Venture Capital and Methods of Payment in Mergers and Acquisitions

This draft: January 15, 2021

Venture Capital and Methods of Payment in Mergers and Acquisitions

Abstract

We document that Venture Capital (VC)-backed targets accept more stock in mergers and acquisitions than non-VC-backed targets, even after controlling for self-selection bias, characteristic differences between transactions of VC-backed and non-VC-backed targets, and VC information bridge-building. VC-backed targets prefer the stock of acquirers that are small, young, risky, or have a large capital investment. They also hold more stock when they are backed by independent VCs, reputable VCs, VC syndicates, or VCs that have a low average fund maturity. In addition, we find that the acquirer's short-term and long-term performance is improved when VC-backed targets choose stock as the method of payment. Overall, the evidence suggests that VCs strategically hold the shares of acquirers that meet their investment preferences, and improve the acquirers' performance.

Keywords: Venture Capital; Method of Payment; Merger and Acquisition.

1. Introduction

Venture Capital firms (VCs) are funds raised by management companies from a number of limited partners. VCs invest the funds in potential companies and target one of two successful exits, Initial Public Offering (IPO) or merger and acquisition (M&A) (Giot and Schwienbacher, 2007; Cumming, 2008; Nahata, 2008; Krishnan et al., 2011; Bernstein et al., 2016; Cumming et al., 2017). When VCs exit through IPOs, they often need to decide between selling or holding shares of the IPO firms. Cumming and MacIntosh (2003) indicate that VCs usually do not sell a large portion of shares at the date of the public offering. Instead, VCs may sell shares of IPO firms to the market months or years after the IPO date (Field and Hanka, 2001; Cumming and MacIntosh, 2003). However, more recent studies show that VCs continue to hold shares of IPO firms beyond the lockup period (Krishnan et al., 2011; Celikyurt, et al., 2014; Hsu et al., 2020) and continue to invest in the IPO firms (e.g., Iliev and Lowry, 2020).[1]

Similarly, when VCs exit their investments through M&As, they also need to choose between cash or acquirers' shares as the method of payment (Cumming, 2008; Cumming and MacIntosh, 2003). The decision depends on a number of factors. For example, if VC funds approach their maturity, VCs may choose cash as the method of payment and return cash proceeds to partners or reinvest into new VC funds (Lee and Wahal, 2004). In addition, VCs may pressure the management of portfolio firms to liquidate their assets so as to increase the VC funds' rate of return (Gompers and Lerner, 2004; Masulis and Nahata, 2011). It is also possible that VCs may choose to hold shares of acquirers to capture the long-term returns when they can improve the shares' future value.

A broad question is whether VCs prefer cash or stock when they exit their investments. In this paper, we focus on the analysis of the methods of payment when VCs exit their investments through M&As because of following reasons. First, we can draw meaningful insights from the methods of payment for M&A transactions because both portfolio firms and acquirers have to decide the method of payment (and also the transaction value) and formally announce it at the announcement date. This is different from the context of IPO exits in which VCs can only sell shares after the lock-up period (in most of cases) and the payment decision is not immediate and fixed, causing difficulties for the analysis of the cash-or-stock decision. Second, we can analyze

[1] Iliev and Lowry (2020) document that 15% of the VC-backed firms continue to receive investment from VCs within the first five years after the IPO. And interestingly, 50% of the post-IPO investments come from the same VC that funds the company before the IPO.

VCs' strategies to hold shares of the acquirer in M&A exits. For example, VCs may search for acquirers with characteristics that meet their investment interests to ensure future increases in the share value. This empirical strategy cannot be applied in the context of IPOs because VCs sell shares to many public investors in IPOs. Third, the existing literature often focuses on IPO exits which account for 8.9% of VC investments while ignoring the importance of M&A exits which occur in 37.5% of VC investments.[2]

We propose two reasons for the preference of cash payments over stock payments in M&A transactions with VC-backed targets. First, VCs may face liquidation pressures as their funds mature and need to return cash proceeds to partners (Masulis and Nahata, 2011), hence requesting a cash offer from the acquirer. Second, acquirers that are concerned about the uncertainty of the target valuation tend to offer stock (Chang, 1998; Fuller et al., 2002). However, VCs alleviate such valuation uncertainty, i.e., their presence in the targets addresses the concern of inaccurate target valuation (Megginson and Weiss, 1991; Cumming and Johan, 2008). They encourage portfolio firms to disclose information by setting optimal contracts (Healy and Palepu, 2001). They also verify the performance and disclose the value of the portfolio company in each financing round. According to Cumming and Johan (2008), acquirers have limited time, inclination, and ability to assess the target value. However, with the support of VCs, the limitation is resolved which leads to a reduction of the target valuation uncertainty. As a result, stock is less likely to be selected as the method of payment.

In contrast, the value-added hypothesis suggests that VCs prefer to obtain the acquiring firm's shares and benefit from future share value increases. Indeed, VCs are capable of delivering value-added services to potential acquirers, hence increasing the likelihood of increases in share value. VCs are known as active advisors of portfolio companies during their early development period (Lerner, 1995; Hellmann and Puri, 2002; Gompers and Lerner, 2004; Bernstein et al., 2016), in the private-public transition period (Hochberg, 2012; Tian et al., 2016), and in the post-exit period (Jain, 2001; Krishnan et al., 2011; Iliev and Lowry, 2020). According to Krishnan et al., (2011), VCs positively influence the post-IPO corporate governance and improve the long-term

[2] We calculate the exit ratio via IPO and M&A using the VentureXpert database for the period 1990-2008, following the method of Tian (2012). Specifically, we allocate portfolio companies to IPO and M&A exits if the corporate situation defined in the IPO database is "went public", or "acquisition" and "mergers", respectively. Portfolio companies that are defined as bankruptcy, defunct, or active but not receiving a VC investment within a 10-year span after its last financing round. The exit ratios are generated from a sample of 24,232 observations.

performance of IPO firms. Similarly, VCs in M&A exits can choose stock as the method of payment and influence the acquiring firm's governance in the long-term. Their experience, skillset, and information advantage allow them to address asymmetric information problems in the firm and help identify potential positive NPV projects (Iliev and Lowry, 2020). Collectively, VCs can improve the future value of the acquirer in a stock-financed transaction and benefit more from holding the acquirer's shares.

We collect a sample of 5,972 M&A transactions between public acquirers and private targets during the period 1990-2016. We use both all-stock payment indicator and the fraction of stock to examine the effect of VC backing on the choice of payment. First, the linear probability model (LPM) estimation results reveal that the likelihood of all-stock offers increases 6.4% when the target is VC-backed, *ceteris paribus*, consistent with the value-added hypothesis. We document similar evidence when we use a multinomial probit model to analyze the methods of payment (all-stock, mixed, and all-cash payment). Second, we analyze the effect of VC backing on the fraction of stock. OLS estimation results show that VC backing increases the faction of stock by 7.9%, while and the effect is significantly amplified in Tobit regressions. Our results are robust to self-selection bias, characteristic differences between VC-backed and non-VC-backed targets, and potential VC bridge-building between targets and acquirers.

We also explore how acquirer characteristics can affect the relationship between VC backing and the choice of payment. We find that VCs prefer acquirer shares when the acquirer is young, when the acquirer's total assets is small, or when the acquirer's accounting risk, volatility of stock returns, or level of capital investment is high. This evidence implies that VCs have investment interests in young and risky firms, or firms with a high level of investment. Then, we investigate the relationship between VC characteristics and the choice of payment. First, we show that independent VCs, i.e., private equity, prefer stock payment because they can realize higher returns through better value-added support during the post-acquisition period, while corporate VCs have no preference for the choice of payment. Second, we examine a more restricted sample of only transactions with VC-backed targets. We argue that VC syndicates can provide better value-added support than individual VCs, and reputable VCs are better than non-reputable in providing value to the acquirer, so VC syndicates and reputable VCs will prefer more stock in M&As. The empirical evidence supports our arguments. Third, we investigate how VC funds' maturity affects the choice of payment. The evidence shows that when VCs' funds approach maturity, VCs are less likely to choose stock as the method of payment due to liquidation pressure. The positive

relationship between VC backing and stock as the method of payment is stronger when the average fund age is small, or the ratio of early-stage funds is high.

We further investigate the value-added hypothesis whether VC-backing with stock as the method of payment improves the short-term and long-term performance of acquirers. We measure the acquirer's short-term performance as cumulative abnormal returns (CAR) around the transaction's announcement date. We show that the acquirer's short-term performance is lower when the target is VC-backed, but the effect becomes larger when the transaction is paid fully in stock. Importantly, the positive effect of VC backing with stock payment is not the result of temporary market overreactions at the announcement date. The long-term returns after the transaction announcement are also positive and significant when targets are VC-backed and choose stock payment. This evidence supports the view that VCs hold the acquirers' shares and contribute value to them in both short-term and the long-term.

Our paper contributes to the existing literature in several dimensions. First, we realize VC backing as one of important determinants of the choice of payment in the existing M&A literature (bidder overvaluation (Eckbo et al., 2018; Faccio and Masulis, 2005; Heron and Lie, 2002), debt financing constraints (Faccio and Masulis, 2005; Harford et al., 2009), valuation uncertainty (Boone et al., 2014), targets' relative size (Hansen, 1987), targets' investment opportunities (Martin, 1996), and target public status (Faccio and Masulis, 2005)). Second, we contribute to the literature on the investment preferences of VCs (Chaplinsky and Gupta-Mukherjee, 2016; Guo and Jiang, 2013). We show evidence that VC-backed targets hold more shares of the acquirers that meet their investment preference. Third, the paper supports the literature on the performance of VC investment exits (e.g., Krishnan et al., 2011; Masulis and Nahata, 2011; Nahata, 2008). We show that VCs contribute to the acquirer's performance in both the short-term and long-term when they hold the acquirer's shares. The later evidence also supports the view that the stock market values the continuing involvement of VCs in the long-term (e.g., Barry et al., 1990; Fürth and Rauch, 2015; Hsu et al., 2020; Krishnan et al., 2011; Lasfer and Matanova, 2013). Finally, the paper supports the relationship between VC characteristics and the abilities of VCs to add value, for example, VC independence (e.g., Cumming et al., 2017), VC reputation (Krishnan et al., 2011; Nahata, 2008), and VC syndication (Brander et al., 2002; Tian, 2012). We consistently document that VC independence, reputation, and syndication are positively related to the fraction of stock payment.

The remainder of the paper is organized as follows. Section 2 describes data collection and summary statistics. Section 3 provides main the empirical results. Section 4 reports robustness tests. Section 5 concludes the paper.

2. Data and Descriptive Statistics

2.1 Sample Selection

We collect a sample of 5972 unlisted acquisitions for the period 1990-2016 from SDC Platinum (hereafter the SDC M&A sample) under the following selection criteria: (1) The transactions are domestic; (2) Acquirers are U.S. listed firms, and targets are unlisted firms; (3) The value of transactions is disclosed and at least 5 million; (4) All transactions are completed: They are classified as *C* in the SDC database; (5) Transactions that are defined as spin-offs, recapitalizations, self-tenders, exchange offers, repurchases, acquisitions of remaining interest or a minority stake, and privatizations are excluded from the sample.

We clean the SDC M&A sample as follows. First, we drop targets that operate in financial and utility industries, i.e., the targets with the primary SIC code between 4900-4999, and 6000-6999. Then, we exclude targets that are small relative to acquirers. Specifically, the targets with the relative size of less than 1% are excluded from the sample. We also exclude transactions that have the total percentage of "unknown" payment of 100%. Next, we only keep transactions that have the total of cash and stock equal or greater than 99.99% in the SDC M&A database.[3] Finally, we require acquirers to have available information listed in the CRSP and Compustat database to construct necessary variables.

Following Gompers and Xuan (2009) and Masulis and Nahata (2011), we identify VC-backed M&As from the VentureXpert database (The VCMA sample). The sample is selected as follows: (1) The value of transactions is equal to or more than 5 million; (2) The acquired percentage ownership of the target firm is 100%; (3) Acquisitions of partial interest, acquisitions of remaining interests, buyback, exchange offer, and recapitalization are excluded from the VC-backed M&A sample. Then, we match the VCMA sample to the SDC M&A sample using target Cusip, acquirer Cusip, and transaction announcement date to identify VC-backed targets in the SDC M&A sample. We also carefully check the consistency of target names in both samples. Table 1 presents the

[3] This selection criterion means that we do not consider other payment methods rather than cash or stock into our analyses, therefore the total fraction of cash and stock should be approximately 100%.

composition of the SDC M&A sample. Variable definitions and data sources are described in Appendix 1.

2.2 Descriptive Statistics

We report the year and industry distributions of M&A transactions during the period 1990-2016 in Panel A and B of Table 1, respectively. Panel A shows that the number of transactions increases gradually for the period 1995-2000. It then drops from 402 transactions in 2000 to 223 transactions in 2001. The number of transactions then recovers between 2001 and 2006, but drops significantly again for the period 2007-2009 due to the Great Recession before increasing again. The patterns of the annual distribution are similar to the distribution of public M&A transactions documented in the existing literature (e.g., Eckbo et al., 2018). Overall, 23% of deals chooses all-stock payments, 60% of deals chooses all-cash payments, and 17% of deals chooses a mixture of cash and stock payments. Panel B shows that M&A activities are concentrated in several industries. The Business Services industry has the highest number of transactions, at 1679. This is followed by the Electronic & Other Electric Equipment and the Instruments & Related Products industry with 472 and 392 transactions, respectively. The three industries with the highest fraction of stock as the choice of payment are Business service (33.2%), Electronic & Other Electric Equipment (32.8%), and Miscellaneous Retail (29.3%).

[Insert Table 1 here]

Table 2 presents the fraction of stock as the method of payment in M&A transactions announced by VC-backed and non-VC-backed targets across time periods between 1990 and 2016. We split our sample into different time periods, 1990-1995, 1996-2000, 2001-2005, 2006-2010, and 2011-2016. We then generate the average ratio of stock for the group of VC-backed and non-VC-backed transactions in each period and summarize mean differences in Table 2. As shown, the mean of stock ratio for all VC-backed targets is 40%, which is significantly larger than that of non-VC-backed targets at 29.5%. In particular, the overall difference of 10.5% is statistically significant at 1%. For the period 1990-1995, 1996-2000, and 2001-2005, the mean difference is large at 37.9%, 37.9%, and 16.8%, respectively. The later gaps become smaller, 4.8% and 4.0% for the period 2006-2010 and 2011-2016, but they are still statistically significant at 5%. In Figure 2, although the average stock ratio declines over time for both VC-backed and non-VC-backed targets, there is a persistent gap throughout the period, suggesting that VC-backed targets hold more acquirer stock than non-VC-backed targets.

[Insert Table 2 here]

[Insert Figure 1 here]

Table 3 presents summary statistics for deal and acquirer characteristics. We report the mean, median, and standard deviation of each variable for the full sample, the subsample of all-stock offers, and the subsample of all-cash offers. The full sample includes 5972 transactions of which 1393 (23%) are all-stock deals, 3570 (60%) are all-cash deals, and the remaining 1009 transactions (17%) are mixed between cash and stock. On average, 13.9% of the targets in our sample are VC-backed i.e., they receive at least one investment from VCs before the announcement date. 18.3% of targets are VC-backed in the sample of all-stock offers, while only 12.3 % of targets in all-cash offers are VC-backed. The mean difference of 6% is statistically significant at the 1% level, consistent with our prediction that VC-backed targets are more likely to choose stock as the method of payment.

[Insert Table 3 here]

In terms of acquirer characteristics, the mean acquirer size is 6.106 for the whole sample, which is greater than the mean for all-stock transactions (5.332) but smaller than the mean for all-cash transactions (6.589). We observe a statistically significant difference between acquirer size in all-stock offers and all-cash offers, consistent with the view of low expected bankruptcy and flotation costs in large firms (Faccio and Masulis, 2005). *TOBIN_Q* (measured as the ratio between the market value of assets and the book value of assets) in the entire sample, has a mean of 2.827 and a median of 1.933. The mean of *TOBIN_Q* in all-stock offers equals 4.649, which is significantly higher than that of 2.151 in all-cash offers, indicating a positive effect of bidder investment opportunities on the choice of stock payment, as in Jung et al., (1996) and Faccio and Masulis (2005). Acquirers have stock price runup (*RUNUP*) of -0.1% on average with a large standard deviation of 60.9%. They also experience a price runup of 4.4% and -2.8% in all-stock and all-cash offer, respectively. The mean difference of *RUNUP* of 7.2% is statistically significant at 5%, suggesting that a higher stock runup leads to greater likelihood of all-stock offers. This evidence is consistent with the previous findings that overvalued acquirers are more likely to choose stock as the method of payment (Jensen, 2005; Myers and Majluf, 1984). Acquirers that face difficulties to raise for the financing for transactions, i.e., low liquidity and high leverage, tend to issue stocks. However, we document that the acquirer's liquidity is higher in all-stock offers, while its leverage is lower. The acquirer's investment, *INVESTMENT*, (measured as

CAPEX scaled by total assets) equals 0.055 on average for the whole sample. Meanwhile, the average investment is 0.063 in all-stock offers, which is significantly larger than that in all-cash offers. Overall, Table 3 indicates that all-stock deals have a higher ratio of VC backing, acquirer Tobin's Q, liquidity, investment, and stock run-up than all-cash deals. However, acquirers with all-stock offers tend to have lower total assets, leverage, and return on total assets than those with all-cash offers. We also observe that all-stock offers have lower transaction size, higher relatedness (the similarity between the main businesses of target and acquirer), and higher ratio of similar location than all-cash offers.

3. Main Empirical Results

3.1 Venture Capital and Methods of Payment.

In this section, we employ multiple models to examine the relationship between VC backing and the method of payment in M&As. First, we employ the linear probability model (as in De La Bruslerie (2013)) to examine if the presence of VC investment in the target can explain its payment decision.[4]

$$STOCK\_D_{i,t} = \alpha + \beta VC\_BACKED_{i,t} + \gamma X_{i,t-1} + \delta Z_{i,t} + n_j + v_t + \varepsilon_{i,t} \quad (1)$$

where the dependent variable, *STOCK_D*, is an indicator that takes value of one if the method of payment is all-stock, and zero otherwise. The main independent variable, *VC_BACKED*, equals one if the target is VC-backed, and zero otherwise. We follow the existing literature on M&As to control for acquirer characteristics ($X_{i,t-1}$) that determine the choice of payment, including *LN_AT*, *TOBIN_Q*, *LIQUIDITY*, *LEVERAGE*, *ROA*, and *INVESTMENT* (Eckbo et al., 2018; Faccio and Masulis, 2005; Heron and Lie, 2002). These firm characteristics are measured at the end of the fiscal year immediately prior the announcement date. We further control for deal characteristics ($Z_{i,t}$) that have been identified as the determinants of the methods of payment, including *RELATED*, *DEAL_SIZE*, and *LOCATION* (Eckbo et al., 2018; Boone et al., 2014; Harford et al., 2009; Faccio and Masulis, 2005; Martin, 1996; Hansen, 1987). We include industry and year fixed effects in Equation (1). The standard errors are robust to heteroskedasticity.

Second, we follow Eckbo et al., (2018) and use the multi-nominal probit model to examine the impact of VC-backing on the choice of payment. This model allows us to capture the effects

[4] We avoid to use the probit model because the inclusion of many dummies in a non-linear model can lead to biased and inconsistent estimates (Greene, 2004)

of firm-deal characteristics on the likelihood of all-stock offers and compare them with the remaining all-cash and mixed offers. We specify all-cash offers as the based outcome and report regression results in Table 4. We control for the same firm-deal characteristics as in Equation (1).

Table 4 reports the regression results. The result of the linear regression is presented in Column (1). The coefficient of *VC_BACKED* is positive and statistically significant at the 1% level, indicating that targets with the presence of VC-backing will increase the likelihood of all-stock offers by 6.4%, *ceteris paribus*. This evidence is consistent with the value-added hypothesis that VC-backed targets prefer holding acquirer shares. Bernstein et al. (2016) document the monitoring role of VCs in the portfolio companies as their involvement increase the companies' innovation and success. Eckbo et al., (2018) find that bidders use more stock as the method of payment when targets have more information to monitor bidders. Similarly, VCs choose stock offers and use their broad information network to monitor and advise the acquirer, which will improve the acquirer's future value. Additionally, VC-backed targets can form block-holders in the acquiring firm if they choose shares as the major payment method. This may raise the level of VC monitoring in the acquiring firm, as stated in the literature of acquisitions of private firms (e.g., Slovin et al., 2005). Consistent with prior literature, the results in Column (1) and (2) show that *LN_AT*, *LEVERAGE*, *ROA*, and *RELATED* have a negative impact on the likelihood of all-stock offers, while *TOBIN_Q*, *INVESTMENT*, *TRANSACTION*, and *LOCATION* show positive effects.

[Insert Table 4 here]

The multi-nominal probit estimation is presented in Column (2) to (3), Table 4. We show the probability of an acquisition choosing an all-stock payment or a mixed payment of stocks and cash instead of an all-cash payment. We find that the coefficient of *VC_BACKED* in Column (2) is positive and statistically significant at the 1% level, suggesting that VC-backed targets tend to choose all-stock offers relative to all-cash offers. However, *VC_BACKED* is positive but not statistically significant in Column (3). This evidence shows that VC-backed targets may not have a clear preference between mixed payments and all-cash payments.

As the payment is made as a continuum between 0% and 100% stock, we re-examine the relation between *VC_BACKED* and the fraction of stock as the method of payment *(STOCK_R*). We estimate the following model:

$$STOCK\_R_{i,t} = \alpha + \beta VC\_BACKED_{i,t} + \gamma X_{i,t-1} + \delta Z_{i,t} + n_j + v_t + \varepsilon_{i,t} \quad (2)$$

Similar to Equation (1), we also control for firm and deal characteristics. Column (1) Table 5 reports OLS estimation results. In addition, the fraction of stock is truncated at 0% and 100%, and this truncation will lead to biased estimates in Equation (2) when using OLS estimation. Indeed, there is a large fraction of transactions that are financed with all stock or all cash, which could aggravate the truncation problem. Therefore, we will analyze the effect of VC backing on the fraction of stock using a Tobit regression as in Eckbo et al., (2018). The Tobit estimation results are shown in Column (2), Table 5. The evidence in Column (1) shows that the coefficient of *VC_BACKED* is positive and statistically significant at the 1% level, suggesting that the stock ratio increases by 7.9% when targets are VC-backed, *ceteris paribus*. Tobit regression results in Column (2) also show a positive sign of *VC_BACKED*, but the economic significance is larger than that in the OLS estimation output in Column (1). Overall, the evidence supports our prediction that VC-backed targets prefer stock as the method of payment.

[Insert Table 5 here]

3.2 Venture Capital, Acquirer Characteristics, and Methods of Payment

We are interested in exploring how acquirer characteristics affect VCs' preference to hold acquirer stock in mergers and acquisitions. Previous studies show that VCs normally allocate their capital to early-staged companies, companies with high R&D investment, or high level of risk (e.g., Chaplinsky and Gupta-Mukherjee, 2016; Guo and Jiang, 2013). We argue that VCs may select acquirers that meet their investment preference as they decide to be a shareholder that adds value to the acquirers during the post-acquisition period. Therefore, the ratio of stock payment is likely to increase when acquiring firms are small, young and risky, and have a high level of capital investment.

We use the natural logarithm of total assets to proxy for the acquirer's size. We employ the ratio of total debts, the ratio of long-term debts (*LT_DEBT*), and the volatility of stock returns before the transaction announcement (*RET_VO*) to proxy for risk. We also measure the acquirer's age, *FIRM_AGE*, as the number of years the acquirer has been listed since its IPO date. Then, we employ linear regressions to investigate the impact of VC-backing on the fraction of stock conditional on acquirer characteristics. We similarly control for firm and deal characteristics, and the industry and year fixed effects as in Equation (1).

Table 6 reports the regression results. We find that *VC_BACKED* is positive and statistically significant in all specifications, supporting our prediction that VC-backed targets prefer stock as

the method of payment. In addition, the coefficient of *VC_BACKED*LN_AT* is negative and statistically significant in Column (1), indicating that VC-backed targets accept more shares when the acquirer is a small-listed firm. In Column (2), the coefficient of *VC_BACKED*FIRM_AGE* is also negative, at -0.009 and statistically significant at 1% level, suggesting that the effect of VC-backing on the fraction of stock is 0.9% lower when the acquirer's age increases one. The effect of acquirer's age, *FIRM_AGE*, on the fraction of stock is positive but statistically significant.

[Insert Table 6 here]

The results in Columns (3), (4), and (5) explore the preference of VC-backed targets on the holding of shares of risky acquirers. Specifically, in Columns (3) and (4), the coefficients of *VC_BACKED*LEVERAGE* and *VC_BACKED*LT_DEBT* are both positive and statistically significant at 5%, suggesting that the higher the level of debt in the acquirer, the stronger the effect of VC-backing on the ratio of stock payment. Moreover, in Column (5), the positive coefficient of *VC_BACKED*RET_VO* indicates that VC-backed targets tend to hold more shares of risky acquirers as compared to other acquirers. The coefficient of *RET_VO* is positive at 0.086 and statistically significant at 1% which implies that VCs hold more shares of the acquirer when its volatility of stock returns prior to the announcement is high. Lastly, Column (6) shows that VC-backed targets are interested in the shares of acquirers with a high level of investment. In particular, we find that the coefficient of *VC_BACKED*INVESTMENT* equals 0.862 and is statistically significant at 1%. Overall, Table 6 supports the view that VCs accept more stock when the acquirers meet their investment preference, i.e., when the acquirers are small, young, and risky, and when the acquirers invest intensively.

3.3 Venture Capital Characteristics and Methods of Payment

We further analyze the relationship between different types of venture capital and the choice of payment. There are several types of VC firms, such as private equity (*PE*), corporate venture capital (*CVC*), bank-affiliated (*BANK_AFF*), and investment management firms (*IMF*). Each type of VC firm has different objectives, fund capacity, and investment ability. For instance, CVCs are subsidiaries of large corporations that often invest in entrepreneurial firms to realize strategic benefits instead of financial benefits. However, PEs seek financial investment returns when allocating their capital (Cumming et al., 2017; Andrieu and Groh, 2012; Dushnitsky and Lenox, 2006; Gompers and Lerner, 2000). We argue that PEs are more likely to choose stock as the method of payment because they can realize larger returns through holding shares and delivering

value-added support to the acquirer during the post-acquisition period, while CVCs may be interested in cash payments to reinvest in new innovative strategies.

To examine our conjecture, we explore how VC types affect the method of payment. Table 7, Panel A, provides the regression of all-stock payment indicator and fraction of stock on the types of VCs. We identify the VC types based on data from the VentureXpert. We construct binary variables indicating if the VC type is private equity (*PE*), corporate venture capital (*CVC*), bank-affiliated (*BANK_AFF*), or investment management (*IMF*). *OTHER_VC1* (*OTHER_VC2*) indicate the remaining types of VCs when the list of VC types included (does not include) the indicator of investment management firm (*IMF*), respectively.

[Insert Table 7 here]

The results in Column (1) and (2), Panel A, indicate that the coefficient of *PE* is positive and statistically significant at the 1% level, suggesting that the likelihood of all-stock payment increases by 6.2% when the target is backed by a private equity VC. This finding is consistent with the view that private equity firms are interested in holding shares of acquirers. We find similar results when the fraction of stock, *STOCK_R*, is the dependent variable in Columns (3) and (4). The fraction of stock held by PE-backed targets is 7.9% and 7.8% larger relative to non-VC-backed targets, respectively. However, we do not document strong evidence on the relationship between *CVC* and the method of payment. The coefficient of *CVC* in all specifications is positive but statistically insignificant. Meanwhile, bank-affiliated VCs increase the likelihood of all-stock payment by 11.5% as shown in Columns (1) and (2). They also increase the ratio of stock by 11.9% and 11.8% in Columns (3) and (4), respectively. *IMF* is negative and statistically significant at 1% as shown in Column (2), suggesting that IMF-backed targets are unlikely to accept 100% stock as the method of payment. The effect of *IMF* remains negative in Column (4) when *STOCK_R* is the dependent variable, but it becomes statistically insignificant.

We proceed to analyze the relationship between VC syndication, VC reputation, and the method of payment. Existing studies suggest that VC syndicates provide better monitoring and advising services than individual VCs, and they contribute more value to portfolio firms (Bayar, et al., 2019; Brander, et al., 2002; Filatotchev, et al., 2006; Lerner, 1994b; Tian, 2012). According to this view, targets backed by a syndicate of VCs tend to accept a higher ratio of stock payment in M&As since they are more confident and more capable in providing value-added support to the acquirer. Similarly, reputable VCs tend to hold more shares of the acquirer as they have superior

monitoring and advising skills (Krishnan, et al., 2011; Nahata, 2008). Therefore, we predict that the ratio of stock payment is positively related to the reputation of VCs in the target.

We construct measurements for VC syndication and VC reputation. Specifically, we define *VC_SYN* as a binary variable equal to one if the target is backed by more than one VC, and zero otherwise. *VC_REP* is a continuous measurement of VC reputation; it is the average IPO capitalization share of lead VCs (Nahata, 2008). The IPO share is measured as the relative cumulative market capitalization of IPOs backed by VCs, and the lead VCs are VCs that have the largest investment in the target. Panel B of Table 7 reports regression results of the choice of payment on VC syndication and reputation. The coefficient of *VC_SYN* in Column (1) is positive and statistically significant at 1%, suggesting that syndicate-backed targets prefer stock as the method of payment relative to individual-backed targets. In particular, the probability of all-stock offers increases by 9.4% when the target is syndicate-backed, *ceteris paribus*. Consistently, the linear regression results of the stock ratio on syndication in Column (3) show that syndicate-backed targets receive 9.2% more stock than individual-backed targets. Meanwhile, *VC_REP* in Model (2) is positive but statistically insignificant. However, the coefficient of *VC_REP* equals 0.011 and it is statistically significant at 5% in Column (4) when the fraction of stock is the dependent variable, suggesting that reputable VCs accept a larger fraction of stock as the method of payment than other VCs. Overall, the results in Table 7 show that PEs, reputable VCs, and VC syndicates prefer stock payment, consistent with the value-added hypothesis.

3.4 *Venture Capital, Fund Maturity, and Methods of Payment*

We further examine how fund maturity affects the method of payment in M&A transactions. According to Gompers and Lerner (1996), the major structure of VCs had been limited partnership with a typical life span of 10 years (which may be extended by 1 to 3 years). This fixed maturity feature is to eliminate the conflict of interest between the general partnership and limited partnerships (Kandel et al., 2011). Existing studies show that VC funds' limited horizon can affect their investment and exit decisions (Kandel et. al., 2011; Masulis and Nahata, 2011; Barrot, 2017). For example, Barrot (2017) finds that when VC funds get closer to the end of their investment horizon, VC managers tend to select more mature assets. Masulis and Nahata (2011) show that when VC funds reach maturity, they are often under liquidation pressure and need to exit their investments, implying that they might be impatient to complete acquisitions and sell the targets at undervalued price. This evidence suggests that when VC funds approach the end of their investment horizon, VCs are more likely to choose cash as the method of payment instead of

continuing their investment in the acquiring firm by holding its shares. We run the following regressions to examine how fund maturity affects the method of payment:

$$STOCK\_D/R = \alpha + \beta_1 LOW\_FAGE_{i,t} + \beta_2 \beta HIGH\_FAGE_{i,t} + \gamma X_{i,t-1} + \delta Z_{i,t} + n_j + v_t + \varepsilon_{i,t} \quad (3)$$

$$STOCK\_D/R = \alpha + \beta_1 PCT\_EARLY + \gamma X_{i,t-1} + \delta Z_{i,t} + n_j + v_t + \varepsilon_{i,t} \quad (4)$$

In Equation (3) and (4), we use both all-stock offer indicator and fraction of stock as the dependent variables. *STOCK_D* is a dummy variable that equals one if the transaction is 100% financed with stock, and zero otherwise. We also use *STOCK_R* as an alternative dependent variable measuring the fraction of stock used as the method of payment. Following Barrot (2017), we consider the fund's age and the percentage of early-stage funds that invest in the targets prior to the announcement date as proxies for fund maturity. Specifically, the main independent variable *LOW_FAGE (HIGH_FAGE)* that is employed in Columns (1) and (2) of Table 8 is a binary variable equal to one if the average age of VC funds investing in the target is below (above) the median, and zero otherwise. The main independent variable in Columns (3) and (4), Table 8, *PCT_EARLY*, is the percentage of early-stage funds in the target. The other control variables are defined in Appendix 1. Noted that when estimating Equation (3), we use the full sample of transactions with available information of fund maturity, while we use a subsample of transactions with VC-backed targets in Equation (4). As we predict that young funds prefer stock as the method of payment and established funds prefer cash, β_1 is expected to be positive and larger than β_2 in Equation (3). Also, we predict that targets with more early-stage funds prefer stock as the method of payment so β_1 in Equation (4) is expected to be positive and statistically significant.

[Insert Table 8 here]

Table 8 presents the regression results. The coefficient of *LOW_FAGE* is positive and statistically significant at the 1% level in Column (1), suggesting that targets with young funds favor all-stock payment. The coefficient of *HIGH_FAGE* is also positive and statistically significant at the 5% level in Column (1), but it is significantly smaller than the coefficient of *LOW_FAGE*. This difference between the coefficients of *LOW_FAGE* and *HIGH_FAGE* is positive and statistically significant at the 5% level, supporting our prediction that targets with young funds are more likely to choose all-stock payment than targets with mature funds, relative to targets that do not receive VC funding. We also find similar results in Column (2) when the fraction of stock payment, *STOCK_R*, is employed as the dependent variable. In Columns (3) and

(4), we find that the coefficients of *PCT_EARLY* are all positive and statistically significant at the 1% level, indicating that targets with more funds in early-stage favor stock as the method of payment. Collectively, these findings suggest that fund maturity partially explains the preference of stock as the method of payment in M&A transactions.

3.5. Venture Capital, Methods of Payment, and Acquirer Performance

In the acquisition of private firms, the stock offers often lead to a formation of block-holders in the acquirer (e.g., Dunne et al., 2010; Huang et al., 2016; Masulis et al., 2007). These new block-holders will monitor, advise, and increase the acquirer's value. In the context of venture-backed IPOs, VCs impact the management of newly created firms through holding of the firms' shares (Jain, 2001; Krishnan et al., 2011). Similarly, in the acquisitions of VC-backed targets, it is likely that VCs keep holding acquirer shares and provide value-added support to the acquirer. And stock payment will be an important channel through which VCs to continue to monitor and advise the acquirer in both the short-term and the long-term. In this section, we investigate how the method of payment affects the relationship between VC-backing and the acquirer's performance. We first estimate the following equation:

$$ACAR(-5,5) = \alpha + \beta VC\_BACKED_{i,t} + \lambda_1 VC\_BACKED_{i,t} * STOCK\_D_{i,t} + \lambda_2 VC\_BACKED_{i,t} * CASH\_D_{i,t} + \gamma X_{i,t-1} + \delta Z_{i,t} + n_j + v_t + \varepsilon_{i,t} \quad (5)$$

The dependent variable, *ACAR(-5, 5)*, is measured as the cumulative abnormal returns during the period (-5, 5), given 0 is the announcement date. We use *ACAR(-5, 5)* as the proxy for the acquirer's short-term performance. The main independent variable, *VC_BACKED*, is a dummy variable that takes a value of one if a target VC-backed, and zero otherwise. *STOCK_D (CASH_D)* is a binary variable indicating all-stock (all-cash) payment. We use the same set of control variables as in Equation (1). According to our prediction, all-stock offers are good for acquirers when targets are VC-backed, suggesting that λ_1 should be positive and statistically significant.

[Insert Table 9 here]

Table 9, Column (2), reports the estimation results of Equation (5)[5]. We first exclude interaction terms and show the estimation output in Column (1). As shown, the effect of VC-

[5] We generate the variance inflation factor (VIF) of independent variables for each regression model and present the highest VIF values in Table 9. These VIF values indicate that multicollinearity is not a serious issue in our regression analyses because they are all are below the threshold value of 10 as suggested by Hair et al., (2009).

backing on the acquirer's announcement returns is negative and statistically insignificant. In Column (2), the coefficient of *VC_BACKED* is negative and statistically significant at 5% level, suggesting that VC backing reduces the acquirer's CAR by 2.8% when both *STOCK_D* and *CASH_D* equal zero. In addition, the coefficient of *STOCK_D*VC_BACKED* is positive and statistically significant at the 5% level in Column (2), suggesting that that the acquirer's announcement returns increase 3.4% if VC-backed targets choose all-stock payment. To affirm our results, In Column (3) we exclude *CASH_D*VC_BACKED* and *CASH_D* from Equation (5), and find that that the coefficient of *VC_BACKED* is negative at -1.4% and statistically significant at 5%, while the interaction term, *STOCK_D*VC_BACKED*, remains positive at 2% and statistically significant at 10%, emphasizing the joint positive impact of all-stock payment and VC-backing on the acquirer's short-term performance. In Column (4), we exclude *STOCK_D*VC_BACKED* and *STOCK_D* from Equation (5), we find no significant evidence for the effect of VC-backing and its conditional effect on the payment of all cash. Specifically, the coefficient of *CASH_D*VC_BACKED* and *CASH_D* are small, negative and statistically insignificant in Column (4). Overall, the empirical evidence shows that the acquirer's short-term performance is larger when VC-backed targets select all-stock payment.

Then, we examine the acquirer's long-term performance after purchasing the target. We adopt a calendar time methodology that has been widely used in previous literature to measure the acquirer's long-term abnormal returns following an acquisition announcement. Following Peyer and Vermaelen (2009), we estimate monthly abnormal returns by constructing calendar time equally-weighted portfolios and using a variety of models including the five-factor model (Fama and French, 2015), six-factor model (Carhart, 1997), seven-factor model (Pástor and Stambaugh, 2003), and the seven-factor model minus HML. These models are presented as follows:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_1 MKTRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + e_t \quad (6)$$

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_1 MKTRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 UMD_t + e_t \quad (7)$$

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_1 MKTRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 UMD_t + \beta_7 LIQ_t + e_t \quad (8)$$

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_1 MKTRF_t + \beta_2 SMB_t + \beta_3 RMW_t + \beta_4 CMA_t + \beta_6 UMD_t + e_t \quad (9)$$

Where:

The dependent variable ($R_{p,t} - R_{f,t}$) is the portfolio's monthly excess return. The independent variables include: α: The average monthly abnormal returns; *MKTRF*: The excess return on the

market portfolio; *SMB*: The difference in return between small and large market capitalization stock portfolios; *HML*: The difference in return between high book to market and low book to market stock portfolios; *RMW*: The difference in return between a diversified portfolio of stock with robust profitability and one with weak profitability; *CMA*: The difference in return between high and low investment stock portfolios; *LIQ*: The liquidity factor; and *UMD*: the momentum factor.

[Insert Table 10 here]

At the beginning of each month after M&A announcements, acquirers are assigned into a portfolio of VC-backed targets with all-stock payment and a portfolio of the remaining targets for 36, 48, and 60 months. Using the weighted least square method, we report the long-term abnormal returns (α) following M&A announcements for the subsamples partitioned based on whether acquirers buy VC-backed targets and offer 100% stock or purchase other targets in Table 10. We find consistent evidence of positive average monthly abnormal returns over 36, 48, and 60 calendar months after the M&A announcements for acquirers buying VC-backed targets with all-stock payment. Meanwhile, we do not find strong evidence supporting the positive long-term performance of the acquirers in the acquisitions of other targets. Specifically, α values for the acquirers of other targets are generally economically small and statistically insignificant across model specifications. Collectively, the findings document in this section are consistent with our prediction that VC-backing is positively associated to the acquirer's performance in the short-term and the long-term.

4. Robustness checks

4.1 Adjustment for Self-Selection by Heckman Procedure

From our baseline findings, we generally conclude that VC-backed targets prefer stock as the method of payment. However, the analyses may contain a potential selection bias because VCs do not choose to invest in private targets at random, but rather base their selection on certain characteristics of the target firms. The presence of unobserved variables determining whether targets are VC-backed which correlate with the factors determining the method of payment will lead to a specification error of the baseline regressions.

We employ Heckman (1979)'s two-step correction procedure to address the concern of omitted variables and understand to what extent the self-selection may affect our baseline results. In the first stage of the Heckman procedure, we estimate a probit regression of whether targets are

VC-backed and generate the inverse Mills ratio *(IMR)*. We follow Masulis and Nahata (2011) and use the following variables as the instruments in the first stage: *H_TECH, F_STATES, AG_IPO_PROC, and AG_VC_INVEST*. *H_TECH* is a binary indicator which equals one if the target operates in a high-tech industry, and zero otherwise. *F_STATES* equals one if the state location of the target is California, Massachusetts, New York, or Texas, and zero otherwise. We construct *AG_IPO_PROC* as the total of the proceeds of all IPOs with issue dates within 90 days before the announcement date. *AG_VC_INVEST* is the total of VC investments in the industry over the period of 3 months prior to the acquisition announcement. We then calculate *IMR* and include it in the second-stage regression.

$First\ Stage\ (Probit)$:

$$Prob(VC\_BACKED) = \alpha_o + \beta_1 H\_TECH + \beta_2 F\_STATES + \beta_3\ AG\_IPO\_PROC + \beta_4\ AG\_VC\_INVEST + \gamma\ Control\ variables + \varepsilon \quad (10)$$

$Second\ Stage\ (Linear\ regressions)$:

$$STOCK\_D/\_R = \alpha_1 + \delta_1\ VC\_BACKED + \theta\ Control\ variables + \vartheta_1\ IMR + \eta \quad (11)$$

[Insert Table 11 here]

We report the estimation results in Table 11. The probit estimation of Equation (10) is presented in Column (1) of Table 11. It shows that targets operating in high-tech industries tend to receive investments from VCs. The coefficient of *H_TECH* of 0.438 is positive and statistically significant at 1%. Targets located in hot VC investment states are also more likely to obtain VC investments than other targets. Specifically, the coefficient of *F_STATES* is equal to 0.367 and statistically significant at 1%. In addition, the coefficient of *AG_VC_INVEST* is positive at 0.03 and statistically consistent at 5%, suggesting that the total VC investments in the target industry prior to the transaction is positively related to the probability that the target is VC-backed. The coefficient of *AG_IPO_PROC*, however, is not statistically significant, providing no supportive evidence for the argument that VCs are more likely to invest in private firms when conditions of the IPO market are positive (Lerner, 1994a).

From the estimation of Equation (10), we compute *IMR*. The linear probability model estimation of all-stock payments is reported in Column (2) of Table 11, while the linear regression of the ratio of stock is shown in Column (3). The coefficient of *IMR* is negative and statistically significant at 1%, suggesting that without the correction, the estimate of *VC_BACKED* in the

baseline regressions would have been downward-biased. The coefficients of *VC_BACKED* in Column (2) and (3) Table 11 equal 0.075 and 0.084, respectively, which are larger than those reported in Column (1) of Tables 4 and 5, respectively. Overall, the evidence supports the positive association between VC-backing and stock payment in M&As, even after controlling for self-selection bias.

4.2 Propensity Score Matching, Deal Size Matching, and VC Information Bridge Building

4.2.1 Propensity Score Matching

In Section 4.1, we apply the Heckman two-step procedure to correct possible self-selection bias and confirm that the self-selection does affect our baseline results. However, the findings that VC-backed targets prefer stock as the method of payment in M&A transactions remains valid. In this section, we employ propensity score matching methods (Rosenbaum and Rubi, 1983) in an alternative approach to examine whether our results are driven by the differences of firm-deal characteristics between VC-backed and non-VC-backed targets. Specifically, we construct a matched sample using propensity scores and re-estimate our baseline models while accounting for potential errors generated by the selection process (VC's preferences for a particular target). Eckbo (2007) notes that matching models rely on a fundamentally different set of assumptions compared to selection models (as in Section 4.1).

We generate propensity scores using the same set of variables in Column (1) of Table 4. Then, we perform one-on-one nearest neighbor matching and create a new sample of "matched pairs" that identifies pairs of most-similar VC-backed and non-VC-backed targets. We report analysis results using the matched sample in Columns (1) and (2) of Table 12. Overall, the coefficients of *VC_BACKED* remain positive and statistically significant in all specifications, supporting our prediction that VC-backed targets prefer stock as the method of payment. We also observe that propensity score matching enlarges the effect of VC-backing. Specifically, Columns (1) and (2) show that the probability of all-stock offers increases by 8.4% and the fraction of stock increases by 9% when the target is VC-backed, *ceteris paribus*.

[Insert Table 12 here]

4.2.2 Deal Size Matching

In addition to propensity score matching, we create a matched sample based on target industry and transaction value. Specifically, for each VC-backed target, we search for all non-VC-backed

targets in the same industry (defined by the first 2 digits of SIC codes) and announcement year, and then select the matched transaction that has the nearest transaction value. We re-estimate our baseline regressions using the asset-matched sample and report results in Columns (3) and (4) of Table 12. As shown, the coefficient of *VC_BACKED* is positive and statistically significant in both models, supporting our hypothesis that VC-backed targets prefer stock as the method of payment. Overall, the baseline results are consistent with our prediction even after we use different methods and criteria to generate matched samples.

4.2.3 A Sample of Non-VC-backed Acquirers

The M&A literature shows that targets are unlikely to accept stock offers if the acquirer's shares are overvalued. Gompers and Xuan (2009) suggest that a shared VC between the target and the acquirer can help reduce the uncertainty of the acquirer's valuation, and as a result, the target tends to accept more shares of the acquirer. Unfortunately, such information bridge-building could cause bias in our main findings because some VCs invest in the target can also be an investor in the acquiring firm. Indeed, we are unclear whether the positive association between VC-backing and stock payment is because of the reduced information asymmetry on the acquirer side through shared VCs or because of VCs' genuine interests in holding the acquirer's shares during the post-acquisition period.

To eliminate this potential bias, we construct a new sample of transactions with only non-VC-backed acquirers. Specifically, we drop all transactions that are defined as *"VC Company Acquired VC Company"* and *"VC Fund Acquired VC Company"*. As a result, 148 transactions are excluded from our main sample. Then, we replicate our analyses in Tables (3) and (4) and report results in Columns (5) and (6) of Table 12. Overall, the coefficients of *VC_BACKED* are slightly smaller but remain statistically significant at 1%, suggesting that VC-backed targets still prefer stock payments even after controlling for information sharing.

4.3 Stock Market Run-up, Acquirer Misvaluation, and Target Quality

The existing M&A literature documents robust evidence that stock-financed transactions are largely motivated by the overvaluation of the acquirer's shares (Myers and Majluf, 1984; Shleifer and Vishny, 2003; Faccio and Masulis, 2005; Eckbo et al., 2018). When paying with overvalued shares, it is believed that the acquirers are paying "less" for the transaction as compared to cash, hence a greater motivation to pay with stocks. Indeed, from the summary statistics in Table 3, there is a large stock price run-up in transactions with all-stock payment, suggesting that acquirers may have offered stock because they believe their stock is overvalued. Furthermore, since high-quality

firms are more likely to exit through IPO instead of M&A (Chemmanur, et al., 2018), VC-backed firms that exit through M&As may not have a strong bargaining position relative to other private firms (non-VC-backed) because of low quality. This suggests that VC-backed firms may be unable to exit their investments with cash and must accept the acquirers' overvalued stocks. Hence, there is a concern that the acquirer's stock overvaluation may have driven the baseline results and affected the method of payment.

We address this concern using two different approaches. First, we control for the acquirer's stock price run-up which is measured by the acquirer's cumulative abnormal returns during the period of -210 and -10 (*RUNUP)* and carry out our baseline analyses in Internet Appendix Table IA1, Columns (1) and (3). As shown, the coefficient of *RUNUP* is positive but statistically insignificant, suggesting that stock price run-up is not associated with the choice of stock payment. In Columns (2) and (4), we further control for the interaction between *VC-BACKED* and *RUNUP* to examine whether relationship between VC backing and stock payment can be explained by the acquirer's stock price run-up. We find that the effect of VC backing on the likelihood of all-stock payments and the fraction of stock is positive and statistically significant at 1%, while the interaction term, *VC_BACKED*RUNRUP*, is statistically insignificant in both specifications, suggesting that the acquirer's overvaluation does not drive the baseline results.

Second, we directly quantify the acquirers' misvaluation by following the approach of Rhodes-Kropf, Robinson, and Viswanathan (2005, hereafter RRV) since our sample contains only listed acquirers. The RRV method is summarized in Internet Appendix IA1. We divide the acquirer's misvaluation into quartiles and conduct our baseline analyses for the top and bottom quartiles. The regression results are reported in Internet Appendix Table IA2. The regression results of *STOCK_D* are shown in Column (1) and (2), Table IA2. Although the coefficients of *VC_BACKED* are positive and statistically significant at 5% and 1%, respectively, the effect in Column (1) using the subsample of the top quartile of misvaluation is smaller than it is in Column (2). This evidence suggests that the probability VC-backed targets accept all-stock offers is lower when the acquirers have higher misvaluation, i.e., the effect is 5.7% in Column (1) and 8.1% in Column (2). We find similar evidence when we analyse the fraction of stock using the subsample of the top and bottom quartiles of misvaluation. Specifically, the effect of *VC_BACKED* on *STOCK_R* is 7.2% and 11% in Columns (3) and (4), respectively. Overall, the effect of *VC_BACKED* is positive and economically significant in all columns, suggesting that acquirer

overvaluation does not explain completely the relationship between VC backing and stock payment in M&A transactions.

Finally, we examine the hypothesis that VC-backed targets are of low quality and may have to accept the offer of overvalued shares from the acquirers due to low bargaining power. Since all targets in our sample are private, the information on stock price and offer price is unavailable. However, we can compare the average sales multiple between all-stock offers and other offers in the subsample of transactions with VC-backed or non-VC-backed targets to examine whether low-quality targets are more likely to receive stock offers. We define sales multiple as the ratio between the transaction value and the target's total sales. Using data from SDC M&A, we can observe information on the sales multiple for 1013 transactions. The summary statistics (untabulated) show that in the group of non-VC-backed targets, the average sales multiple for all-stock offers and other offers is 6.12 and 3.25 respectively. Meanwhile, in the group of VC-backed targets, the mean sales multiple for all-stock offers and other offers is 12.58 and 8.77, respectively. Overall, the VC-backed targets that accept all-stock offers are of good quality as they have large sales multiples on average. This evidence shows that targets are unlikely to accept overvalued stocks because they are of low quality and have low bargaining power.

5. Conclusion

We investigate the role of venture capital (VC) in determining the method of payment in M&A transactions. Using a sample of 5972 private mergers and acquisitions during the period 1990-2016. We document robust evidence, for the first time in literature, that stock is the preferred method of payment in M&As when the target is VC-backed. This evidence is more pronounced in transactions with acquirers that are small, young and risky, have large capital investments. In addition, using the SDC's classification of venture capitals, we show that targets backed by independent VCs are more likely to choose stock, while CVC-backed targets are neutral between the choice of stock and cash. Targets with reputable VCs and a syndicate of VCs prefer stock as the method of payment. The empirical evidence also indicate that fund maturity partly explains the relationship between VC-backing and the choice of method of payment. Specifically, targets with VC funds that have low maturity tend to choose stock as the method of payment. Finally, we find that VC-backed targets lead to lower acquirer returns in the short-term, but the effect of VC-backing becomes positive when the targets choose stock offers. Furthermore, the performance of acquirers is positive in the long-term when VC-backed targets choose all-stock offers. Overall, the

empirical evidence supports the value-added hypothesis that VC-backed targets prefer holding shares of the acquirers and contribute to their performance.

References

Andrieu, G., & Groh, A. P. (2012). Entrepreneurs' financing choice between independent and bank-affiliated venture capital firms. *Journal of Corporate Finance*, *18*(5), 1143–1167.

Barrot, J. N. (2017). Investor horizon and the life cycle of innovative firms: Evidence from venture capital. *Management Science*, *63*(9), 3021–3043.

Barry, C. B., Muscarella, C. J., Peavy, J. W., & Vetsuypens, M. R. (1990). The role of venture capital in the creation of public companies: Evidence from the going-public process. *Journal of Financial Economics*, *27*(2), 447–471.

Bayar, O., Chemmanur, T. J., & Tian, X. (2019). Peer monitoring, syndication, and the dynamics of venture capital interactions: Theory and evidence. *Journal of Financial and Quantitative Analysis*, *55*(6), 1875–1914.

Bernstein, S., Giroud, X., & Townsend, R. R. (2016). The impact of venture capital monitoring. *Journal of Finance*, *71*(4), 1591–1622.

Boone, A. L., Lie, E., & Liu, Y. (2014). Time trends and determinants of the method of payment in M&As. *Journal of Corporate Finance*, *27*, 296–304.

Brander, J. A., Amit, R., & Antweiler, W. (2002). Venture-capital syndication: Improved venture selection vs. the value-added hypothesis. *Journal of Economics and Management Strategy*, *11*(3), 423–452.

Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance*, *52*(1), 57–82.

Celikyurt, U., Sevilir, M., & Shivdasani, A. (2014). Venture capitalists on boards of mature public firms. *Review of Financial Studies*, *27*(1), 56–101.

Chang, S. (1998). Takeovers of privately held targets, methods of payment, and bidder returns. *Journal of Finance*, *53*(2), 773–784.

Chaplinsky, S., & Gupta-Mukherjee, S. (2016). Investment risk allocation and the venture capital exit market: Evidence from early stage investing. *Journal of Banking & Finance*, *73*, 38–54.

Chemmanur, T. J., He, J., He, S., & Nandy, D. (2018). Product market characteristics and the choice between IPOs and acquisitions. *Journal of Financial and Quantitative Analysis*, *53*(2), 681–721.

Cumming, D. J., & MacIntosh, J. G. (2003). A cross-country comparison of full and partial venture capital exits. *Journal of Banking & Finance*, *27*(3), 511–548.

Cumming, D., & Johan, S. (2008). Information asymmetries, agency costs and venture capital exit outcomes. *Venture Capital*, *10*(3), 197–231.

Cumming, D. (2008). Contracts and exits in venture capital finance. *Review of Financial Studies*, *21*(5), 1947–1982.

Cumming, D. J., Grilli, L., Murtinu, S. (2017). Governmental and independent venture capital investments in Europe: A firm-level performance analysis, *Journal of Corporate Finance*, 42, 439-459.

De La Bruslerie, H. (2013). Crossing takeover premiums and mix of payment: An empirical test of contractual setting in M&A transactions. *Journal of Banking & Finance*, *37*(6), 2106–2123.

Dunne, P., Feldman, D., Forker, J., Garret, I., & Moore, M. (2010). The sources of value destruction in acquisitions by entrenched managers. *Journal of Financial Economics*, *106*(2), 247–261.

Dushnitsky, G., & Lenox, M. J. (2006). When does corporate venture capital investment create firm value? *Journal of Business Venturing*, 21(6), 753–772.

Eckbo, B. E., Makaew, T., & Thorburn, K. S. (2018). Are stock-financed takeovers opportunistic? *Journal of Financial Economics*, *128(*3), 443–465.

Eckbo, B. E. (2007). Volume 1: Handbook of empirical corporate finance. Elsevier.
Faccio, M., & Masulis, R. W. (2005). The choice of payment method in Dutch mergers and acquisitions. *Journal of Finance*, *60*(3), 1345–1388.
Fama, E., French, K. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, *116*(1), 1–22.
Field, L. C., & Hanka, G. (2001). The expiration of IPO share lockups. *Journal of Finance*, *56*(2), 471–500.
Filatotchev, I., Wright, M., & Arberk, M. (2006). Venture capitalists, syndication and governance in initial public offerings. *Small Business Economics*, *26*(4), 337–350.
Fuller, K., Netter, J., & Stegemoller, M. (2002). What do returns to acquiring firms tell us? evidence from firms that make many acquisitions. *Journal of Finance*, *57*(4), 1763–1793.
Fürth, S., & Rauch, C. (2015). Fare thee well? An analysis of buyout funds' exit strategies. *Financial Management*, *44*(4), 811–849.
Giot, P., & Schwienbacher, A. (2007). IPOs, trade sales and liquidations: Modelling venture capital exits using survival analysis. *Journal of Banking & Finance*, *31*(3), 679–702.
Gompers, P. A., & Lerner, J. (2004). The venture capital cycle, second edition. MIT Press.
Gompers, P., & Lerner, J. (2000). Money chasing deals? The impact of fund inflows on private equity valuation. *Journal of Financial Economics*, *55*(2), 281–325.
Gompers, P., & Lerner, J. (1996). The use of covenants: An empirical analysis of venture partnership agreements. *Journal of Law and Economics*, *39*(2), 463–498.
Gompers, P. A., & Xuan, Y. (2009). Bridge building in venture capital-backed acquisitions. *AFA 2009 San Francisco Meetings Paper*.
Greene, W. (2004). The behaviour of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects. *The Econometrics Journal*, *7*(1), 98–119.
Guo, D., & Jiang, K. (2013). Venture capital investment and the performance of entrepreneurial firms: Evidence from China. *Journal of Corporate Finance*, 22, 375–395.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., (2009). Multivariate Data Analysis. 7th edn. Pearson Prentice Hall, Upper Saddle River, NJ.
Hansen, R. G. (1987). A theory for the choice of exchange medium in mergers and acquisitions. Journal of Business, *60*(1), 75–95.
Harford, J., Klasa, S., & Walcott, N. (2009). Do firms have leverage targets? Evidence from acquisitions. *Journal of Financial Economics*, *93*(1), 1–14.
Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, *31*(1-3), 405–440.
Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153–153.
Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: empirical evidence. *Journal of Finance*, *57*(1), 169–197.
Heron, R., & Lie, E. (2002). Operating performance and the method of payment in takeovers. *Journal of Financial and Quantitative Analysis*, *37*(1), 137–155.
Hochberg, Y. V. (2012). Venture capital and corporate governance in the newly public firm. *Review of Finance*, *16*(2), 429–480.
Hsu, W. H., Owen, S., & Suchard, J. A. (2020). The value of ongoing venture capital investment to newly listed firms. *Accounting & Finance*, *60*(2), 1327–1349.
Huang, P., Officer, M. S., & Powell, R. (2016). Method of payment and risk mitigation in cross-border mergers and acquisitions. *Journal of Corporate Finance, 40, 216–234.*
Iliev, P., & Lowry, M. (2020). Venturing beyond the IPO: Financing of newly public firms by

venture capitalists. *Journal of Finance, 75*(3), 1527–1577.
Jain, B. A. (2001). Predictors of performance of venture capitalist-backed organizations. *Journal of Business Research*, *52*(3), 223–233.
Jensen, M. C. (2005). Agency costs of overvalued equity. *Financial Management*, *34*(1), 5–19.
Jung, K., Kim, Y. C., & Stulz, R. M. (1996). Timing, investment opportunities, managerial discretion, and the security issue decision. *Journal of Financial Economics*, *42*(2), 159–185.
Kandel, E., Leshchinskii, D., & Yuklea, H. (2011). VC funds: Aging brings myopia. *Journal of Financial and Quantitative Analysis*, *46*(2),431–457.
Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, *46*(5), 1295–1333.
Lasfer, M., & Matanova, N. (2013). Why do PE and VC Firms retain ownership after the Initial Public Offering? *Cass Business School Working Paper*.
Lee, P. M. and Wahal, S. (2004). Grandstanding, certification and the underpricing of venture capital backed IPOs, *Journal of Financial Economics, 73*(2), 375–407.
Lerner, J. (1994a). Venture capitalists and the decision to go public. *Journal of Financial Economics*, *35*(3), 293–316.
Lerner, J. (1994b). The syndication of venture capital investments. *Financial Management*, *23*(3), 16–27.
Lerner, J. (1995). Venture capitalists and the oversight of private firms. *Journal of Finance*, *50*(1), 301–318.
Martin, K. J. (1996). The method of payment in corporate acquisitions, investment opportunities, and management ownership. *Journal of Finance, 51*(4), 1227–1246.
Masulis, R. W., & Nahata, R. (2011). Venture capital conflicts of interest: evidence from acquisitions of venture-backed firms. *Journal of Financial and Quantitative Analysis*, *46*(2), 395–430.
Masulis, R. W., Wang, C., & Xie, F. (2007). Corporate governance and acquirer returns. *Journal of Finance*, *62*(4), 1851–1889.
Megginson, W. L., & Weiss, K. A. (1991). Venture capitalist certification in Initial Public Offerings. *Journal of Finance, 46*(3), 879–903.
Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187–221.
Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, *90*(2), 127–151.
Pástor, Ľ., & Stambaugh, R. F. (2003). Liquidity risk and expected stock returns. *Journal of Political Economy*, *111*(3), 642–685.
Peyer, U., & Vermaelen, T. (2009). The nature and persistence of buyback anomalies. *Review of Financial Studies*, *22*(4), 1693–1745.
Rhodes–Kropf, M., Robinson, D., & Viswanathan, S. (2005). Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics, 77*(3), 561–603.
Rosenbaum, P. R., & Rubin, D. B., (1983). The central role of the propensity score in observational studies for causal effects, *Biometrika, 70*(1), 41–55.
Shleifer, A., & Vishny, R. W. (2003). Stock market driven acquisitions. *Journal of Financial Economics*, *70*(3), 295–311.
Slovin, M. B., Sushka, M. E., & Poloncheck, J. A. (2005). Methods of payment in asset sales: contracting with equity versus cash. *Journal of Finance, 60*(5), 2385–2407.
Tian, X. (2012). The role of venture capital syndication in value creation for entrepreneurial firms.

Review of Finance, *16*(1), 245–283.
Tian, X., Udell, G. F., & Yu, X. (2016). Disciplining delegated monitors: when venture capitalists fail to prevent fraud by their IPO firms. *Journal of Accounting and Economics*, *61*(2-3), 526–544.

Appendix

Appendix 1: Definition of Variables and Data Sources

Variable name	Definition	Sources
Acquirer characteristics		
ACAR(-5, 5)	The acquirer's cumulative abnormal returns between date -5 and 5, given 0 is the announcement date. Abnormal returns are generated from the adjusted market model of which parameters are estimated over the 200-day estimation window (-215;-15) before the event date of *t* and CRSP value-weighted returns served as the market benchmark.	CRSP (US)
RUNUP	The acquirer's cumulative abnormal returns during the period between -210 and -10, calculated using the market model. The market model parameters are estimated over the period (-420, -220) with the CRSP value-weighted return as the market index.	CRSP (US)
LN_AT	The natural logarithm of the acquirer's total assets.	Compustat
TOBIN_Q	The market value of assets divided by the book value of assets.	Compustat
LIQUIDITY	The ratio of cash and short-term investments divided by the total assets.	Compustat
LEVERAGE	The ratio between the total debts and the total assets.	Compustat
ROA	The earnings before interest and taxes scaled by the total assets.	Compustat
INVESTMENT	The total capital expenditure divided by the total assets.	Compustat
Transaction characteristics		
VC_BACKED	A dummy indicator equal to one if the target is VC-backed, and zero otherwise.	SDC M&A; VentureXpert
RELATED	A binary indicator equal to one if the first three digit of the target's SIC code equals the first three digit of the acquirer's SIC code.	SDC M&A
DEAL_SIZE	The natural logarithm of the transaction value.	SDC M&A
LOCATION	A binary indicator equal to one if the target and acquirer share the same state of location, and zero otherwise.	SDC M&A
CASH_D	A binary indicator equal to one if the transaction is financed with 100% cash.	SDC M&A
STOCK_D	A binary indicator equal to one if the transaction is financed with 100% stock.	SDC M&A
STOCK_R	The fraction of stock as the method of payment.	SDC M&A
Instrument variables		
H_TECH	A binary indicator equal to one if the target operates in a high-technology industry, and zero otherwise.	SDC M&A
F_STATES	A binary indicator equal to one if the target is located in California, Massachusetts, New York, and Texas, and zero otherwise.	SDC M&A
AG_IPO_PROC	Aggregate IPO proceeds in the 3 months preceding the acquisition announcement.	SDC Global New Issues
AG_VC_ INVEST	Aggregate VC industry investment in the industry over the 3 months prior to the acquisition announcement.	VentureXpert

Figure 1: Venture Capital and the Ratio of Stock payment

The ratio of stock as the method of payment in M&A transactions with VC-backed and Non-VC-backed targets across time periods between 1990 and 2016.

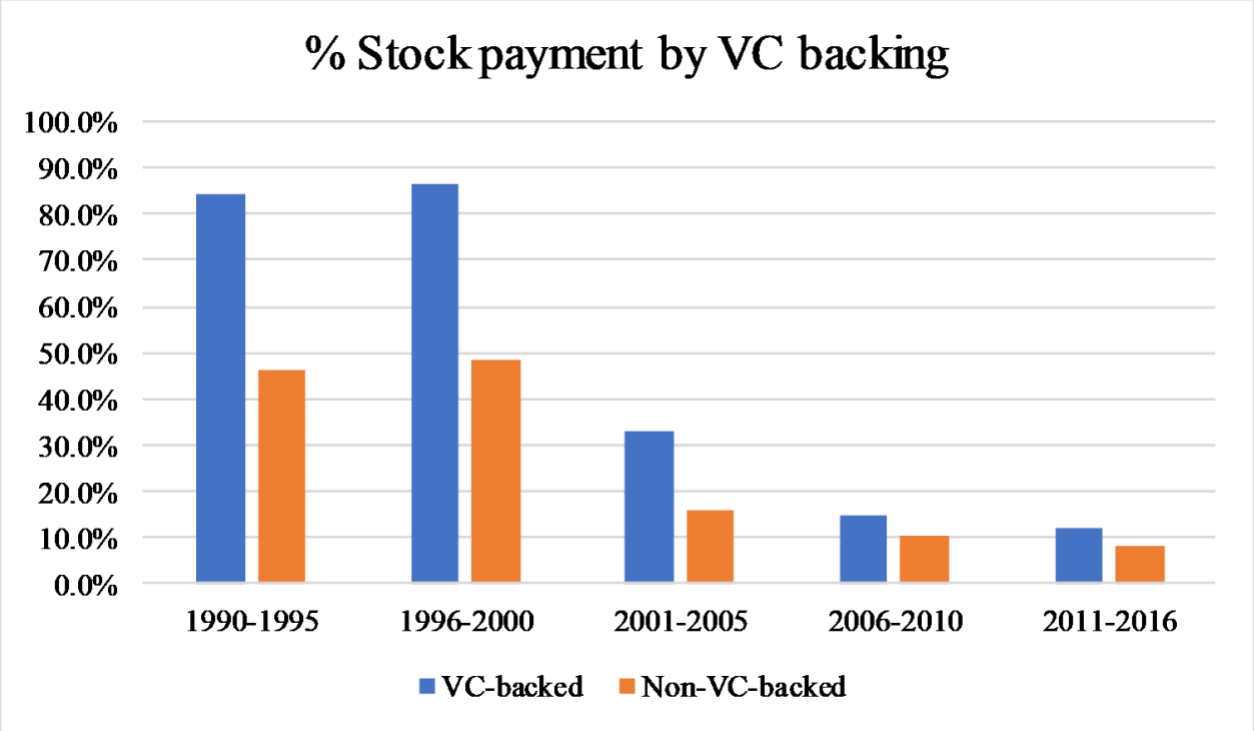

Table 1: Distribution of M&A transactions by Year and Industry

This table reports the annual and 2-digit SIC code industry distribution of the unlisted mergers and acquisitions announced between 1990 and 2016.

Panel A: Annual distribution of transactions and methods of payment

Year	N of transactions	All-stock (N)	All-cash (N)	All-stock (%)	All-cash (%)	Stock ratio (%)
1990	51	14	33	27%	65%	34%
1991	79	31	35	39%	44%	49%
1992	113	59	42	52%	37%	57%
1993	113	44	56	39%	50%	45%
1994	188	70	91	37%	48%	45%
1995	261	119	108	46%	41%	52%
1996	334	146	143	44%	43%	50%
1997	442	165	182	37%	41%	47%
1998	435	160	191	37%	44%	46%
1999	338	162	124	48%	37%	54%
2000	402	217	124	54%	31%	63%
2001	223	57	123	26%	55%	36%
2002	234	27	158	12%	68%	21%
2003	218	22	156	10%	72%	19%
2004	268	14	211	5%	79%	12%
2005	296	14	222	5%	75%	12%
2006	305	15	241	5%	79%	11%
2007	253	7	199	3%	79%	10%
2008	187	13	143	7%	76%	12%
2009	112	7	90	6%	80%	13%
2010	167	7	141	4%	84%	9%
2011	166	3	140	2%	84%	7%
2012	183	4	151	2%	83%	7%
2013	205	6	170	3%	83%	8%
2014	199	6	153	3%	77%	11%
2015	136	3	98	2%	72%	11%
2016	64	1	45	2%	70%	11%
Total	5972	1393	3570	23%	60%	31%

Panel B: Industry distribution of transactions and methods of payment

Industry name	N	N stock	N cash	% of All-stock	% of All-cash	% of Stock ratio	Industry Code
Business Services	1679	558	800	33.2%	47.6%	42.5%	73
Electronic & Other Electric Equipment	472	155	253	32.8%	53.6%	39.6%	36
Instruments & Related Products	392	70	262	17.9%	66.8%	25.4%	38
Engineering & Management Services	314	91	152	29.0%	48.4%	39.7%	87
Oil & Gas Extraction	306	29	202	9.5%	66.0%	20.1%	13
Communications	290	64	178	22.1%	61.4%	29.1%	48
Chemical & Allied Products	289	55	188	19.0%	65.1%	26.3%	28
Industrial Machinery & Equipment	272	65	172	23.9%	63.2%	29.3%	35
Health Services	243	61	149	25.1%	61.3%	31.3%	80
Wholesale Trade - Durable Goods	161	36	93	22.4%	57.8%	30.4%	50
Food & Kindred Products	108	9	84	8.3%	77.8%	13.4%	20
Wholesale Trade - Nondurable Goods	107	28	56	26.2%	52.3%	36.9%	51
Fabricated Metal Products	103	10	82	9.7%	79.6%	12.9%	34
Hotels & Other Lodging Places	102	4	94	3.9%	92.2%	6.3%	70
Transportation Equipment	99	6	84	6.1%	84.8%	9.5%	37
Miscellaneous Retail	82	24	48	29.3%	58.5%	34.9%	59
Printing & Publishing	70	11	53	15.7%	75.7%	19.7%	27
Primary Metal Industries	65	5	51	7.7%	78.5%	13.0%	33
Rubber & Miscellaneous Plastics Products	51	1	44	2.0%	86.3%	6.0%	30
Trucking & Warehousing	50	3	39	6.0%	78.0%	10.8%	42
Others	717	108	486	15.1%	67.8%	21.3%	

Table 2: Venture Capital and the Ratio of Stock payment

The ratio of stock as the method of payment in M&A transactions with VC-backed and Non-VC-backed targets across time periods between 1990 and 2016. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	The Average Ratio of Stock Payment		Mean Difference	Mean Difference # 0
	VC-backed targets	Non-VC-backed targets		
Overall	40.0%	29.5%	10.5%	***
1990-1995	84.3%	46.4%	37.9%	***
1996-2000	86.3%	48.4%	37.9%	***
2001-2005	32.9%	16.1%	16.8%	***
2006-2010	15.0%	10.2%	4.8%	**
2011-2016	12.2%	8.2%	4.0%	**

Table 3: Summary Statistics

This table presents the descriptive statistics for the full sample and the subsamples of all-stock and all-cash deals, respectively. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, zero otherwise. *LN_AT* is the natural logarithm of the acquirer's total assets. *TOBIN_Q* is the market value of assets divided by the book value of assets. *LIQUIDITY* is the ratio of cash and short-term investments divided by the total assets. *LEVERAGE* is the ratio between the total debts and the total assets. *ROA* is the earnings before interest and taxes scaled by the total assets. *INVESTMENT* is total capital expenditure divided by the total assets. *RELATED* is a binary indicator equal to one if the target's SIC is the same as the acquirer's SIC code. *DEAL_SIZE* is the natural logarithm of the transaction value. *LOCATION* is a binary indicator equal to one if the target and acquirer share the same state of location, and zero otherwise. Other variables are defined in the Appendix 1. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Full Sample (N=5972)				All Stock (N=1393)			All Cash (N=3570)			Mean Difference	Mean Difference # 0
	N	mean	std	p50	mean	std	p50	mean	std	p50		
VC_BACKED	5972	0.139	0.346	0.000	0.183	0.387	0.000	0.123	0.329	0.000	0.060	***
LN_AT	5972	6.106	1.675	6.023	5.332	1.640	5.211	6.589	1.553	6.519	-1.257	***
TOBIN_Q	5972	2.827	2.715	1.933	4.649	4.225	3.103	2.151	1.472	1.724	2.498	***
LIQUIDITY	5972	0.219	0.222	0.139	0.313	0.246	0.264	0.174	0.191	0.099	0.139	***
LEVERAGE	5972	0.195	0.200	0.149	0.139	0.179	0.051	0.219	0.200	0.191	-0.080	***
ROA	5972	0.072	0.135	0.088	0.038	0.196	0.082	0.095	0.093	0.094	-0.057	***
INVESTMENT	5972	0.055	0.065	0.035	0.063	0.061	0.047	0.051	0.064	0.031	0.012	***
RELATED	5972	0.489	0.500	0.000	0.502	0.500	1.000	0.471	0.499	0.000	0.030	*
DEAL_SIZE	5972	4.006	1.458	3.829	3.760	1.346	3.561	4.137	1.470	4.007	-0.376	***
LOCATION	5972	0.213	0.409	0.000	0.279	0.448	0.000	0.180	0.384	0.000	0.099	***
RUNUP	5619	-0.001	0.609	-0.017	0.044	0.769	0.008	-0.028	0.502	-0.027	0.072	**

Table 4: Venture Capital and Methods of Payment

This table reports the linear probability and multiple probit regression of payment methods on the presence of venture capital in target firms. The main dependent, *STOCK_D*, is a binary indicator equal to one if the transaction is financed 100% with stock. *MIXED* is a dummy indicator equal to 1 if the transaction is financed with both cash and stock. *CASH_D* is a binary indicator equal to one if the transaction is financed 100% with cash. In the multinomial probit model, *CASH_D* is the base outcome. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, and zero otherwise. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Probability of All-stock Payment	Multinomial Probit	
Dependent variable	All-stock	All-stock vs Cash	Mixed vs Cash
	(1)	(2)	(3)
VC_BACKED	0.064***	0.239***	0.059
	(0.014)	(0.084)	(0.087)
LN_AT	-0.022***	-0.417***	-0.478***
	(0.005)	(0.026)	(0.025)
TOBIN_Q	0.035***	0.274***	0.113***
	(0.002)	(0.022)	(0.021)
LIQUIDITY	0.018	-0.002	0.058
	(0.031)	(0.171)	(0.174)
LEVERAGE	-0.081***	-0.219	0.075
	(0.028)	(0.160)	(0.166)
ROA	-0.373***	-2.534***	-2.653***
	(0.047)	(0.306)	(0.296)
INVESTMENT	0.208**	2.235***	0.976**
	(0.095)	(0.422)	(0.466)
RELATED	-0.026***	-0.135**	0.045
	(0.010)	(0.057)	(0.058)
DEAL_SIZE	0.023***	0.151***	0.277***
	(0.004)	(0.026)	(0.026)
LOCATION	0.040***	0.244***	0.190***
	(0.012)	(0.067)	(0.070)
Intercept	0.135*	0.429***	0.544***
	(0.081)	(0.140)	(0.144)
Industry FE	Yes	No	No
Year FE	Yes	No	No
No. of Obs.	5972	5972	5972

R-Squared/Log likelihood	0.33	-4762	-4762

Table 5: Venture Capital and the Ratio of Stock Payment

This table reports the linear and Tobit regression of the fraction of stock as the method of payment in mergers and acquisitions. The main dependent, *STOCK_R*, is the fraction of stock as the method of payment. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, zero otherwise. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Regression of Stock Ratio	Tobit Regression of Stock Ratio
	(1)	(2)
VC_BACKED	0.079***	0.419***
	(0.014)	(0.074)
LN_AT	-0.045***	-0.309***
	(0.004)	(0.024)
TOBIN_Q	0.032***	0.160***
	(0.002)	(0.015)
LIQUIDITY	0.045	0.086
	(0.029)	(0.146)
LEVERAGE	-0.096***	-0.331**
	(0.028)	(0.154)
ROA	-0.518***	-2.341***
	(0.040)	(0.235)
INVESTMENT	0.211**	1.068**
	(0.093)	(0.454)
RELATED	-0.020**	-0.072
	(0.009)	(0.052)
DEAL_SIZE	0.033***	0.233***
	(0.004)	(0.025)
LOCATION	0.055***	0.282***
	(0.012)	(0.061)
Intercept	0.312***	-0.413
	(0.087)	(0.544)
Industry FE	Yes	Yes
Year FE	Yes	Yes
No. of Obs.	5972	5972
R-Squared/Log likelihood	0.38	-4339

Table 6: Venture Capital, Acquirer Characteristics, and Methods of Payment

This table reports linear regression of the ratio of stock payment in mergers and acquisitions. The main dependent, *STOCK_R*, is the fraction of stock as the method of payment. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, zero otherwise. *FIRM_AGE* is the number of years listing after IPO. *LT_DEBT* is the ratio between the total long-term debts and the total assets. *RET_VO* is the volatility of stock returns during the period (-272,15) multiplied 100. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Regression of Stock Ratio					
	(1)	(2)	(3)	(4)	(5)	[6]
VC_BACKED	0.182***	0.140***	0.056***	0.059***	0.043***	0.041**
	(0.051)	(0.024)	(0.017)	(0.016)	(0.016)	(0.018)
*VC_BACKED*LN_AT*	-0.016**					
	(0.007)					
*VC_BACKED*FIRM_AGE*		-0.009***				
		(0.002)				
FIRM_AGE		0.001				
		(0.001)				
*VC_BACKED*LEVERAGE*			0.171**			
			(0.073)			
*VC_BACKED*LT_DEBT*				0.172**		
				(0.078)		
LT_DEBT				-0.283***		
				(0.107)		
*VC_BACKED*RET_VO*					0.214***	
					(0.058)	
RET_VO					0.086***	
					(0.026)	
*VC_BACKED*INVESTMENT*						0.862***
						(0.315)
LN_AT	-0.042***	-0.050***	-0.045***	-0.043***	-0.041***	-0.045***

	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)
TOBIN_Q	0.032***	0.026***	0.032***	0.032***	0.031***	0.032***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
LIQUIDITY	0.042	0.027	0.046	0.053*	0.038	0.047
	(0.029)	(0.033)	(0.029)	(0.029)	(0.029)	(0.029)
LEVERAGE	-0.097***	-0.110***	-0.114***	0.15	-0.096***	-0.097***
	(0.028)	(0.034)	(0.029)	(0.104)	(0.028)	(0.028)
ROA	-0.512***	-0.515***	-0.519***	-0.519***	-0.444***	-0.519***
	(0.040)	(0.045)	(0.040)	(0.040)	(0.043)	(0.040)
INVESTMENT	0.212**	0.271**	0.208**	0.224**	0.221**	0.153
	(0.093)	(0.107)	(0.093)	(0.093)	(0.093)	(0.096)
RELATED	-0.021**	-0.029**	-0.019**	-0.021**	-0.023**	-0.019**
	(0.009)	(0.012)	(0.009)	(0.009)	(0.010)	(0.009)
DEAL_SIZE	0.033***	0.042***	0.033***	0.033***	0.032***	0.033***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
LOCATION	0.055***	0.054***	0.055***	0.053***	0.054***	0.054***
	(0.012)	(0.014)	(0.012)	(0.012)	(0.012)	(0.012)
Intercept	0.302***	0.248***	0.314***	0.349***	0.287***	0.316***
	(0.087)	(0.076)	(0.086)	(0.131)	(0.087)	(0.087)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	5972	3919	5972	5919	5906	5972
R-Squared	0.38	0.43	0.38	0.38	0.38	0.38

Table 7: Types of Venture Capital and Methods of Payment

Panel A: VC types and method of payments

Panel A shows regressions of methods of payment on types of venture capital. The main dependent, *STOCK_D*, is a binary indicator equal to one if the transaction is financed 100% with stock. *STOCK_R* is the fraction of stock as the method of payment. *PE*, *CVC*, *BANK_AFF*, and *IMF* are binary variables indicating one if the lead VC in the target is classified as private equity, corporate venture capital, bank affiliated, and investment management firm, 0 otherwise. *OTHER_VC1* and *OTHER_VC2* are other VC types rather than the ones that are specified in the regression model. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Probability of All-stock Payment		Linear Regression of Stock Ratio	
	(1)	(2)	(3)	(4)
PE	0.062***	0.062***	0.079***	0.078***
	(0.015)	(0.015)	(0.014)	(0.014)
CVC	0.036	0.036	0.025	0.025
	(0.053)	(0.053)	(0.047)	(0.047)
BANK_AFF	0.115**	0.115**	0.119**	0.118**
	(0.050)	(0.050)	(0.049)	(0.049)
OTHER_VC1	0.057		0.089	
	(0.057)		(0.059)	
IMF		-0.098***		-0.053
		(0.031)		(0.052)
OTHER_VC2		0.190**		0.211**
		(0.088)		(0.088)
LN_AT	-0.022***	-0.022***	-0.045***	-0.045***
	(0.005)	(0.005)	(0.004)	(0.004)
TOBIN_Q	0.035***	0.035***	0.032***	0.032***
	(0.002)	(0.002)	(0.002)	(0.002)
LIQUIDITY	0.018	0.018	0.046	0.045
	(0.031)	(0.031)	(0.029)	(0.029)
LEVERAGE	-0.081***	-0.081***	-0.096***	-0.096***
	(0.028)	(0.028)	(0.028)	(0.028)
ROA	-0.373***	-0.372***	-0.518***	-0.517***
	(0.047)	(0.047)	(0.040)	(0.040)

INVESTMENT	0.209**	0.208**	0.212**	0.211**
	(0.095)	(0.095)	(0.093)	(0.093)
RELATED	-0.026***	-0.026***	-0.020**	-0.020**
	(0.010)	(0.010)	(0.009)	(0.009)
DEAL_SIZE	0.023***	0.023***	0.033***	0.033***
	(0.004)	(0.004)	(0.004)	(0.004)
LOCATION	0.040***	0.040***	0.055***	0.055***
	(0.012)	(0.012)	(0.012)	(0.012)
Intercept	0.136*	0.132	0.312***	0.309***
	(0.081)	(0.082)	(0.087)	(0.087)
Industry FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
No. of Obs.	5972	5972	5972	5972
R-Squared	0.33	0.33	0.38	0.38

Panel B: Venture Capital syndication, Venture Capital reputation, and methods of payment

Panel B shows regression analyses using the subsample of VC-backed transactions. The main dependent, *STOCK_D* is a binary indicator equal to one if the transaction is financed 100% with stock. *STOCK_R* is the fraction of stock as the method of payment. *VC_SYN* is a binary variable equal to one if the target is financed by more than one VC, and zero otherwise. *VC_REP* is a continuous measurement of VC reputation which is the average IPO capitalization share (based on cumulative market capitalization of VC-backed IPOs) of lead VCs[6]. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Probability of All-stock Payment		Linear Regression of Stock Ratio	
	(1)	(2)	(3)	(4)
VC_SYN	0.094***		0.092***	
	(0.033)		(0.035)	
VC_REP		0.005		0.011**
		(0.006)		(0.005)
LN_AT	-0.028**	-0.021	-0.063***	-0.059***
	(0.012)	(0.013)	(0.012)	(0.013)
TOBIN_Q	0.017***	0.018***	0.015***	0.017***
	(0.005)	(0.005)	(0.004)	(0.005)
LIQUIDITY	-0.104	-0.06	-0.043	-0.026
	(0.075)	(0.088)	(0.071)	(0.082)
LEVERAGE	0.085	0.122	0.023	0.065
	(0.097)	(0.118)	(0.091)	(0.107)
ROA	-0.420***	-0.369***	-0.556***	-0.514***
	(0.108)	(0.118)	(0.098)	(0.108)
INVESTMENT	0.334	0.078	0.513	0.39
	(0.393)	(0.440)	(0.370)	(0.417)
RELATED	-0.002	-0.001	-0.039	-0.036
	(0.025)	(0.031)	(0.025)	(0.029)
DEAL_SIZE	0.032**	0.035**	0.053***	0.055***
	(0.014)	(0.017)	(0.013)	(0.016)
LOCATION	0.01	0.005	0.014	-0.01
	(0.027)	(0.031)	(0.026)	(0.030)
Intercept	0.169	-0.01	1.168***	1.005***
	(0.109)	(0.108)	(0.116)	(0.113)
Industry FE	Yes	Yes	Yes	Yes

[6] Lead VCs are venture capital firms that have largest investments in the target.

Year FE	Yes	Yes	Yes	Yes
No. of Obs.	828	645	828	645
R-Squared	0.58	0.57	0.58	0.58

Table 8: Venture Capital, Fund Maturity, and Methods of Payment

This table provides regression analyses of methods of payment on fund age and fund stage. The main dependent, *STOCK_D*, a binary indicator equal to one if the transaction is financed with 100% stock. *STOCK_R* is the fraction of stock as the method of payment. *LOW_FAGE (HIGH_FAGE)* is a binary variable equal to one if the average age of funds in the target is below (above) the median, and zero otherwise. *PCT_EARLY* is the percentage of early-stage funds in the target. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	VC Fund Age and Stock as the Choice of Payment		Percentage of Funds in Early Stage and Stock as the Choice of Payment	
	STOCK_D	STOCK_R	STOCK_D	STOCK_R
	(1)	(2)	(3)	(4)
LOW_FAGE	0.105***	0.115***		
	(0.021)	(0.019)		
HIGH_FAGE	0.041**	0.059***		
	(0.018)	(0.018)		
PCT_EARLY			0.091***	0.097***
			(0.033)	(0.033)
LN_AT	-0.022***	-0.045***	-0.028**	-0.064***
	(0.005)	(0.004)	(0.013)	(0.012)
TOBIN_Q	0.035***	0.032***	0.018***	0.014***
	(0.002)	(0.002)	(0.005)	(0.004)
LIQUIDITY	0.021	0.047	-0.108	-0.049
	(0.032)	(0.029)	(0.079)	(0.075)
LEVERAGE	-0.079***	-0.094***	0.088	0.023
	(0.028)	(0.028)	(0.104)	(0.098)
ROA	-0.372***	-0.511***	-0.432***	-0.528***
	(0.047)	(0.040)	(0.113)	(0.100)
INVESTMENT	0.205**	0.207**	0.335	0.481
	(0.095)	(0.094)	(0.442)	(0.409)
RELATED	-0.028***	-0.021**	-0.007	-0.047*
	(0.010)	(0.010)	(0.027)	(0.026)
DEAL_SIZE	0.022***	0.032***	0.031**	0.053***
	(0.005)	(0.004)	(0.014)	(0.014)
LOCATION	0.040***	0.052***	0.008	-0.002
	(0.012)	(0.012)	(0.028)	(0.027)
Intercept	0.126	0.303***	0.149	1.145***
	(0.084)	(0.090)	(0.115)	(0.113)
Low – High (2-sided p-value)	0.013	0.023		
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

No. of Obs.	5910	5910	766	766
R-Squared	0.33	0.38	0.57	0.58

Table 9: Venture Capital, Methods of Payment, and Acquirers' Announcement Returns

This table shows regression analyses of acquirers' announcement returns. The main dependent variable, *ACAR (5, 5)* are cumulative abnormal returns of acquirers during the period (-5, 5), given 0 is the annoucement date. Abnormal returns are generated from the market adjusted model of which parameters are estimated over the 200-day estimation window (-215;-15) before the announcement date. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, and zero otherwise. *STOCK_D* is a binary indicator equal to one if the transaction is financed 100% with stock, and zero otherwise. *CASH_D* is a binary indicator equal to one if the transaction is financed 100% with cash, and zero otherwise. Other variables are defined in Appendix 1. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Regression of Acquirers' Announcement Returns			
	(1)	(2)	(3)	(4)
VC_BACKED	-0.008	-0.028**	-0.014**	-0.006
	(0.006)	(0.013)	(0.007)	(0.008)
*STOCK_D*VC_BACKED*		0.034**	0.020*	
		(0.016)	(0.012)	
*CASH_D*VC_BACKED*		0.018		-0.003
		(0.015)		(0.011)
STOCK_D	0.017***	0.012*	0.014**	0.017***
	(0.006)	(0.007)	(0.006)	(0.006)
CASH_D	-0.001	-0.004	-0.002	-0.001
	(0.005)	(0.006)	(0.005)	(0.005)
LN_AT	-0.019***	-0.019***	-0.019***	-0.019***
	(0.002)	(0.002)	(0.002)	(0.002)
TOBIN_Q	-0.004***	-0.004***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
LIQUIDITY	-0.001	0.001	0.000	-0.001
	(0.011)	(0.011)	(0.011)	(0.011)
LEVERAGE	0.037***	0.036***	0.036***	0.037***
	(0.011)	(0.011)	(0.011)	(0.011)
ROA	-0.016	-0.016	-0.015	-0.016
	(0.015)	(0.015)	(0.015)	(0.015)
INVESTMENT	0.041	0.042	0.041	0.041
	(0.033)	(0.033)	(0.033)	(0.033)
RELATED	-0.005	-0.005	-0.005	-0.005
	(0.004)	(0.004)	(0.004)	(0.004)
DEAL_SIZE	0.015***	0.015***	0.015***	0.015***
	(0.002)	(0.002)	(0.002)	(0.002)
LOCATION	0.009**	0.009**	0.009**	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)
Intercept	0.078***	0.081***	0.079***	0.077***

	(0.023)	(0.023)	(0.023)	(0.023)
Industry & Year FE	Yes	Yes	Yes	Yes
No. of Obs.	5971	5971	5971	5971
R-Squared	0.04	0.04	0.04	0.04
Highest VIF	2.01	6.52	2.31	2.42

Table 10: Venture Capital, Methods of Payment, and Acquirers' Long-run Performance

This table reports monthly average abnormal returns (α) of equally-weighted calendar time portfolio methods using Fama and French (1993) and Fama and French (2015)'s factors models. A single-time series regression is run with the excess return of the calendar portfolio as the dependent variable and the return on the five/six/seven factors as the independent variables including the market, size, B/M, Momentum, Liquidity, profitability and the investment factor). We employ weighted least square method to estimate the monthly average returns. The standard error (denominator of the t-statistic) for a window is the square root of the sum of the squares of the monthly standard errors. The significance levels are indicated by *, **, and ***, and correspond to a significance level of 10%, 5%, and 1%.

	Five-Factor Model (Fama, E., French, 2015)		Six-Factor Model (Carhart, 1997; Fama, E., French, 2015)		Seven-Factor Model (Carhart, 1997; Fama, E., French, 2015; Pástor & Stambaugh, 2003)		Seven-Factor Model Minus HML	
Period (months)	VC-backed targets with all-stock offers	Other targets	VC-backed targets with all-stock offers	Other targets	VC-backed targets with all-stock offers	Other targets	VC-backed targets with all-stock offers	Other targets
36	0.010	-0.001	0.014**	0.002	0.0137**	0.002	0.014*	0.002
	(1.59)	(-0.29)	(2.37)	(1.29)	(2.05)	(1.36)	(1.89)	(1.43)
48	0.010*	0.000	0.013**	0.002*	0.016*	0.002*	0.012*	0.002*
	(1.68)	(0.020)	(2.49)	(1.66)	(1.94)	(1.75)	(1.78)	(1.82)
60	0.008	0.000	0.010**	0.002*	0.009	0.002*	0.008	0.002*
	(1.47)	(0.14)	(2.27)	(1.71)	(1.59)	(1.78)	(1.41)	(1.85)

Table 11: Adjustment for the Sample Selection by Heckman Procedure

This table shows the adjustment for the sample selection problem using Heckman procedure. The first stage of Heckman is a probit model of whether the target is VC-backed. The second stage is linear models of the choice of payment with the inclusion of *IMR* (Inverse Mills ratio) generated from the first stage. Definitions of instruments in the first stage are shown in Appendix 1. *STOCK_D* is a binary indicator equal to one if the transaction is financed 100% with stock, and zero otherwise. *STOCK_R* is the fraction of stock as the method of payment. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, zero otherwise. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Probit Regression of VC-backed M&As	Linear Probability of All-stock Payment	Linear Regression of Stock Ratio
	(1)	(2)	(3)
VC_BACKED		0.075***	0.084***
		(0.016)	(0.015)
LN_AT	0.157***	-0.041***	-0.069***
	(0.022)	(0.007)	(0.007)
TOBIN_Q	0.000	0.031***	0.028***
	(0.009)	(0.003)	(0.002)
LIQUIDITY	1.088***	-0.137***	-0.129***
	(0.137)	(0.047)	(0.043)
LEVERAGE	-0.698***	-0.06	-0.06
	(0.167)	(0.043)	(0.042)
ROA	-0.723***	-0.305***	-0.411***
	(0.178)	(0.056)	(0.049)
INVESTMENT	-0.71	0.347**	0.295**
	(0.541)	(0.139)	(0.134)
RELATED	0.016	-0.021	-0.023*
	(0.053)	(0.013)	(0.012)
DEAL_SIZE	0.128***	0.020***	0.028***
	(0.024)	(0.007)	(0.006)
LOCATION	0.031	0.022	0.041***
	(0.062)	(0.015)	(0.015)
IMR		-0.106***	-0.131***
		(0.030)	(0.029)
H_TECH	0.438***		
	(0.078)		
F_STATES	0.367***		
	(0.055)		
AG_VC_INVEST	0.030**		
	(0.012)		
AG_IPO_PROC	-0.055		
	(0.038)		

Intercept	-2.744***	0.761***	0.977***
	(0.388)	(0.141)	(0.135)
Industry & Year FE	No	Yes	Yes
No. of Obs.	3792	3792	3792
Pseudo R2/R-Squared	0.15	0.37	0.41

Table 12: Propensity Score Matching, Deal Size Matching, and VC Information Bridge Building

This table provides regression analyses of methods of payment using different samples: (1) The matched sample created by matching one on one VC-backed targets with non-VC-backed targets. Propensity scores are generated from the probit regression of being VC backed on firm-deal characteristics; (2) The matched sample created by matching VC-backed targets with non-VC-backed targets which are in the same year and industry (by the first 2 digits of SIC codes) and have closest deal size; (3) The sample constructed by excluding transactions with VC-backed targets in which the acquirer is also VC-backed. The main dependent, *STOCK_D*, is a binary indicator equal to one if the transaction is financed 100% with stock, and zero otherwise. *STOCK_R* is the fraction of stock as the method of payment. *VC_BACKED* is a dummy indicator equal to one if the target is VC-backed, and zero otherwise. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Propensity Score Matching		Deal Size Matching		Venture Capital Information Bridge Building	
Dependent variable	STOCK_D	STOCK_R	STOCK_D	STOCK_R	STOCK_D	STOCK_R
	(1)	(2)	(3)	(4)	(5)	(6)
VC_BACKED	0.084***	0.090***	0.084***	0.106***	0.055***	0.071***
	(0.023)	(0.022)	(0.018)	(0.017)	(0.015)	(0.015)
LN_AT	-0.022*	-0.046***	-0.012	-0.043***	-0.021***	-0.044***
	(0.012)	(0.011)	(0.008)	(0.008)	(0.005)	(0.004)
TOBIN_Q	0.035***	0.031***	0.029***	0.025***	0.035***	0.033***
	(0.005)	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)
LIQUIDITY	-0.105	-0.041	-0.006	-0.034	0.026	0.051*
	(0.070)	(0.066)	(0.051)	(0.048)	(0.032)	(0.030)
LEVERAGE	-0.034	-0.036	-0.023	-0.103*	-0.084***	-0.096***
	(0.080)	(0.077)	(0.060)	(0.059)	(0.028)	(0.028)
ROA	-0.550***	-0.613***	-0.447***	-0.584***	-0.364***	-0.504***
	(0.098)	(0.093)	(0.079)	(0.074)	(0.047)	(0.041)
INVESTMENT	0.641*	0.553*	0.309	0.540**	0.211**	0.213**
	(0.333)	(0.313)	(0.266)	(0.233)	(0.096)	(0.094)
RELATED	-0.040*	-0.031	0.013	-0.013	-0.028***	-0.022**
	(0.024)	(0.023)	(0.017)	(0.017)	(0.010)	(0.010)
DEAL_SIZE	0.017	0.032***	0.035***	0.045***	0.022***	0.033***

	(0.012)	(0.011)	(0.010)	(0.009)	(0.005)	(0.004)
LOCATION	0.054*	0.064**	0.026	0.066***	0.045***	0.059***
	(0.029)	(0.028)	(0.021)	(0.020)	(0.012)	(0.012)
Intercept	0.312	0.631**	0.425***	0.419***	0.134*	0.309***
	(0.283)	(0.270)	(0.151)	(0.146)	(0.081)	(0.087)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	1032	1032	1614	1614	5824	5824
R-Squared	0.46	0.51	0.48	0.50	0.32	0.37

Online Internet Appendix

Appendix IA1: Summary of RRV method

The basic model of the market-to-book ratio (M/B) is specified as:

$$\ln\left(\frac{M}{B}\right) = \ln\left(\frac{M}{V}\right) + \ln\left(\frac{V}{B}\right), \qquad (1)$$

where M is the market value of equity, B is the book value of equity, and V is the intrinsic value of equity. As V is unobservable, the residual income model is often used to estimate V (e.g. Lee, Myers, and Swaminathan, 1999; Ang and Cheng, 2006). However, the estimation of this model relies on strict assumptions and have potential biases in large M&A transactions (Fu, Lin, and Officier, 2013).

We follow Rhodes-Kropf, Robinson, and Viswanathan (2005, hereafter RRV)'s method to relax the residual income model. RRV (2005) decompose M/B into three components: firm-specific error, time-series or sector-wide error, and long-run pricing to book. It states that price-to-true value, $\ln\left(\frac{M}{V}\right)$ of Equation (1), is composed of a firm-specific and sector-wide portion, where

$$\ln\left(\frac{M_{it}}{B_{it}}\right) = \underbrace{\ln\left(\frac{M_{it}}{V(\theta_{it};\alpha_{jt})}\right)}_{firm} + \underbrace{\ln\left(\frac{V(\theta_{it};\alpha_{jt})}{V(\theta_{it};\alpha_{j})}\right)}_{time/sector} + \underbrace{\ln\left(\frac{V(\theta_{it};\alpha_{j})}{B_{it}}\right)}_{long-run} \qquad (2)$$

To estimate the market value and hence Equation (2), we must first estimate the factors that relate to time-t fundamental value and true value. RRV (2005) first define firm value (M_t) to be the present value of expected free cash flows (FCF), and rewrites FCF to be the sum of the book value of the assets (B_t) and residual income (RI). RI is then defined as the difference between the return on equity (ROE) and the cost of capital, multiplied by the previous period's capital stock, as shown here:

$$\begin{aligned}\ln M_{it} &= \int_t^{\infty} e^{-\int_t^{\tau} r(\eta)\, d\eta} \ln(FCF)\, d\tau \\ &= \ln B_t + \int_t^{\infty} e^{-\int_t^{\tau} r(\eta)\, d\eta} \ln(RI)\, d\tau\rho \\ &= \ln B_t + E_t \textstyle\sum_{\tau=t+1}^{\infty} \frac{(ROE_{\tau} - r_{\tau}) \ln B_{\tau-1}}{(1+r_{\tau})^{\tau}} \qquad (3)\end{aligned}$$

RRV (2005) impose less restrictive assumptions on Equation (3) to overcome the shortcomings of the estimation pointed out by Ritter and Warr (2002) and propose a new estimation equation:

$$\ln(M_{it}) = \alpha_{0jt} + \alpha_{1jt} \ln(B_{it}) + \alpha_{2jt} \ln(|NI_{it}|) + \alpha_{3jt} I_{(<0)} \ln(|NI_{it}|) + \alpha_{4jt} LEV_{it} + \varepsilon_{it} \qquad (4)$$

In Equation (4), the intrinsic value of a firm is made up of the book value of equity, net income (i.e., the growth of book value of equity), and leverage. i, j, and t indicate the considerations for variations between firms, across industries, and over time (accounting for discount rates), respectively. We classify firms into 12 industries using Fama and French (1997)'s industry

classification. Then, we run the cross-sectional regressions of Equation (4) for each industry and year to estimate the parameters, α_{jt}.

In Equation (4), M_{it} and B_{it} are the market equity and book equity of firm i at time t respectively. We include net income as $\ln(|NI_{it}|)$ (we use $|NI|$, the absolute value of net income as we estimate NI in logs). We employ separate parameters $\{\alpha_2\}$ and $\{\alpha_3\}$ for positive and negative net income, respectively. RRV (2005) prove that accounting information and leverage play a key role in the cross-sectional variation of market values, so the market leverage, LEV, is also included in Equation (4). As such, any difference between the linear addition of the three components as stated above and the intrinsic value of a firm will represent misvaluation of the equity, as ε in Equation (4).

Finally, while the residual value from the regression equation, ε_{it}, is the firm-level misvaluation at a time t, the effective misvaluation sums up the firm-level and industry-level misvaluation. A note is that the magnitude of misvaluation for the industry-level is dependent on t. Taking in such considerations, the long-run parameters, $\bar{\alpha}_j = \frac{1}{T}\sum_t \hat{\alpha}_{jt}$, is derived from the time-series average of $\hat{\alpha}_{jt}$, and the misvaluation is finally measured as:

$$\ln\left(\frac{M_{it}}{V_{it}}\right) = \ln(M_{it}) - \left[\bar{\alpha}_{0j} + \bar{\alpha}_{1j}\ln(B_{it}) + \bar{\alpha}_{2j}\ln(|NI_{it}|) + \bar{\alpha}_{3j}I_{(<0)}\ln(|NI_{it}|) + \bar{\alpha}_{4j}LEV_{it}\right] \quad (5)$$

Reference

Ang, J., & Cheng, Y. (2006). Direct evidence on the market-driven acquisition theory. *Journal of Financial Research*, 29(2), 199–216.

Fama, E., & French, K. (1997). Industry costs of equity. *Journal of Financial Economics*, 43(2), 153–193.

Fu, F., Lin, L., & Officer, M. (2013). Acquisitions driven by stock overvaluation: Are they good deals? *Journal of Financial Economics*, 109(1), 24–39.

Lee, C., Myers, J., & Swaminathan, B. (1999). What is the intrinsic value of the Dow? *Journal of Finance*, 54(5), 1693–1741.

Rhodes–Kropf, M., Robinson, D., & Viswanathan, S. (2005). Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics*, 77(3), 561–603.

Ritter, J., & Warr, R. (2002). The decline of inflation and the bull market of 1982–1999. *Journal of Financial and Quantitative Analysis*, 37(1), 29–61.

Table IA1: Stock Price Run-up, Venture Capital, and Methods of Payment

This table provides robustness tests for our baseline equations with control for acquirers' stock price runup (cumulative abnormal returns). The main dependent, *STOCK_D*, a binary indicator equal to one if the transaction is financed with 100% stock. *STOCK_R* is the fraction of stock as the method of payment. *RUNUP* is measured as the acquirer's cumulative abnormal returns during the period between -210 and -10, calculated using the market model. The market model parameters are estimated over the period (-420, -220) with the CRSP value-weighted returns as the market returns. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Linear Probability of All-stock Payment		Linear Regression of Stock Ratio	
	STOCK_D	STOCK_D	STOCK_R	STOCK_R
	(1)	(2)	(3)	(4)
VC_BACKED	0.062***	0.062***	0.082***	0.082***
	(0.015)	(0.015)	(0.014)	(0.014)
RUNUP	0.002	0.003	0.010	0.009
	(0.009)	(0.010)	(0.008)	(0.009)
*VC_BACKED*RUNUP*		-0.010		0.010
		(0.025)		(0.023)
LN_AT	-0.021***	-0.021***	-0.044***	-0.044***
	(0.005)	(0.005)	(0.005)	(0.005)
TOBIN_Q	0.039***	0.039***	0.037***	0.037***
	(0.003)	(0.003)	(0.003)	(0.003)
LIQUIDITY	0.012	0.013	0.036	0.035
	(0.033)	(0.033)	(0.031)	(0.031)
LEVERAGE	-0.073**	-0.073**	-0.091***	-0.090***
	(0.029)	(0.029)	(0.029)	(0.029)
ROA	-0.398***	-0.398***	-0.540***	-0.540***
	(0.050)	(0.050)	(0.044)	(0.044)
INVESTMENT	0.198**	0.198**	0.206**	0.206**
	(0.100)	(0.100)	(0.099)	(0.099)
RELATED	-0.028***	-0.028***	-0.022**	-0.022**
	(0.010)	(0.010)	(0.010)	(0.010)
DEAL_SIZE	0.021***	0.021***	0.032***	0.032***
	(0.005)	(0.005)	(0.005)	(0.005)
LOCATION	0.033***	0.033***	0.049***	0.049***
	(0.012)	(0.012)	(0.012)	(0.012)
Intercept	0.111	0.111	0.292***	0.293***
	(0.085)	(0.085)	(0.091)	(0.091)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of Obs.	5619	5619	5619	5619
R-Squared	0.32	0.32	0.37	0.37

Table IA2: Acquirer Overvaluation, Venture Capital, and Methods of Payment

This table shows regression analyses of methods of payment using the subsample of the first and fourth quartile of acquirer overvaluation. The acquirer overvaluation is measured using the RRV (2005)'s method summarized in Appendix IA1. The main dependent, *STOCK_D*, a binary indicator equal to one if the transaction is financed with 100% stock, and zero otherwise. *STOCK_R* is the fraction of stock as the method of payment. Other variables are defined in Appendix 1. Heteroscedasticity-robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	STOCK_D	STOCK_D	STOCK_R	STOCK_R
Acquirer Overvaluation	>= 75th pct	<25th pct	>= 75th pct	<25th pct
	(1)	(2)	(3)	(4)
VC_BACKED	0.057**	0.081***	0.072***	0.110***
	(0.027)	(0.028)	(0.025)	(0.027)
LN_AT	-0.021**	-0.041***	-0.041***	-0.067***
	(0.010)	(0.009)	(0.009)	(0.008)
TOBIN_Q	0.024***	0.083***	0.018***	0.084***
	(0.003)	(0.015)	(0.003)	(0.014)
LIQUIDITY	-0.03	-0.02	0.019	0.041
	(0.061)	(0.055)	(0.054)	(0.053)
LEVERAGE	-0.196***	0.162**	-0.262***	0.211***
	(0.051)	(0.081)	(0.048)	(0.081)
ROA	-0.11	-0.672***	-0.275***	-0.729***
	(0.076)	(0.092)	(0.066)	(0.079)
INVESTMENT	0.103	0.090	0.106	0.197
	(0.176)	(0.211)	(0.168)	(0.198)
RELATED	-0.031	-0.034*	-0.024	-0.021
	(0.021)	(0.018)	(0.020)	(0.018)
DEAL_SIZE	0.038***	0.019**	0.053***	0.033***
	(0.009)	(0.009)	(0.009)	(0.009)
LOCATION	0.037	0.041*	0.060**	0.039*
	(0.026)	(0.022)	(0.024)	(0.022)
Intercept	-0.023	0.681***	0.153	0.709***
	(0.102)	(0.211)	(0.105)	(0.178)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of Obs.	1628	1448	1628	1448
R-Squared	0.41	0.30	0.45	0.36