

Panel A of Table 3 reports the differences in firm characteristics across the 2 acquisition samples (i.e., VC-backed targets and matched non-VC-backed targets) using a standard *t*-test for a difference in means as well as a Wilcoxon test for difference in medians. In general, VC-backed targets and their acquirers are slightly larger in size, and so is the relative deal size of VC-backed targets. However, the differences in all 3 characteristics are statistically insignificant. We conclude that the matches are relatively close, though imperfect. As a consequence, we also control for all these characteristics in our multivariate analysis.

Panel A of Table 3 also reports basic financial information on the pairs of acquisitions. Since all of our targets are privately held, we find that only 40% of the targets have the required data available from the standard publicly available databases. To expand our sample of targets, we hand-collect target total assets from SEC filings. As a result, we obtain total assets for nearly 90% of our sample of target firms. The distributions are quite skewed, with large variability; hence, both means and medians are reported for each of the 2 target samples. Analysis of the targets' mean and median total assets reveal that they are

TABLE 3

Descriptive Statistics for Acquisitions of VC-Backed Targets and a Matched Sample

The acquisition sample period is 1991–2006. Acquisitions must have a relative deal size (deal size divided by acquirer's market value of equity 1 month prior to the acquisition announcement) of at least 10%. Panels A and B of Table 3 compare VC-backed to non-VC-backed targets. Non-VC-backed targets are selected based on propensity score matching. Acquirer size is measured by the market value of acquirer equity 1 month prior to acquisition announcement. Target size is the price paid for acquisition of the target. A standard *t*-test for a difference in means and a Wilcoxon test for a difference in medians are used to compare VC-backed and non-VC-backed targets. Propensity score matching is undertaken across the following deal characteristics: deal size, method of payment, relative deal size, and target technology status.

	VC-Backed Targets		Non-VC-Backed Targets		Tests of Equality (*p*-values)	
	Mean	Median	Mean	Median	Mean	Median
Panel A. Acquisition Characteristics for VC-Backed Targets and a Matched Sample						
Acquirer size ($M)	759	253	602	234	0.20	0.37
Target size ($M)	175	68	154	58	0.48	0.18
Target size relative to acquirer size	0.40	0.23	0.36	0.21	0.26	0.52
Target total assets (book value in $M)	28.81	12.58	51.00	11.26	0.17	0.70
Target takeover premium (purchase price to book value)	17.03	4.69	20.58	3.95	0.55	0.37

	VC-Backed Targets		Non-VC-Backed Targets		Tests of Equality (*p*-values)
	No.	%	No.	%	
Panel B. Frequency of Deal Financing Methods					
Involve acquirer stock	187	76%	187	76%	1.00
Do not involve acquirer stock	58	24%	58	24%	1.00
Total	245	100%	245	100%	

insignificantly different across the 2 samples. The median total assets for the VC-backed and non-VC-backed targets equal $12.58 million and $11.26 million, respectively. The median takeover premia of VC-backed and non-VC-backed targets are 4.69 and 3.95, respectively, which are not significantly different from each other.[10]

Panel B of Table 3 reports the frequency of acquisition financing methods for the 2 matched samples. A comparison of the 2 samples on the basis of financing methods also indicates close matching on this dimension, given that in both samples 76% of the acquisitions involve stock financing. Overall, the 2 groups of targets are well matched on the following dimensions: industry, technology intensity, acquisition financing method, target book assets, deal size, relative deal size, and target takeover premium (target purchase price to book value). The closeness of the sample matching substantially alleviates concerns about selection bias that arise from the nonrandom nature of VC investment decisions and the resulting large differences in deal characteristics between the VC-backed and non-VC-backed samples.

[10]Including target-specific financial information—book assets, their log values, or transaction price deflated by book assets—in our analyses does not qualitatively alter the basic results. We do not report the results both for reasons of brevity and the reduced sample size, since the relevant information is not available for all the cases.

IV. Acquirer Returns for VC-Backed and Non-VC-Backed Targets

As a first step in our analysis of bidder acquisition announcement effects, we examine acquisition announcements of VC-backed targets and our matched sample of non-VC-backed targets. We estimate the abnormal returns using a standard market-adjusted return model:

$$\mathrm{AR}_i \quad = \quad r_i - r_m.$$

In the previous model, r_i is the return on firm i, and r_m is the value-weighted market (CRSP) index return. We calculate a CAR for the 5-day (–2, 2) period around the acquisition announcements (event day 0) that are drawn from SDC's M&A database and then verified by searching the Lexis-Nexis and Factiva databases. Moeller et al. (2004) report that SDC announcement dates are accurate within 2 trading days of the actual acquisition announcement dates. Brown and Warner (1980) show that for short-window event studies, weighting the market return by the firm's stock beta does not significantly improve the power of the test, given the estimation error for beta and the small size of the daily expected return on the market index.[11]

A. Univariate Analysis of Acquisition CARs for VC-Backed and Non-VC-Backed Targets

Table 4 presents acquirer mean and median 5-day abnormal stock returns on the announcements of private firm acquisitions. Panel A presents acquisition announcements separated into stock- and cash-financed deals. Acquirer mean (median) abnormal returns for stock- and cash-financed deals are 5.11% (3.12%) and 4.00% (2.47%), respectively, which are not statistically distinguishable using either a t-test or a Wilcoxon test. However, as shown in Panel B, acquirer mean (median) abnormal return for announcements of VC-backed targets is 6.31% (4.30%), which is significantly higher than the mean (median) abnormal return of 3.38% (2.03%) for the matched acquisition announcements of non-VC-backed targets. The difference in mean and median CARs for acquisition announcements of VC-backed and non-VC-backed targets is both economically meaningful and statistically significant. In both samples of VC-backed and non-VC-backed targets, slightly more than 65% of acquirers experience positive announcement abnormal returns.

Panel C of Table 4 reports acquisition announcement returns for stock-financed offers distinguished by VC-backing status. The mean (median) abnormal return for acquirers of VC-backed targets is 6.92% (4.70%), which is significantly different from the mean (median) abnormal return of 3.29% (1.98%) for

[11] See also Brown and Warner (1985). However, as a robustness check, we also calculate CARs to acquirers using the constant mean return model: $\mathrm{AR}_{it} = R_{it} - \mathrm{E}(R_i)$, where AR is the abnormal return for firm i during the period t ($t = 5$ days) after adjusting for average returns to firm i calculated from 6 to 270 days prior to the acquisition announcement date. When using this specification for acquirer CARs, the results remain qualitatively unchanged. Finally, results using the equal-weighted market (CRSP) return are qualitatively similar.

TABLE 4

Acquirer CARs for Purchases of Private Targets: Method of Payment and VC Backing

Cumulative abnormal returns (CARs) for acquirer stocks are calculated over the 5 trading days (–2, 2) around the acquisition announcement (day 0). Abnormal returns are estimated using a market-adjusted return model: $r_i - r_m$, where r_i is the return on the acquirer's stock i and r_m is the value-weighted market (CRSP index) return. The sample period is 1991–2006. All acquirers are publicly traded firms listed on the NYSE, NASDAQ, or AMEX with a stock price of $2 or greater around the acquisition announcement. Acquisitions must have a relative deal size (deal size divided by acquirer's market value of equity 1 month prior to the acquisition announcement) of at least 10%. The matched sample of non-VC-backed targets is extracted from a universe of all privately held targets on the basis of high-technology industry indicator, method-of-payment indicator, deal size, and relative deal size. Panel A presents acquirer CARs for the full sample by the method of payment. Panel B displays results for the full sample for VC-backed and non-VC-backed targets. Panels C and D present the abnormal returns classified both by method of payment and VC backing. Mixed offers (those with both cash and stock consideration) are combined with pure stock offers under the heading "Stock Offers." Medians and Wilcoxon test statistics for a significant difference are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Category	No. of Obs.	Average (Median) Acquirer CAR	Test of Equality of Means (Medians) *p*-Values	Percent Positive
Panel A. Full Sample Distinguished by Method of Payment				
Acquisitions involving stock	374	5.11% (3.12%)	0.453 (0.826)	66.31%
Acquisitions not involving stock	116	4.00% (2.47%)		63.79%
Panel B. Full Sample Distinguished by VC Backing				
VC-backed targets	245	6.31% (4.30%)	0.018** (0.026)**	66.12%
Non-VC-backed targets	245	3.38% (2.03%)		65.31%
Panel C. Subsample of Stock-Funded Offers				
VC-backed targets	187	6.92% (4.70%)	0.018** (0.024)**	68.45%
Non-VC-backed targets	187	3.29% (1.98%)		64.17%
Panel D. Subsample of Offers Not Involving Stock				
VC-backed targets	58	4.36% (3.48%)	0.686 (0.460)	58.62%
Non-VC-backed targets	58	3.65% (2.19%)		68.97%

the matched acquirers of non-VC-backed targets. Finally, Panel D shows that acquirers announcing offers that do not involve stock as the acquisition currency have positive abnormal returns, regardless of VC-backing status. This evidence contrasts with the findings reported in Chang (1998) of an insignificant mean abnormal return to acquirers announcing cash offers. For offers that do not involve stock, the mean and median announcement CARs for the VC-backed and non-VC-backed targets are 4.36% (3.48%) and 3.65% (2.19%), respectively; however, neither mean nor median differences are statistically significant.

In the VC-backed target sample, a comparison of acquirer CARs for acquisitions with and without stock financing uncovers a statistically insignificant difference, although acquirer CARs are larger for stock-financed offers. Potential monitoring of acquirers by large blockholders, created by stock-financed acquisitions of targets with large shareholders, is one reason offered for the higher acquirer CARs in private firm acquisitions (Chang (1998)). Yet, our evidence indicates that this explanation is unlikely to be the primary cause for the observed differences in acquirer returns. This leads us to look for other explanations for the

larger acquirer wealth effects associated with VC-backed targets, which involve several VC conflicts of interest with other private firm investors.

B. Multivariate Analysis of Acquisition CARs for VC-Backed and Non-VC-Backed Targets

Moving to a multivariate analysis of acquirer announcement returns, we control for a number of deal characteristics found in prior studies to have explanatory power, along with a VC backing indicator. The deal characteristics used as controls are: log of acquirer size, relative deal size, market-to-book ratio in the target firm's industry in the year of the takeover announcement, and volatility of the acquirer's excess stock returns (measured from 270 to 6 trading days prior to the acquisition announcement), as well as indicators for i) VC-backed targets, ii) common stock-financed deals (partially or completely), iii) within-industry deals based on their 2-digit SIC codes (a proxy for potential synergies between the acquirer and target firms), and iv) high-technology-intensive targets.[12]

Moeller et al. (2004) provide evidence that firm size is a key determinant of a bidder's announcement period abnormal return, with larger bidders exhibiting poorer announcement returns. Prior research also documents a significant relation between relative deal size and acquirer returns. Fuller et al. (2002) observe that relative deal size directly affects the relative importance of the acquisition to an acquirer's share value and thus makes it more likely that the deal announcement effect can be detected. A higher market-to-book ratio in an industry is an indication of a favorable investment climate, which is likely to influence potential acquirers' interest in such targets, thereby affecting acquirer CARs. Finally, in the spirit of Moeller et al. (2007), we control for the idiosyncratic volatility of acquiring firms, which has been found to partially account for differences in acquirer announcement returns across public and private targets.

Table 5 presents regression estimates of acquirer announcement CARs for the combined sample of VC-backed and matched non-VC-backed privately held targets. Consistent with the earlier univariate analysis, stock-financed acquisitions have a statistically insignificant effect, while acquisitions of VC-backed firms are significantly more profitable for acquirer shareholders than acquisitions of non-VC-backed firms.

Turning to the control variables, the coefficient estimate on relative deal size is positive and statistically significant, indicating that the market views relatively larger deals as more beneficial to acquirers or, alternatively, that we are better able to detect the acquisition's economic effects. The coefficient on target industry market-to-book is significantly positive, consistent with a greater stock price reaction for bidders acquiring high growth firms. The coefficient on acquirer stock return volatility is also positive and statistically significant. Consistent with

[12] Variable definitions are reported in the Appendix. We also examine alternative measures of stock acquisitions and the effect of high-technology combinations. First, we replace the equity financing indicator with a deal's percentage of stock financing, and second, we include a high-technology combination indicator to represent cases where both the acquirer and target belong to the high-technology industry. Our qualitative results remain unchanged.

TABLE 5

Analysis of Acquirer CARs for VC-Backed and Non-VC-Backed Targets

Table 5 reports ordinary least squares estimates. The dependent variable is the cumulative abnormal return (CAR) for the acquirer stock and is calculated over the 5 trading days (–2, 2) around the acquisition announcement (day 0). Abnormal returns are estimated using a market-adjusted return model: $r_i - r_m$, where r_i is the return on the acquirer's stock i and r_m is the value-weighted market (CRSP index) return. The sample period is 1991–2006. The sample represents matched pairs of privately held acquisitions, half of which are VC-backed and the other half are non-VC-backed, where propensity score matching is used to choose the non-VC-backed matching acquisition. Stock acquisition is an indicator for common stock financed transactions (includes mixed offers—targets acquired through a combination of cash and stock). The VC-backed target variable indicates when a target has VC backing. The log(acquirer size) (equity market value measured 1 month prior to the acquisition announcement) and relative deal size (deal size divided by acquirer size) are included separately in the regression. Intraindustry deal is an indicator variable denoting whether the target and acquirer firms belong to the same industry based on their 2-digit SIC codes. The high-technology target indicator denotes targets in the following high-technology industries: biological products, pharmaceuticals, genetics, software services, electronic equipment, computers, communication services, and high-technology communications. Target industry market-to-book denotes the median value of the market-to-book ratio in the target firm's industry in the year of the takeover announcement. Acquirer stock return volatility denotes the standard deviation of the acquirer's excess stock returns measured from trading days –6 to –270 prior to the announcement date (day 0). *p*-values based on heteroskedastic-consistent robust standard errors adjusted for industry clustering are reported in brackets next to the parameter estimates. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	CAR (1)		CAR (2)		CAR (3)		CAR Stock Offers (4)	
	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value
Stock acquisition	0.001	[0.909]			0.002	[0.916]		
VC-backed target			0.027	[0.030]**	0.027	[0.030]**	0.034	[0.025]**
log(acquirer size)	–0.006	[0.254]	–0.007	[0.166]	–0.007	[0.164]	–0.006	[0.358]
Relative deal size	0.030	[0.024]**	0.028	[0.032]**	0.028	[0.033]**	0.032	[0.075]*
Intraindustry deal	–0.013	[0.303]	–0.015	[0.259]	–0.015	[0.258]	–0.014	[0.389]
High-technology target	–0.015	[0.506]	–0.013	[0.555]	–0.013	[0.553]	–0.014	[0.588]
Target industry market-to-book	0.046	[0.005]***	0.048	[0.003]***	0.048	[0.003]***	0.062	[0.003]***
Acquirer stock return volatility	1.110	[0.002]***	1.042	[0.004]***	1.034	[0.005]***	0.936	[0.030]**
Intercept	–0.004	[0.978]	0.010	[0.940]	0.011	[0.936]	–0.082	[0.207]
Industry and year fixed effects	Present		Present		Present		Present	
Adjusted R^2	3.56%		4.47%		4.26%		3.38%	
No. of obs.	490		490		490		374	

the findings in Moeller et al. (2004), the coefficient on acquirer size is negative, though statistically insignificant. The other control variables, namely indicators for intraindustry acquisitions and technology-intensive targets, are statistically insignificant.[13]

In model 4 of Table 5, we replicate the analysis on the subsample of acquisitions that are partially or completely stock financed. We find that the VC-backed target indicator has a larger positive coefficient than in the full sample of acquirer announcements. In summary, acquisitions of VC-backed targets lead to significantly higher acquirer announcement returns than acquisitions of non-VC-backed targets.

[13]We also include acquirer-specific characteristics, namely leverage, Tobin's Q, free cash flow (all 3 are calculated for the previous year as well as the previous quarter), and stock price run-up (the run-up is calculated from the 120th trading day to the 11th trading day prior to the acquisition announcement) in unreported regressions. However, none of these variables is significant, and their inclusion does not alter our basic results. We do not report the results both for reasons of brevity and because information for these variables is not always available, which reduces the sample size. We also interact the high-technology target and intraindustry deal indicators, but the coefficient estimate is not statistically significant. Finally, weighting acquirer CARs by their time-series volatility yields qualitatively similar results.

V. Profitable Acquisitions of VC-Backed Targets: VC Liquidity, VC Self-Dealing, and CVC Strategic Focus Hypotheses

A. Comparison of Mean and Median Acquisition CARs for Samples of VC-Backed Targets

We now examine the descriptive power of the 3 VC conflicts of interest hypotheses, namely VC liquidity, VC self-dealing, and CVC strategic focus, to explain the higher acquirer CARs associated with acquisitions of VC-backed targets. To improve the power of our tests to distinguish among these VC-based hypotheses, we restrict our analysis to acquisitions of VC-backed targets. To test the predictions of our 3 hypotheses, we distinguish among VC-backed targets by the types of conflicts of interest they face, as discussed later. We initially examine the mean and median acquirer announcement returns across the various subsamples of acquisitions of VC-backed targets, and we follow this with multivariate regression analysis.

The *VC liquidity* hypothesis reflects the fact that VC funds are primarily organized as limited partnerships that are self-liquidating on a fixed termination date. VC funds nearing their termination dates should experience greater pressure to liquidate their investments. As a consequence, VCs have incentives to use their strong control rights and the target's need for further VC funding to pressure managers to sell portfolio companies quickly, causing sales at relatively lower prices. The result is lower takeover premia for targets and higher wealth gains for acquirer shareholders. We measure VC fund liquidation pressure using the interval between the acquisition announcement date and the lead VC fund's initial closing date.[14] We focus on the lead VC, since a lead VC will have the most influence in the VC syndicate and is also most likely to have 1 or more seats on a start-up's board of directors. The lead VC is defined as the VC making the largest investment in the target across all rounds of VC funding. While it is not uncommon for VC firms that manage multiple funds to invest in the same portfolio firm, in our sample lead VCs rarely have more than 1 fund investing in the same target company.

To test the *VC liquidity* hypothesis, we compare acquisitions of VC-backed targets backed by older and younger VC funds that face more and less liquidation pressure, respectively. We construct an indicator variable representing the top tercile of VC funds closest to liquidation, which face more intense liquidity pressure. We find that acquisitions of targets backed by older VC funds closer to liquidation result in higher acquirer returns (median CAR: 5.04%) than those backed by younger VC funds (median CAR: 3.81%). However, the difference is not statistically significant, so this is at best weak evidence in support of the *VC liquidity* hypothesis.

[14]In cases where the VentureXpert database does not identify the lead VC fund (but identifies the lead VC *firm*) that invested in the portfolio company, we take the initial closing date of *that fund* (floated by the lead VC firm) that is closest to the date when the lead VC firm made its first investment in the company.

For the *VC self-dealing* hypothesis, we create an indicator variable to capture the dual financial relationship a VC firm can have with both the acquirer and target firms. The indicator variable denoting the dual financial relationship equals unity when the same VC firm holds equity stakes in both the acquiring and target firms before the acquisition announcement, and 0 otherwise. The economic impacts of cross-holdings of bidder and target firms by institutional shareholders are analyzed in the context of public firm acquisitions by Harford et al. (2008), Bodnaruk et al. (2008), and Matvos and Ostrovsky (2008). These studies explore the effects of conflicts of interest among institutional stockholders, which result from cross-holdings of shares in both bidders and targets. We hand-collect information on VC shareholdings in acquiring firms from a variety of acquirer SEC filings, including proxy statements (15 cases), prospectuses and registration statements (9 cases), and other filings (SC13G: 3 cases; S-4: 1 case). All of these SEC filings must be dated prior to the acquisition announcement, and we use VC shareholding data from the most recent acquirer filing (predating the acquisition announcement) that contains this information. Thus, we uncover 28 cases of potential conflicts of interest/self-dealing, in which a VC held equity stakes in both the acquiring and target firms before the acquisition announcement.

We find significantly higher acquirer returns in deals involving clear VC conflicts of interest, which support H2: the *VC self-dealing* hypothesis. More specifically, mean and median acquirer announcement effects (CARs) in acquisitions susceptible to a VC self-dealing problem are 14.65% and 12.58%, respectively, and the portion of the sample with positive acquirer announcement effects is nearly 86%. By way of contrast, the mean and median acquirer announcement effects in VC-backed acquisitions without such conflicted VCs are notably lower, at 5.24% and 3.68%, respectively, and the portion of the sample with positive acquirer announcement effects is below 64%.

As mentioned earlier, strategically oriented CVCs have fundamentally different incentives from financially oriented TVCs. In addition, CVCs are typically controlled by more risk-averse parent boards of directors. As a result, potential acquirers are likely to factor into their offer prices CVCs' weaker financial incentives, their strong strategic focus, and greater risk aversion, which can toughen their negotiating position and raise acquirer announcement returns. We test the *CVC strategic focus* hypothesis using an indicator variable for the existence of a CVC in the VC syndicate. We find that 60 of the 245 VC-backed targets include CVC investors. The mean (median) size of CVC-backed targets, measured by purchase price, is $222 ($75) million. This is in comparison to the mean (median) purchase price of $160 ($63) million for the sample of purely TVC-backed targets. Thus, targets with CVC backing are slightly larger than those with only TVC backing, though the differences are not statistically significant using either a *t*-test or a Wilcoxon test. The mean or median differences in the book values of total assets of CVC-backed targets and purely VC-backed targets are not significant either.

Of the 60 CVC-backed targets, 57 receive investments from strategically inclined CVCs. We code whether there is a strategic fit between the CVC parent and the target firm based on information collected from a variety of sources, as explained below. If the 2 parties have the same 2-digit SIC code, then we classify

the CVC investment as strategic. We also read the SEC filings of CVC parents to uncover any operating relationships between the 2 parties. For instance, if the CVC parent is a customer, supplier, strategic alliance partner, or technology licensor to the target firm, we classify the CVC investment as strategic in nature. Finally, we use Web searches to obtain further information on whether the operating relationship between the target firm and CVC parent is strategic in nature. Even though we are explicitly able to code the relations between target firms and CVC parents in an overwhelming majority (95%) of the cases, we continue to use the entire sample of CVC-backed targets in our analysis, since some strategic relations may not be observable from the publicly filed documents. However, our results are robust to using only the subsample of 57 explicitly classified CVC-target strategic relations. We find that the mean and median acquirer CARs in deals involving CVC-backed targets are 11.50% and 7.36%, respectively, which are significantly greater than the mean and median acquirer CARs of 4.86% and 3.68%, respectively, observed in acquisitions of pure TVC-backed firms. This evidence supports the predictions of H3: the *CVC strategic focus* hypothesis. Although we do not tabulate the univariate results to conserve space, they are available from the authors.

B. Multivariate Analysis of Acquisition CARs for VC-Backed Targets

In this section we analyze VC-backed acquisitions in a multivariate setting to more accurately assess the causes for the higher announcement returns in acquisitions of VC-backed targets than is possible in a univariate analysis. We test our 3 VC conflicts of interest hypotheses individually and jointly. As control variables, we use the same control variables employed in Table 5, plus 2 indicators denoting whether i) the lead VC is in the bottom third of the firms by virtue of their investment experience, and ii) the target is in the seed or early stage of development at the most recent VC funding round preceding the acquisition.

The motivations for the 2 indicator variables follow. Younger, less experienced VCs can be less effective at assisting targets in negotiating higher acquisition prices. They are also likely to have weaker networks of contacts, which can lead to weaker interest in buying their portfolio firms. If competition is sparse for acquiring a target, then an acquirer is in a stronger negotiating position. Young VC firms also have incentives to establish a successful track record in venture investing to support their next rounds of fundraising. For instance, Gompers (1996) explores the "grandstanding" hypothesis in the IPO market, where younger VCs are under strong pressure to establish a successful track record in venture investing to support their next round of fundraising. Strong track records reduce future fundraising costs and time commitments. Thus, young VC firms could be willing to accept lower acquisition prices to obtain profitable exits sooner, which can raise acquirer returns.

VentureXpert provides very little information on portfolio companies other than funding rounds, amounts invested, venture investors, and eventual exits. We partially account for differences in unobservable characteristics, such as a target's riskiness, by including an indicator denoting companies in an early development stage at their most recent funding round prior to the acquisition announcement.

This indicator also acts as a proxy for the uncertainty about target valuation at the time of the merger transaction (Officer et al. (2009)). In addition, we include industry indicators that allow us to partially account for differences in technological intensity and product market competition across portfolio companies.

Table 6 presents a multivariate analysis of acquirer announcement CARs focusing on Hypotheses 1–3 individually in the first 3 models and then jointly in the last model. Model 1 presents a test of H1, the *VC liquidity* hypothesis. We find that the indicator variable for funds closer to liquidation has a positive sign as predicted, but it is not statistically significant.

TABLE 6

Analysis of Acquirer CARs to Announcements of Purchases of VC-Backed Targets

Table 6 reports ordinary least squares estimates. The dependent variable CAR is the 5-day cumulative abnormal return (CAR), the excess over the value-weighted CRSP market return. The sample period is 1991–2006. VC liquidity is an indicator variable denoting a third of the funds (in our sample) closest to liquidation and is based on the time interval between the acquisition announcement date and the initial closing date of the VC fund. The VC self-dealing indicator denotes the presence of a VC conflict of interest, which occurs when a VC has a dual financial relationship with the target and acquirer through share holdings in both. The CVC strategic focus indicator denotes that the VC syndicate includes a corporate venture capitalist. Early/seed stage target is an indicator variable denoting whether the target was in the seed/early development stage in the last VC funding round preceding the acquisition announcement. VC inexperience is an indicator variable denoting a third of the least experienced VC funds in our sample and is based on the age of the lead VC firm at the time of the takeover announcement. Stock acquisition indicates that the acquisition currency includes common stock. The other control variables include the log of acquirer size (equity market value measured 1 month prior to the announcement), relative deal size (deal size divided by acquirer size), an intraindustry deal indicator denoting that the target and acquirer belong to the same industry, a high-technology target indicator denoting that the target is in a high-technology industry, target industry market-to-book ratio, and acquirer stock return volatility. Target and acquirer firms belong to the same industry if they have the same 2-digit SIC code. High-technology industries include: biological products, pharmaceuticals, genetics, software services, electronic equipment, computers, communication services, and high-technology communications. Acquirer stock return volatility is measured by the standard deviation of the acquirer's excess stock returns estimated over trading days –6 to –270 days prior to the announcement date (day 0). *p*-values, based on heteroskedastic-consistent robust standard errors adjusted for VC firm clustering, are reported in brackets next to the parameter estimates. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	CAR (1)		CAR (2)		CAR (3)		CAR (4)	
	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value
VC liquidity	0.018	[0.64]					0.022	[0.56]
VC self-dealing			0.066	[0.02]**			0.066	[0.02]**
CVC strategic focus					0.053	[0.07]*	0.055	[0.07]*
Early/seed stage target	0.024	[0.27]	0.016	[0.46]	0.023	[0.27]	0.021	[0.32]
VC inexperience	0.010	[0.66]	0.007	[0.71]	0.003	[0.86]	0.006	[0.79]
Stock acquisition	–0.010	[0.64]	–0.011	[0.57]	–0.004	[0.85]	–0.013	[0.54]
log(acquirer size)	–0.006	[0.50]	–0.007	[0.50]	–0.008	[0.41]	–0.006	[0.52]
Relative deal size	0.020	[0.39]	0.018	[0.42]	0.014	[0.55]	0.012	[0.58]
Intraindustry deal	–0.016	[0.56]	–0.023	[0.36]	–0.009	[0.71]	–0.014	[0.56]
High-technology target	–0.025	[0.43]	–0.032	[0.27]	–0.029	[0.28]	–0.019	[0.52]
Target industry market-to-book	0.058	[0.06]*	0.054	[0.07]*	0.052	[0.08]*	0.049	[0.09]*
Acquirer stock return volatility	2.082	[0.03]**	2.003	[0.03]**	1.826	[0.03]**	1.875	[0.03]**
Intercept	0.021	[0.78]	0.056	[0.40]	0.056	[0.41]	0.026	[0.72]
Industry and year fixed effects	Present		Present		Present		Present	
Adjusted R^2	4.33%		6.05%		6.24%		7.20%	
No. of obs.	239		245		245		239	

In model 2, the VC self-dealing indicator has a positive and significant coefficient. This is consistent with VCs having conflicts of interest with other target investors when VCs also have financial relationships with the acquiring firms. This conflict thus results in higher wealth gains for the acquiring firms if it leads these VCs to pressure portfolio firms to sell themselves more cheaply. On average, the presence of such dual relationships results in a nearly 7% increase in acquirer CARs during the 5-day window. Thus the evidence supports H2, the *VC self-dealing* hypothesis. Model 3 tests H3, the *CVC strategic focus* hypothesis

that CVC backing of targets raises acquirer announcement CARs, by using an indicator for the presence of a CVC in the VC syndicate. We find that CVCs are associated with higher acquirer CARs, which on average are 5% higher over the 5-day announcement period. To assess the marginal effects of the last 2 indicators, recall from Table 4 that the mean acquirer CAR is 6.3% for VC-backed targets.

Finally, in model 4 of Table 6, we jointly test the significance of all 3 hypotheses on acquirer announcement returns. Again we find support for the *VC self-dealing* and *CVC strategic focus* hypotheses. Examining the other control variables, we find in all 4 models that the coefficients on target industry market-to-book and acquirer stock return volatility are positive and significant, while the remaining control variables are statistically insignificant. In an unreported regression, we follow Officer et al. (2009) by interacting the early development stage indicator with the stock acquisition indicator. Similar to the findings in Officer et al., we observe a positive coefficient on the interaction variable, suggesting that acquirer returns are higher in stock-financed acquisitions, which are more difficult to value. However, the interaction variable is not significant at conventional levels (p-value = 0.2), and our other results remain qualitatively unchanged. In summary, higher acquirer CARs are at least partially attributable to various VC conflicts of interest with other target firm shareholders, which lead to positive announcement effects for acquirer shareholders.

C. Univariate and Multivariate Analysis of Target Takeover Premia

To further evaluate the 3 VC conflicts of interest hypotheses, we next examine the determinants of a target's takeover premium, which we proxy by the target's purchase price scaled by its book value. Scaling the target purchase price by its book value provides for a more meaningful comparison across target firms. If VC involvement can affect acquirer CARs, then it is also likely to affect the purchase prices of VC-backed targets. In robustness checks, we obtain similar qualitative results upon normalizing the target's purchase price to book value by the median target industry market-to-book ratio, and using the natural logarithm of the ratio as our measure of takeover premium.

In the univariate comparisons across subsamples of acquisitions, we find that sales of targets backed by VC funds closer to liquidation occur at a significantly lower median takeover premium (a median of 3.25) compared to sales of targets backed by VC funds farther from liquidation (a median of 6.38). This is consistent with H1, the *VC liquidity* hypothesis, and suggests that when VCs face stronger incentives to liquidate their investments, they put greater pressure on their portfolio firms to sell and avoid extended negotiations, which might cause the potential acquirers to walk away from proposed deals. The end result is a sale of the target firm at a relatively lower price.

To further test the prediction of H2, the *VC self-dealing* hypothesis, we examine takeover premia for targets backed by VCs with acquirer stockholdings and expect to observe a lower takeover premium when VCs are conflicted. If VCs have conflicts of interest, then negotiations over target purchase prices can be adversely affected, and target purchase prices are likely to be lower. We find the mean (median) takeover premium for targets backed by VCs with acquirer

shareholdings is 7.75 (2.79) compared to a mean (median) of 18.25 (4.71) for targets backed by VCs without these dual financial relationships. Further, these differences are statistically significant. This supports the prediction of H2 that targets receive lower purchase prices. Thus, the evidence indicates that VC incentives to support aggressive negotiations aimed at raising purchase prices for their portfolio firms are measurably compromised by these dual financial relations and result in lower target purchase prices and higher wealth gains for acquirer shareholders.

Finally, when comparing takeover premia of targets backed by CVC and TVC investors, we find the mean (median) takeover premium for CVC-backed targets is 19.66 (5.33), which is higher than the mean (median) takeover premium of 16.16 (4.52) for purely TVC-backed targets. The median differences are statistically significant at the 10% level, although the mean differences are not significant. Although we do not tabulate univariate results to conserve space, they are available from the authors.

In Table 7 we present a multivariate analysis of target takeover premia, controlling for the same deal characteristics that we control for in Table 6. In the first model we include an indicator for VC funds nearing maturity. The significant negative coefficient is consistent with older VC funds experiencing greater liquidity pressure, which leads VCs to pressure target managers into selling out more quickly at lower purchase prices. In contrast, VC funds farther from liquidation appear to support more aggressive acquisition negotiations. This evidence is consistent with H1: the *VC liquidity* hypothesis.

The second equation of Table 7 tests the importance of the *VC self-dealing* hypothesis on target takeover premia. We find a significant negative coefficient on the self-dealing indicator, consistent with the prediction that targets backed by conflicted VCs receive lower purchase prices. The third model includes a CVC-backed target indicator, which we find has an insignificant coefficient estimate, suggesting that CVC backing does not have a strong impact on target takeover premia.

Finally, the last equation in Table 7 presents a joint test of these hypotheses by including all 3 indicator variables. The results are consistent with the earlier estimates, though the model's explanatory power is higher. We also observe that acquisitions involving stock financing, high-technology targets, and targets in early development stages are associated with higher target takeover premia. Finally, when the market-to-book ratio in the target industry is higher, acquirers pay more for targets as well.

Taken together, the evidence on acquirer CARs and target purchase prices provides support for the *VC self-dealing* hypothesis as well as the *VC liquidity* and *CVC strategic focus* hypotheses. In addition, we find that VC inexperience does not have a significant effect on either the acquirer CARs or the target takeover premia. This suggests that while grandstanding by inexperienced VCs is important in the IPO market (Gompers (1996)), it does not appear to be so in the acquisition market. Finally, we find evidence that stock financing is associated with higher target takeover premia, though this could be due to a self-selection effect. We explore this issue further in the robustness analysis that follows.

TABLE 7

Analysis of Takeover Premia of VC-Backed Targets

Table 7 reports ordinary least squares estimates. The dependent variable, log(P/B), is the target firm's takeover premium, defined as the log of the purchase price to book value of total assets ratio. The sample period is 1991–2006. VC liquidity is an indicator variable denoting a third of the funds (in our sample) closest to liquidation and is based on the time interval between the acquisition announcement date and the initial closing date of the VC fund. The VC self-dealing indicator denotes the presence of VC conflicts of interest, which occurs when the VC has a dual financial relationship with both the target and acquiring firms through share holdings in both. The CVC strategic focus indicates that the VC syndicate includes a corporate venture capitalist. Early/seed stage target is an indicator variable denoting whether the target was in the seed/early development stage in the last VC funding round preceding the acquisition announcement. VC inexperience is an indicator variable denoting a third of the least experienced VC funds in our sample and is based on the age of the lead VC firm at the time of the takeover announcement. Stock acquisition indicates that the acquisition currency includes common stock. The other control variables include relative deal size (deal size divided by acquirer's market value of equity 1 month prior to acquisition announcement), an intraindustry deal indicator denoting that the target and acquirer belong to the same industry, and a high-technology target indicator denoting that the target is in a high-technology industry. Target and acquirer firms belong to the same industry if they have the same 2-digit SIC code. High-technology industries include: biological products, pharmaceuticals, genetics, software services, electronic equipment, computers, communication services, and high-technology communications. The last 2 control variables are the target industry market-to-book ratio and acquirer stock return volatility, which is measured by the standard deviation of the acquirer's excess stock returns estimated over trading days –6 to –270 prior to the announcement date (day 0). *p*-values based on heteroskedastic-consistent robust standard errors adjusted for VC firm clustering are reported in brackets next to the parameter estimates. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	log(P/B) (1)		log(P/B) (2)		log(P/B) (3)		log(P/B) (4)	
	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value
VC liquidity	–0.23	[0.00]***					–0.24	[0.00]***
VC self-dealing			–0.26	[0.00]***			–0.28	[0.00]***
CVC strategic focus					0.01	[0.90]	0.01	[0.95]
Seed/early stage target	0.22	[0.05]**	0.27	[0.02]**	0.26	[0.02]**	0.23	[0.03]**
VC inexperience	–0.01	[0.84]	0.04	[0.63]	0.03	[0.71]	–0.01	[0.90]
Stock acquisition	0.25	[0.01]***	0.23	[0.02]**	0.21	[0.03]**	0.26	[0.01]***
Relative deal size	–0.12	[0.04]**	–0.12	[0.02]**	–0.13	[0.02]**	–0.11	[0.06]*
Intraindustry deal	–0.02	[0.77]	–0.02	[0.76]	–0.04	[0.58]	0.01	[0.97]
High-technology target	0.39	[0.01]***	0.40	[0.00]***	0.41	[0.00]***	0.37	[0.00]***
Target industry market-to-book	0.25	[0.00]***	0.25	[0.00]***	0.24	[0.00]***	0.26	[0.00]***
Acquirer stock return volatility	–1.70	[0.39]	–1.10	[0.56]	–1.37	[0.48]	–1.50	[0.44]
Intercept	0.37	[0.13]	0.07	[0.74]	0.10	[0.66]	0.35	[0.14]
Industry and year fixed effects	Present		Present		Present		Present	
Adjusted R^2	27.1%		26.0%		24.0%		28.8%	
No. of obs.	222		228		228		222	

VI. Robustness Checks

A. Matching VC-Backed and Non-VC-Backed Acquisitions Using a Traditional Matching Procedure

To assess the effectiveness of our propensity score matching procedure, we replicate our earlier results using a more traditional matching procedure. As discussed earlier, traditional sequential matching procedures are not as effective as propensity score matching when the number of characteristics being matched on rises, and so sequential matching is unlikely to closely match the key characteristics in the 2 samples. This reflects a well-known problem with the sequential matching approach, that is, when matching is performed across several criteria, the first characteristic is matched more exactly than subsequent characteristics. Despite this shortcoming, we match acquisitions sequentially across 3 dimensions to facilitate comparisons with earlier studies based on this approach. We then control for other potentially important deal characteristics in our multivariate analysis of the combined paired samples. The sequential procedure we follow is to match i) on a similar deal size (the deal size of the non-VC-backed target should be within 50% and 150% of that of its matched VC-backed target),

followed by ii) similar relative deal size (the relative deal size of the non-VC-backed target is constrained to be within 50% and 150% of that of the VC-backed target), and iii) similar acquisition announcement dates (the acquisition announcements of the VC-backed target and its matched non-VC-backed target should be within 90 days of each other).

The third criterion is a refinement on using the relatively coarser year indicators as one of the criteria for matching the M&A deals, which is used in part of our robustness analysis and produces similar qualitative results to our earlier findings (see footnote 9). Existing empirical evidence documents that M&A activity occurs in waves over time and is concentrated in a small number of industries (Andrade, Mitchell, and Stafford (2001)). Thus, firm characteristics could differ for acquisitions occurring in different waves or outside these waves (Harford (2005)). To control for differing economic conditions, we match on announcement dates as well. All of our earlier results remain qualitatively similar after we implement this procedure. Moreover, our results are not specific to a particular matching approach or the sequence adopted for matching across multiple characteristics.

B. Adjusting for Self-Selection Using the Heckman Correction

The purpose of matching acquisitions involving VC-backed and non-VC-backed targets on several dimensions is to ensure a closely matched sample, which also controls for the selection process associated with these firms receiving VC funding. Using both the "nontraditional" propensity score technique and a "more traditional" matching procedure, we show that VC-backed targets create higher wealth gains for acquirer shareholders based on acquisition announcement effects. As an alternative approach, we use the Heckman (1979) correction procedure to generate consistent model estimates after adjusting for selection bias. To implement this approach, data on VC-backed acquisition announcements are combined with *all* non-VC-backed acquisition announcements.[15] In the 1st-step model, we estimate the likelihood of targets being VC-backed using a probit regression framework. In the 2nd-step linear regression, we include the inverse Mills ratio, λ, obtained from the 1st-step estimation as an additional regressor in our earlier model of acquirer announcement returns:

$$\text{1st Step (Probit): Prob (VC-Backed Target)} = a_0 + a_1 \text{ Control Variables} + \varepsilon,$$

$$\text{2nd Step: CAR}(-2,2) = b_0 + b_1 \text{ VC-Backed Target} + b_2 \text{ Control Variables} + b_3\,\lambda + \eta.$$

In the 1st step of the Heckman (1979) procedure, we estimate a predictive model for VC-backed privately held target firms. The instruments used in the 1st-step selection equation include 5 indicator variables denoting targets in high-technology industries, and targets headquartered in California, Massachusetts, New York, and Texas. Prior research shows that VC investments are largely concentrated in these 4 states, making the likelihood high that VC-backed targets are headquartered in these states. We also include aggregate IPO proceeds in

[15] These announcements could include other firm news releases.

the 3 months preceding the acquisition announcement month. Prior studies find that VCs time their exits to periods with better IPO market conditions (Lerner (1994b)), which raises the expected proportion of VC-backed acquisitions in such times. Finally, to account for overall VC activity in the market, we include aggregate VC industry investment in the industry over the 3 months prior to the acquisition announcement month. For these to be valid instruments, they must be significant regressors for the VC selection model, but not in the 2nd-stage acquirer stock return model.

In unreported results we find that most of the explanatory variables in the model predicting VC-backed targets are statistically significant. The likelihood of a target having VC backing is significantly related to indicator variables for targets in high-technology industries and targets headquartered in California and Massachusetts. Increased aggregate VC investment activity is also accompanied by an increased proportion of acquisitions of VC-backed targets. The significant instruments in the 1st stage are not significant in the 2nd-stage model, making them valid instruments for the Heckman (1979) adjustment procedure. The 2nd-step estimates are similar to those reported in Table 5. Most importantly, acquisitions of VC-backed targets lead to significantly larger acquirer announcement returns of more than 2% over the 5-day window, compared to non-VC-backed targets. In addition, stock acquisitions lead to significantly higher acquirer CARs, as does the relative deal size. In contrast, intraindustry deals and acquisitions by larger buyers lead to lower acquirer CARs. The inverse Mills ratio derived from the 1st-step estimation is not statistically significant in the 2nd-stage model, indicating that selection bias does not significantly affect our 2nd-stage estimates. In summary, our results do not appear to be caused by selection bias arising from a common set of VC investment criteria.

C. Interdependence of Acquirer CARs and Target Takeover Premia

In prior analyses, we evaluated the 3 VC conflicts of interest hypotheses separately in acquirer CAR and target takeover premium regressions, treating these 2 dependent variables as independently determined, using single equation models. However, these 2 dependent variables may be jointly determined. To address this concern, we simultaneously estimate the acquirer CAR and the target takeover premium equations for VC-backed targets, where we allow the takeover premium to enter the acquirer announcement return regression. Table 8 reports the joint estimation results, which yields very similar estimates to those obtained earlier from single equation estimation. Although the coefficient on the log of the takeover premium has a negative sign in the CAR equation, it is never statistically significant. The models differ by inclusion of a single indicator associated with 1 of the 3 VC conflicts of interest hypotheses, or all 3 indicators (model 4). The basic conclusions drawn from our earlier analysis concerning the significance of the 3 hypotheses continue to hold under joint estimation of the acquisition announcement CARs and target takeover premia.

Joint estimation of the models for acquisition announcement CARs and target takeover premia based on *matched* samples of VC-backed and non-VC-backed targets also yields qualitatively similar results (not reported), namely that

TABLE 8

Analysis of Acquirer CARs and Takeover Premia of VC-Backed Targets in a 2-Equation Simultaneous System

In the first equation, the dependent variable CAR is the 5-day cumulative abnormal return (CAR), the excess over the value-weighted CRSP market return. In the second equation, the dependent variable is the log of the takeover premium (purchase price to book value of target's assets). The sample period is 1991–2006. VC liquidity is an indicator variable denoting a third of the funds (in our sample) closest to liquidation and is based on the time interval between the acquisition announcement date and the initial closing date of the VC fund. The VC self-dealing indicator denotes the presence of VC conflicts of interest, which occurs when the VC has a dual financial relationship with both the target and acquirer through share holdings in both. The CVC strategic focus indicates that the VC syndicate includes a corporate venture capitalist. Early/seed stage target is an indicator variable denoting whether the target was in the seed/early development stage in the last VC funding round preceding the acquisition announcement. VC inexperience is an indicator variable denoting a third of the least experienced VC funds in our sample and is based on the age of the lead VC firm at the time of takeover announcement. Stock acquisition indicates that the acquisition currency includes common stock. The other control variables include acquirer size measured by market value of acquirer's equity 1 month prior to the acquisition announcement, relative deal size (deal size divided by acquirer size), an intraindustry deal indicator denoting that the target and acquirer belong to the same industry, and a high-technology target indicator denoting that the target is in a high-technology industry. Target and acquirer firms belong to the same industry if they have the same 2-digit SIC code. High-technology industries include: biological products, pharmaceuticals, genetics, software services, electronic equipment, computers, communication services, and high-technology communications. The last 2 control variables are the target industry market-to-book ratio and acquirer stock return volatility, which is measured by the standard deviation of the acquirer's excess stock returns estimated over trading days –6 to –270 prior to the announcement date (day 0). *p*-values based on heteroskedastic-consistent robust standard errors are reported in brackets next to the parameter estimates. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)				(2)				(3)				(4)			
	CAR		log(P/B)		CAR		log(P/B)		CAR		log(P/B)		CAR		log(P/B)	
	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value	Coeff.	*p*-Value
VC liquidity	0.015	[0.61]	–0.23	[0.01]***									0.018	[0.53]	–0.24	[0.01]***
VC self-dealing					0.060	[0.08]*	–0.24	[0.03]**					0.060	[0.08]*	–0.27	[0.02]**
CVC strategic focus									0.059	[0.03]**	0.02	[0.86]	0.059	[0.03]**	0.01	[0.87]
Early/seed stage target	0.022	[0.51]	0.23	[0.03]**	0.015	[0.65]	0.28	[0.01]***	0.020	[0.53]	0.27	[0.01]***	0.017	[0.61]	0.24	[0.02]**
VC inexperience	0.013	[0.62]	–0.02	[0.85]	0.011	[0.67]	0.03	[0.69]	0.007	[0.79]	0.03	[0.76]	0.008	[0.76]	–0.01	[0.87]
Stock acquisition	–0.008	[0.79]	0.25	[0.02]**	–0.011	[0.73]	0.23	[0.02]**	–0.005	[0.87]	0.21	[0.03]**	–0.014	[0.65]	0.27	[0.01]***
log(acquirer size)	–0.004	[0.72]			–0.005	[0.66]			–0.006	[0.56]			–0.006	[0.58]		
Relative deal size	0.018	[0.48]	–0.12	[0.12]	0.017	[0.51]	–0.12	[0.12]	0.015	[0.55]	–0.13	[0.09]**	0.011	[0.66]	–0.11	[0.16]
Intraindustry deal	–0.017	[0.53]	–0.02	[0.79]	–0.022	[0.38]	–0.02	[0.77]	–0.007	[0.77]	–0.04	[0.61]	–0.013	[0.64]	0.01	[0.95]
High-technology target	–0.025	[0.68]	0.39	[0.04]**	–0.031	[0.58]	0.40	[0.02]**	–0.034	[0.54]	0.42	[0.02]**	–0.025	[0.67]	0.38	[0.05]**
Target industry market-to-book	0.070	[0.02]**	0.24	[0.00]***	0.064	[0.02]**	0.25	[0.00]***	0.065	[0.02]**	0.24	[0.01]***	0.060	[0.03]**	0.26	[0.00]***
Acquirer stock return volatility	2.159	[0.00]***	–1.84	[0.37]	2.083	[0.00]***	–1.35	[0.50]	1.846	[0.01]***	–1.55	[0.46]	1.890	[0.01]***	–1.77	[0.39]
log(P/B)	–0.028	[0.29]			–0.024	[0.35]			–0.029	[0.25]			–0.019	[0.47]		
Intercept	0.012	[0.95]	0.37	[0.51]	0.043	[0.81]	0.08	[0.89]	0.044	[0.81]	0.11	[0.85]	0.027	[0.89]	0.35	[0.53]
Industry and year fixed effects	Present		Present		Present		Present		Present		Present		Present		Present	
Adjusted R^2	3.72%		27.91%		5.33%		26.62%		6.23%		24.79%		6.52%		29.43%	
No. of obs.	222				228				228				222			

acquisitions of VC-backed targets lead to higher acquirer announcement returns. Moreover, the correlation between target takeover premia and acquirer CARs is negative, although it is not statistically significant in this simultaneous equations framework.

D. Target Takeover Premia and Endogeneity of the M&A Currency Choice

Another potential concern with our prior analysis of takeover premia is the potential endogeneity of the stock financing regressor. The concern is that the payment method choice could directly impact the size of the target's takeover premium and vice versa. For example, using cash as merger currency can result in immediate tax recognition of long-standing unrealized capital gains for target shareholders, which could induce target shareholders to demand higher purchase prices, ceteris paribus. This would in turn raise target takeover premia. On the other hand, a high takeover premium, especially in larger deals, can make stock more attractive to acquirers as M&A currency, particularly when an acquirer has limited holdings of liquid assets and unused debt capacity. Because of the endogenous nature of the stock financing choice, the estimated coefficients in Table 7 could be biased. Thus, as a further robustness check, we estimate a 2-equation simultaneous system that includes: i) a logit regression to predict stock-financed acquisitions, and ii) a target takeover premium equation. The logit model estimating the likelihood of a stock offer uses as explanatory variables, the log of takeover premium, log of acquirer size, high-technology target indicator, relative deal size, acquirer stock return volatility, early/seed stage target indicator, and industry fixed effects.

As seen in Table 9, the coefficients on the VC liquidity and VC self-dealing indicators remain statistically significant, with the same signs as before, again supporting the *VC liquidity* and *VC self-dealing* hypotheses. We also find that deals involving higher takeover premia are more likely to use stock as acquisition currency. In summary, our results are robust to the use of several alternate estimation methods and are insensitive to controlling for endogeneity.

E. Controlling for VC Shareholdings in Acquirers

Finally, we control for VC shareholdings in acquiring firms, since higher VC shareholdings in acquirers lead to larger conflicts of interest with other target investors. In the specifications reported in Tables 6 and 7, we replace the VC self-dealing indicator with the actual size of VC shareholdings in the acquirers, measured prior to the acquisition announcement. For the potentially self-dealing VCs, the average size of VC shareholdings in acquiring firms is 7.6%. In these regressions (not reported), we continue to find that acquisitions of targets backed by conflicted VCs result in higher acquirer CARs and lower target takeover premia. The significant positive coefficient on VC shareholdings indicates that larger VC holdings of acquirer stock lead to higher acquirer announcement returns and lower target takeover premia.

TABLE 9

Joint Analysis of Takeover Premia and the Likelihood of Stock Financing in Acquisitions of VC-Backed Targets in a 2-Equation Simultaneous System

The dependent variable is the log of the target's takeover premium (purchase price to book value of total assets ratio or the log(P/B)). The sample period is 1991–2006. VC liquidity is an indicator variable denoting a third of the funds (in our sample) closest to liquidation and is based on the time interval between the acquisition announcement date and the initial closing date of the VC fund. The VC self-dealing indicator denotes the presence of VC conflicts of interest, which occurs when the VC has a dual financial relationship with the target and acquirer through share holdings in both. The CVC strategic focus indicates that the VC syndicate includes a corporate venture capitalist. Early/seed stage target is an indicator variable denoting whether the target was in the seed/early development stage in the last VC funding round preceding the acquisition announcement. VC inexperience is an indicator variable denoting a third of the least experienced VC funds in our sample and is based on the age of the lead VC firm at the time of the takeover announcement. Stock acquisition indicates that the acquisition currency includes common stock. The other control variables include relative deal size (deal size divided by acquirer size), an intraindustry deal indicator denoting that the target and acquirer belong to the same industry, and a high-technology target indicator denoting that the target is in a high-technology industry. Target and acquirer firms belong to the same industry if they have the same 2-digit SIC code. High-technology industries include: biological products, pharmaceuticals, genetics, software services, electronic equipment, computers, communication services, and high-technology communications. The last 2 control variables are the target industry market-to-book ratio and acquirer stock return volatility, which is measured by the standard deviation of the acquirer's excess stock returns estimated over trading days –6 to –270 prior to the announcement date (day 0). In the joint estimation of the second equation, which explains the likelihood of a stock offer, we add log(P/B) and acquirer size (market value of acquirer's equity 1 month prior to the acquisition announcement) as additional explanatory variables. *p*-values based on heteroskedastic-consistent robust standard errors are reported in parentheses beneath the parameter estimates. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)	
	log(P/B)	Pr(Stock)	log(P/B)	Pr(Stock)	log(P/B)	Pr(Stock)
	Coeff. (*p*-value)	Coeff. (*p*-value)	Coeff. (*p*-value)	Coeff. (*p*-value)	Coeff. (*p*-value)	Coeff. (*p*-value)
VC liquidity	–0.19*** (0.01)				–0.19*** (0.01)	
VC self-dealing			–0.20** (0.03)		–0.22** (0.02)	
CVC strategic focus	0.03 (0.69)		0.04 (0.63)		0.03 (0.68)	
Early/seed stage target	0.22** (0.02)	–0.26 (0.91)	0.27*** (0.00)	–0.38 (0.58)	0.23** (0.02)	–0.11 (0.69)
VC inexperience	0.01 (0.95)		0.03 (0.69)		–0.01 (0.95)	
Stock acquisition	0.32*** (0.00)		0.31*** (0.00)		0.37*** (0.00)	
log(acquirer size)		–0.07 (0.19)		–0.08 (0.32)		–0.02 (0.93)
Relative deal size	–0.12* (0.08)	0.18 (0.42)	–0.12* (0.08)	0.17 (0.35)	–0.11 (0.13)	0.24 (0.42)
Intraindustry deal	–0.03 (0.64)		–0.02 (0.74)		0.01 (0.96)	
High-technology target	0.37** (0.03)	–0.45 (0.17)	0.38** (0.02)	–0.72 (0.60)	0.35** (0.04)	–0.57 (0.83)
Target industry market-to-book	0.18*** (0.00)		0.18*** (0.00)		0.16*** (0.01)	
Acquirer stock return volatility	–1.93 (0.31)	4.92 (0.26)	–1.51 (0.42)	4.11 (0.35)	–1.91 (0.31)	4.59 (0.31)
log(P/B)		2.05*** (0.00)		2.04*** (0.00)		1.93*** (0.00)
Intercept	0.42 (0.41)	–1.37 (0.27)	0.14 (0.78)	–1.15 (0.23)	0.43 (0.40)	–1.62 (0.63)
Industry and year fixed effects	Present	Present	Present	Present	Present	Present
Log-likelihood	–144.04		–148.55		–141.07	
No. of obs.	222		228		222	

VII. Conclusions

We examine acquisition announcements for private firms with and without VC backing and find that the CARs realized by acquiring shareholders are higher for VC-backed targets than for non-VC-backed targets. This evidence appears contrary to the VC certification hypothesis, which predicts that VCs should enhance the prices of VC-backed targets and reduce the announcement returns to bidders. It suggests that while IPO investors value certification by financial intermediaries such as VCs and underwriters, acquirers of private firms, because of their sophistication and access to proprietary target information, do not rely on certification by VCs or other financial intermediaries.

We then investigate whether VCs, who typically have substantial control rights in their portfolio firms, can have conflicts of interest with other private firm investors around acquisition bids, resulting in higher acquirer wealth gains. To explore this possibility, we undertake an in-depth analysis of acquisitions of VC-backed targets and examine bidder announcement returns as well as target takeover premia to assess whether significant VC conflicts of interest exist. We find several strands of evidence suggesting that the acquisition process is affected by 3 types of VC conflicts with other investors in their portfolio companies, which raises VC incentives to encourage more rapid and less profitable acquisitions of their portfolio companies. Specifically, we find that as VC funds face pressure to liquidate as they move closer to maturity, acquirer returns are on average higher and target takeover premia are significantly lower. This is consistent with maturing VC funds pressuring their portfolio firms to expeditiously negotiate a sale of the company, while VC funds further away from maturity give target firms freer rein to negotiate higher purchase prices over longer negotiating horizons.

We uncover evidence that both informal and formal networks operating in the VC market are helpful in locating potential acquirers, and in a number of cases VCs appear to match targets with acquirers already in their venture networks. However, when a VC investor in a target also has a direct financial tie to the acquirer, acquirer announcement returns are on average higher. Furthermore, when such dual relationships exist, the purchase prices received by targets relative to their book values are significantly lower, suggesting that these dual VC relationships with the acquisition parties adversely affect the acquisition negotiation process from the viewpoint of other target investors.

Examining acquisitions of firms backed by CVCs, we find that acquirers experience relatively higher announcement returns. This evidence is consistent with CVCs having relatively weaker financial incentives to bear venture investment risks and strong strategic objectives that can conflict with the financial interests of other target investors, including entrepreneurs. Thus, CVCs can willingly sacrifice financial returns on their venture investments to support CVC parents' strategic objectives, which results in higher acquirer wealth gains.

In summary, we find that acquisitions of VC-backed targets lead to significantly larger acquirer announcement returns of 2% to 4% compared to non-VC-backed targets. This difference can be partially explained by conflicts of interest between classes of VCs and other portfolio investors due to i) VC fund liquidity

pressures, ii) VC financial ties to acquirers, and iii) strategic objectives and greater risk aversion of CVC parents. We conclude that VCs do not always act in the best interests of all target shareholders. Like other financial intermediaries, VCs can have conflicts of interest with other investors in their portfolio companies. Our findings add to the IPO evidence in Lee and Wahal (2004) that VCs can have perverse incentives to accept lower values for their portfolio companies when they are exiting their private equity investments.

Appendix. Variable Definitions

In Table A1, dependent and independent variables are explained in detail.

TABLE A1
Variable Definitions

Variables	Definitions
Panel A. Dependent Variables	
CAR	Five-trading day acquirer cumulative abnormal return, stock return minus the CRSP market return, over event days (−2, 2), where the announcement day is event date 0.
P/B ratio (takeover premium)	Purchase price of the target (deal size) divided by the target's book value of total assets for the fiscal year-end prior to the acquisition announcement.
Panel B. Explanatory Variables	
Deal-Specific Variables	
VC-backed target	Indicator variable: 1 if the private target is VC backed, and 0 otherwise.
Stock acquisition	Indicator variable: 1 for deals financed at least by some stock, and 0 otherwise.
Deal size	Purchase price paid to acquire the target.
Relative deal size	Deal size over acquirer size, where acquirer size is as defined later.
High-technology target	Indicator variable: 1 if the target is from a high-technology industry as defined in Table 1, and 0 otherwise.
Intraindustry deal	Indicator variable: 1 if target and acquirer firms belong to the same industry based on matching of SIC codes at the 2-digit level, and 0 otherwise.
Target industry market-to-book	Median market-to-book asset ratio in the target's industry calculated in the year of the acquisition announcement.
Early/seed stage target	Indicator variable: 1 if a target's development stage at the most recent VC funding round prior to acquisition announcement is early/seed, and 0 otherwise.
Acquirer-Specific Variables	
Acquirer size	Acquirer equity market capitalization 1 month prior to the announcement of the acquisition.
Acquirer stock return volatility	Standard deviation of an acquirer's daily excess (minus the value-weighted CRSP return) stock returns measured over event days –6 to –270 prior to announcement date (event day 0).
VC-Specific Variables	
VC liquidity	Indicator variable: 1 denotes a third of the funds (in our sample) nearest to their liquidation and is based on the time interval between the acquisition announcement date and the initial closing date of the VC fund.
VC self-dealing	Indicator variable: 1 if there exist potential conflicts of interest due to the presence of equity ownership in both the target and acquiring firms by a common VC, and 0 otherwise.
CVC strategic focus	Indicator variable: 1 if there exists a corporate venture capitalist in the VC syndicate, and 0 otherwise.
VC inexperience	Indicator variable: 1 denotes a third of the least experienced VC funds in our sample and is based on the age of the lead VC firm at the time of the takeover announcement.

References

Acharya, S. "A Generalized Econometric Model and Tests of a Signalling Hypothesis with Two Discrete Signals." *Journal of Finance*, 43 (1988), 413–429.

Acharya, S. "Value of Latent Information: Alternate Event Study Methods." *Journal of Finance*, 48 (1993), 363–385.

Andrade, G.; M. Mitchell; and E. Stafford. "New Evidence and Perspectives on Mergers." *Journal of Economic Perspectives*, 15 (2001), 103–120.

Asquith, P.; R. Gertner; and D. Scharfstein. "Anatomy of Financial Distress: An Examination of Junk Bond Issuers." *Quarterly Journal of Economics,* 109 (1994), 625–658.

Atanasov, V.; V. Ivanov; and K. Litvak. "The Impact of Litigation on Venture Capitalist Reputation." Working Paper, College of William and Mary, University of Kansas, and University of Texas at Austin (2008).

Ayotte, K. M., and E. R. Morrison. "Creditor Control and Conflict in Chapter 11." Working Paper, Columbia Law School (2008).

Barclay, M. J.; C. G. Holderness; and D. P. Sheehan. "Private Placements and Managerial Entrenchment." *Journal of Corporate Finance,* 13 (2007), 461–484.

Barry, C. B.; C. J. Muscarella; J. W. Peavy III; and M. R. Vetsuypens. "The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going-Public Process." *Journal of Financial Economics*, 27 (1990), 447–471.

Bartlett, R. P. III. "Venture Capital, Agency Costs, and the False Dichotomy of the Corporation." *UCLA Law Review,* 54 (2006), 37–115.

Bodnaruk, A.; M. Massa; and A. Simonov. "The Dark Role of Investment Banks in the Market for Corporate Control." Working Paper, University of Notre Dame, INSEAD, and Michigan State University (2008).

Brav, A., and P. A. Gompers. "Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital-Backed Companies." *Journal of Finance*, 52 (1997), 1791–1821.

Brown, S. J., and J. B. Warner. "Measuring Security Price Performance." *Journal of Financial Economics*, 8 (1980), 205–258.

Brown, S. J., and J. B. Warner. "Using Daily Stock Returns: The Case of Event Studies." *Journal of Financial Economics*, 14 (1985), 3–31.

Brunner, A., and J. P. Krahnen. "Multiple Lenders and Corporate Distress: Evidence on Debt Restructuring." *Review of Economic Studies,* 75 (2008), 415–442.

Burgelman, R. A., and L. Välikangas. "Managing Internal Corporate Venturing Cycles." *Sloan Management Review,* 46 (2005), 26–34.

Chang, S. "Takeovers of Privately Held Targets, Methods of Payment and Bidder Returns." *Journal of Finance*, 53 (1998), 773–784.

Cochrane, J. H. "The Risk and Return of Venture Capital." *Journal of Financial Economics,* 75 (2005), 3–52.

Dehejia, R. H., and S. Wahba. "Propensity Score Matching Methods for Nonexperimental Causal Studies." *Review of Economics and Statistics*, 84 (2002), 151–161.

Dushnitsky, G., and M. J. Lenox. "When Does Corporate Venture Capital Investment Create Firm Value?" *Journal of Business Venturing*, 21 (2006), 753–772.

Dushnitsky, G., and Z. B. Shapira. "Entrepreneurial Finance Meets Organizational Reality: Comparing Investment Practices by Corporate and Independent Venture Capitalists." *Academy of Management Best Paper Proceedings* (2008).

Eckbo, B. E.; V. Maksimovic; and J. Williams. "Consistent Estimation of Cross-Sectional Models in Event Studies." *Review of Financial Studies*, 3 (1990), 343–365.

Faccio, M.; J. J. McConnell; and D. Stolin. "Returns to Acquirers of Listed and Unlisted Targets." *Journal of Financial and Quantitative Analysis*, 41 (2006), 197–220.

Fuller, K.; J. Netter; and M. Stegemoller. "What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions." *Journal of Finance*, 57 (2002), 1763–1793.

Gilson, S. C.; K. John; and L. H. P. Lang. "Troubled Debt Restructurings: An Empirical Analysis of Private Reorganization of Firms in Default." *Journal of Financial Economics*, 26 (1990), 315–353.

Gompers, P. A. "Grandstanding in the Venture Capital Industry." *Journal of Financial Economics*, 42 (1996), 133–156.

Gompers, P. A.; J. Ishii; and A. Metrick. "Extreme Governance: An Analysis of Dual-Class Firms in the United States." *Review of Financial Studies*, 23 (2010), 1051–1088.

Gompers, P. A., and J. Lerner. "The Determinants of Corporate Venture Capital Success: Organizational Structure, Incentives and Complementarities." In *Concentrated Corporate Ownership,*

R. K. Morck, ed. Chicago, IL: University of Chicago Press for the National Bureau of Economic Research (2000), 17–50.

Gompers, P., and J. Lerner. *The Venture Capital Cycle.* Cambridge MA: MIT Press (2001).

Hansen, R. G., and J. R. Lott. "Externalities and Corporate Objectives in a World with Diversified Shareholders/Consumers." *Journal of Financial and Quantitative Analysis*, 31 (1996), 43–68.

Harford, J. "What Drives Merger Waves." *Journal of Financial Economics*, 77 (2005), 529–560.

Harford, J.; D. Jenter; and K. Li. "Conflicts of Interest among Shareholders: The Case of Corporate Acquisitions." Working Paper, University of Washington, Massachusetts Institute of Technology, and University of British Columbia (2008).

Heckman, J. J. "Sample Selection Bias as a Specification Error." *Econometrica*, 47 (1979), 153–161.

Heckman, J. J.; H. Ichimura; and P. E. Todd. "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme." *Review of Economic Studies*, 64 (1997), 605–654.

Hellmann, T. "A Theory of Strategic Venture Investing." *Journal of Financial Economics,* 64 (2002), 285–314.

Hellmann, T., and M. Puri. "The Interaction between Product Market and Financing Strategy: The Role of Venture Capital." *Review of Financial Studies,* 13 (2000), 959–984.

Hertzel, M., and R. L. Smith. "Market Discounts and Shareholder Gains for Placing Equity Privately." *Journal of Finance*, 48 (1993), 459–485.

Hochberg, Y. V. "Venture Capital and Corporate Governance in the Newly Public Firm." Working Paper, Northwestern University (2008).

Hochberg, Y.; A. Ljungqvist; and Y. Lu. "Whom You Know Matters: Venture Capital Networks and Investment Performance." *Journal of Finance,* 62 (2007), 251–301.

Hogan, C. E., and C. M. Lewis. "Long-Run Investment Decisions, Operating Performance, and Shareholder Value Creation of Firms Adopting Compensation Plans Based on Economic Profits." *Journal of Financial and Quantitative Analysis,* 40 (2005), 721–745.

Hotchkiss, E. S.; K. John; R. M. Mooradian; and K. S. Thorburn. "Bankruptcy and the Resolution of Financial Distress." In *Handbook of Corporate Finance: Empirical Corporate Finance,* Vol. 2, B. E. Eckbo, ed. Amsterdam, The Netherlands: Elsevier/North Holland (2008).

Hotchkiss, E. S., and R. M. Mooradian. "Vulture Investors and the Market for Control of Distressed Firms." *Journal of Financial Economics,* 43 (1997), 401–432.

Kaplan, S. N., and P. Stromberg. "Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts." *Review of Economic Studies,* 70 (2003), 281–315.

Lee, G., and R. W. Masulis. "Do Underwriters or Venture Capitalists Restrain Earnings Management by IPO Issuers?" *Journal of Corporate Finance*, forthcoming (2011).

Lee, P. M., and S. Wahal. "Grandstanding, Certification and the Underpricing of Venture Capital Backed IPOs." *Journal of Financial Economics*, 73 (2004), 375–407.

Lerner, J. "The Syndication of Venture Capital Investments." *Financial Management*, 23 (1994a), 16–27.

Lerner, J. "Venture Capitalists and the Decision to Go Public." *Journal of Financial Economics*, 35 (1994b), 293–316.

Li, X., and R. W. Masulis. "How Do Venture Investments by Different Classes of Financial Institutions Affect the Equity Underwriting Process?" Working Paper, Vanderbilt University (2008).

Li, X., and X. Zhao. "Propensity Score Matching and Abnormal Performance after Seasoned Equity Offerings." *Journal of Empirical Finance,* 13 (2006), 351–370.

Lindsey, L. "Blurring Firm Boundaries: The Role of Venture Capital in Strategic Alliances." *Journal of Finance,* 63 (2008), 1137–1168.

Masulis, R. W.; C. Wang; and F. Xie. "Agency Problems at Dual-Class Companies." *Journal of Finance,* 64 (2009), 1697–1727.

Matvos, G., and M. Ostrovsky. "Cross-Ownership, Returns, and Voting in Mergers: Conflicts of Interest among Shareholders." *Journal of Financial Economics,* 89 (2008), 391–403.

Megginson, W. L., and K. A. Weiss. "Venture Capitalist Certification in Initial Public Offerings." *Journal of Finance*, 46 (1991), 879–903.

Moeller, S. B.; F. P. Schlingemann; and R. M. Stulz. "Firm Size and the Gains from Acquisitions." *Journal of Financial Economics,* 73 (2004), 201–228.

Moeller, S. B.; F. P. Schlingemann; and R. M. Stulz. "How Do Diversity of Opinion and Information Asymmetry Affect Acquirer Returns?" *Review of Financial Studies,* 20 (2007), 2047–2078.

Officer, M. S.; A. B. Poulsen; and M. Stegemoller. "Target-Firm Information Asymmetry and Acquirer Returns." *Review of Finance*, 13 (2009), 467–493.

Peng, L. "Building a Venture Capital Index." Working Paper, University of Cincinnati (2002).
Poulsen, A. B., and M. Stegemoller. "Moving from Private to Public Ownership: Selling Out to Public Firms versus Initial Public Offerings." *Financial Management,* 37 (2008), 81–101.
Shleifer, A., and R. W. Vishny. "A Survey of Corporate Governance." *Journal of Finance*, 52 (1997), 737–783.
Villalonga, B. "Does Diversification Cause the "Diversification Discount?" *Financial Management*, 33 (2004), 5–27.
Welch, I. "Why Is Bank Debt Senior? A Theory of Asymmetry and Claim Priority Based on Influence Costs." *Review of Financial Studies,* 10 (1997), 1203–1236.
Yost, M., and K. Devlin. "The State of Corporate Venturing." *Venture Capital Journal,* 33 (1993), 37–40.