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Identifying M&A targets and the information content of VC/PEs



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ABSTRACT

The information gap in the M&A market hinders acquirers from effectively identifying high-quality targets. We examine whether VC/PEs convey information content in the M&A market and whether acquirers can use such information to identify high-quality targets. We show that VC/PEs have significant information content and can signal high-quality target companies via “certification”. When acquirers lack acquisition experience and targets are located in inferior information environments, VC/PE “certification” is more significant. The better reputation a VC/PE has, the more information it conveys. Syndicate VC/PEs convey stronger information than independent VC/PEs. We also find that acquirers do not pay higher premiums for high-quality targets. Overall, our results suggest that VC/PEs have value relevance in the M&A market, confirming their “certification” role. We present means for acquirers to select high-quality targets and investors to build efficient portfolios.

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1. Introduction

As newly revised regulations that encourage mergers and acquisitions (M&As) (e.g., “Measures for the Administration of Material Asset Reorganization of Listed Companies” and “Administrative Rules on Acquisition of Listed Companies”) are implemented, an increasing number of listed companies are striving to achieve rapid transformation and enhance core competitiveness through M&As. Thus, identifying high-quality targets has become a crucial issue for listed companies.

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Although some companies possess innovative technologies, heterogeneous resources and new business models, they also face many challenges in the growth process, including a lack of funds, limited product development capability and restricted market expansion potential. These issues largely restrict the future growth of the companies (Zhu and Fei, 2010). As a result, when companies are unable to solve bottlenecks, they tend to seek help from more “well-off” companies. For the acquirers, these candidates can generate synergistic effects through resource complementation or enhancement, bring new profit growth and strengthen the acquirers’ core competitiveness. Hence, they are considered high-quality targets. Nevertheless, capturing useful information to identify these targets can be a difficult task, as many growing companies, especially start-ups, exhibit problems such as low information transparency, limited records of past transactions and the uncertainty of new product development (Elfring and Hulsink, 2003). In particular, due to confidentiality, target companies are often reluctant to disclose detailed information about core technologies and resources before confirming M&A transactions. Consequently, the information gap that arises during M&As poses a great challenge to acquirers when searching for high-quality targets. Research has found that venture capitalists (VCs) and private equity firms (PEs) can decrease the information asymmetry between companies and investors at the time of initial public offering (IPO) by providing “certification” (Megginson and Weiss, 1991). Can VC/PEs also decrease the information gap and play the role of “certification” during M&A transactions?

In the recent years, due to the reform of the IPO system by Chinese regulators and the “Barrier Lake Effect,” the exit channel for VC/PEs has changed and M&As have gradually become an important exit channel. According to Wind, there were only seven cases of VC/PE exit through M&As in 2004 and an average of thirty-one cases per year until 2012. However, in 2013 and 2014, the number of exit cases through M&As jumped tremendously to 120 and 560, with total amounts of RMB12.835 billion and RMB68.562 billion, respectively. The difference in book returns between IPO exit and M&A exit is shrinking. Therefore, M&As are becoming one of the main ways for VC/PEs to exit and are expected to become the “new norm” in the near future. This offers us the opportunity to investigate whether VC/PEs have information content in the Chinese M&A market. When VC/PEs send positive signals to the market, this indicates that VC/PEs play a “certification” role in the M&A market. This also decreases the information gap in the M&A process and provides practical guidance for acquirers to identify high-quality targets.

In this paper, we use Chinese A-share listed companies engaged in M&A transactions during 2013–2014 as our initial research sample and manually collect information about the transaction sellers backed by VC/PEs. Our main results are as follows. First, VC/PEs have strong information content in the M&A market and deliver positive signals to the market. Investors react positively to M&A transactions with VC/PE-backed target firms, which supports the finding that VC/PEs play a “certification” role in the M&A market. Second, when acquirers lack acquisition experience and targets are located in a poor information environment, the “certification” role of VC/PEs is more significant. Third, the better the reputation a VC/PE has and the more VC/PEs a target firm has, the stronger the information content is and the more favorably the market reacts. Fourth, after examining whether acquirers pay higher prices when acquiring VC/PE-backed targets, we find that acquirers obtain high-quality targets without having to pay higher premiums.

Our study makes several contributions. First, from the perspective of non-financial information, we examine the effect of the information embedded in VC/PEs on the value of targets during M&As. The literature related to the effect of target-related information on M&A value focuses mainly on the effect of financial information quality on M&As (Raman et al., 2013; Pan and Yu, 2014; McNichols and Stubben, 2015) rather than how non-financial information affects M&A value. Masulis and Nahata (2011) find that acquiring VC-backed target firms yield higher cumulative abnormal returns (CARs), as the agency conflict between VCs and other stockholders can lead to lower target pricing. Different from Masulis and Nahata (2011), we emphasize the VC/PE signaling mechanism in the M&A market. We find that VC/PEs have significant information content in the Chinese M&A market and can signal the high quality of target companies. Our findings also differ from those of Gompers and Xuan (2012), who find that acquiring VC-backed targets presents lower CARs based on U.S. data.

Second, from the M&A perspective, we provide evidence that VC/PEs perform a “certification” function. Since Barry et al. (1990) and Sahlman (1990) proposed the VC/PE “certification/supervision model”, a large

number of studies have empirically examined it in the IPO setting and found support for it using European and American data (Barry et al., 1990; Megginson and Weiss, 1991; Brav and Gompers, 1997). Bertoni et al. (2015) discover that VC/PEs also play a “certification” role in the financing activities of many young companies. We conduct this study in the setting of Chinese M&A transactions with Chinese listed companies as acquirers and non-listed companies as targets and find that VC/PEs also perform quality “certification” in the M&A field. That is, we extend the “certification” function of VC/PEs from the IPO setting to the M&A setting.

The conclusions of this study have important practical implications. First, we conclude that M&As have become an important means to solve problems during the transformation and upgrading of Chinese companies. The research has unfortunately done little to identify high-quality targets, which are necessary prerequisites for M&A transactions to achieve a synergistic effect. Therefore, how to identify high-quality targets is a core research question with both practical guidance and academic value and comprises the research value of our study. According to our study, acquiring VC/PE-backed targets can bring a higher value to listed companies. This finding provides useful guidance for listed companies when choosing M&A targets. Second, we conclude that the “certification/supervision” hypothesis of VC/PEs is often tested using the IPO setting in China. Most studies have concluded that VC/PEs do not possess a “certification/supervision” function and have further claimed that VC/PEs cannot screen out or help to develop high-quality firms (Yang et al., 2015). We think that this conclusion is inconsistent with the contribution made by VC/PEs in reality, as relying solely on IPO scenarios does not fully reflect the role of VC/PEs. Thus, motivated by VC/PEs exiting through M&As in reality, we consider the setting in which listed companies acquire non-listed target firms and find that VC/PEs also play a “certification” role. This finding allows us to better understand and evaluate the function of VC/PEs in China.

2. Theoretical analysis and hypotheses

Due to the information asymmetry in the M&A market and the large number of potential targets, acquirers are often faced with a serious information gap when selecting target firms. Such an information gap is particularly problematic when acquiring entrepreneurial firms due to the certain characteristics that entrepreneurial firms usually exhibit. First, these firms have low corporate information transparency (Hyytinen and Pajarinen, 2008). As a result of their relatively short history, entrepreneurial firms lack detailed trackable business records, and their financial information is insufficient to reflect the firms’ future value. Second, these firms have low proportions of fixed assets, with R&D resources, patent technology and other intangible assets taking up higher percentages (Qian and Zhang, 2007). This creates great difficulties when conducting firm evaluations. Finally, entrepreneurial firms experience high growth and high risk (Qian and Zhang, 2007). In terms of technology, they are quite capable of making breakthroughs in the market and developing new products. From the business model perspective, entrepreneurial firms may also offer business model innovations that lead future development trends. However, the risk persists that the market will not recognize these new technologies, products and business models.

The preceding arguments reveal that in the M&A process firms encounter an information gap in at least two aspects: target identification and evaluation. First, when screening out targets, acquirers often lack an in-depth understanding of target firms’ private information, such as their core technology resources or business models. Second, when determining the price of M&As, not enough information is provided to effectively evaluate the target firms. As this information is related to target firms’ value creation in the future and has the characteristics of private information, it constitutes the content of the information gap for acquirers. In this case, although the target firms present their financial information, the public information is still not enough for acquirers to identify and evaluate future targets. This leads us to wonder whether VC/PEs can make up for the information gap in the M&A market by conveying information about target firms.

In the IPO market, the “certification/supervision model” states that high-quality firms are more likely to attract VC/PEs. When the market lacks an effective way to reflect firms’ true value, VC/PE holdings can be used as an IPO firm’s “certification,” which investors perceive as a signal that the firm has a promising future. This

subsequently decreases the information asymmetry and the issue price of the IPO (Barry et al., 1990; Sahlman, 1990). In the M&A market, a similar information asymmetry exists between acquirers and targets. The information gap hinders acquirers from effectively identifying high-quality targets. VC/PEs can perform effective *ex ante* screening and provide value-added *ex post* services, which help to send the signal of high-quality targets to the market. These target firms usually have rich technology resources, abundant intellectual property and positive development prospects (Gompers and Xuan, 2012). Therefore, VC/PEs transmit signals that make up for the information gap and play the role of quality “certification” in the M&A process.

First, *ex ante*, VC/PEs can screen out high-quality targets. VC/PEs involve equity capital investment in emerging, fast-growing and potentially competitive firms (American Venture Capital Association). They are invested in by professional fund managers and characterized by high risks and large profits. As active investors with keen insights (Bottazzi et al., 2008), VC/PEs specialize in collecting information about, screening and evaluating investment projects. They rely on professional judgment and social networks to identify target firms with potential investment value in the market.

In general, how do VC/PEs identify target firms? When VC/PEs make investment decisions, they go through four phases: project search, project screening, project evaluation and contract signing. They focus mainly on a firm’s outlook, the quality of its entrepreneurs and its expected rate of return (Fried and Hisrich, 1994). MacMillan et al. (1985) study U.S. venture capitalists and find that they consider six factors when making investments, including entrepreneurs’ personality, entrepreneurs’ experience, the overall quality of the entrepreneurial teams, the innovation of the firm’s products, the market competition structure and the firm’s financial situation. The first two factors are the most important. In addition, VC/PEs pay great attention to firms’ social networks, human capital, patents and other factors (Baum and Silverman, 2004). Using their professionalism, experience and network resources, VC/PEs try their utmost to identify high-quality target firms. Chemmanur et al. (2011) and Guo and Jiang (2013) provide evidence that *ex ante* VC/PEs can select outstanding firms with higher labor productivity, R&D capabilities and sales growth. In fact, in an early study, Sahlman (1990) points out that VC/PEs are agencies that screen (and supervise) projects. Therefore, for acquirers, VC/PEs’ selection activities serve as an alternative to acquirers’ selection and screening of high-quality targets.

Second, VC/PEs enhance the quality of firms by providing *ex post* value-added services. After VC/PEs invest in the firms, they provide a series of value-added services to further increase the firms’ value. These services have three effects. First, they promote firms’ innovation. VC/PEs mostly invest in high-growth firms, which often possess more advanced R&D technology resources (Megginson and Weiss, 1991; Guo and Jiang, 2013). Consequently, the entry of a VC/PE can encourage them to develop more patents (Kortum and Lerner, 2000) and new products (Hellmann and Puri, 2002). After M&A, these innovative resources accelerate acquirers’ upgrading and transforming processes. Second, the *ex post* services can improve corporate governance. Following the investment of a VC/PE, directors are often appointed to the firms. These directors take on supervision and management responsibilities, optimize the compensation structure, enhance the corporate governance structure and standardize the firm’s management system (Bloom et al., 2015). Thus, when a firm’s operations are more standardized, it can help to decrease the difficulty in integration during M&As. Finally, the services help target firms recruit talent. High-quality talent guarantees a firm’s overall quality, especially for start-ups. High-quality talent with rich experience plays a key role in the success of technology commercialization (Dertouzos et al., 1988). Hellmann and Puri (2002) find that VC/PEs use their own networks to help target firms recruit senior management. Bottazzi et al. (2008) also find that the more experience venture capitalists have, the more likely they are to help start-ups recruit managers and directors. The high-quality talents become a valuable asset if they decide to stay with the acquirers after M&As. Therefore, the value-added services from VC/PEs exert a positive effect on firm quality, especially in their improvement of innovation capability, corporate governance enhancement and talent recruitment.

To summarize, VC/PEs can effectively identify high-quality targets *ex ante*, and can also further increase firm value by providing effective supervision and value-added services *ex post* (Chemmanur et al., 2011; Guo and Jiang, 2013). Hence, compared with firms without VC/PE holdings, those with VC/PE shares can ensure that they themselves are more premium targets and therefore send the signal that they are high quality in the M&A market. Based on this, we develop the following hypothesis.

Hypothesis 1. VC/PEs are a signal that target firms are high quality, and the stock market reacts positively to M&A transactions with VC/PE-backed target firms.

Reputation is a valuable intangible asset gradually accumulated through firms' past experience and satisfactory performance, and it is an important mechanism to alleviate information asymmetry (Hsu, 2004). In the absence of credible and sufficient firm information, outsiders rely more on the "certification" of firms from third-party agencies (Nahata, 2008), and the reputation of the agencies essentially determines the degree of credibility of the "certification". As they are in an industry with many competitors and relatively scattered markets, most VC/PEs adopt a differentiation strategy that focuses on specialized market segments. In these market segments, information asymmetry still exists between the firms and VC/PEs. Thus, the role of reputation is particularly important (Shu et al., 2011). A good reputation is a fundamental element in gaining a competitive advantage for VC/PEs. VC/PEs with a better reputation not only enter target firms at a lower cost (Hsu, 2004), but also are more favored by well-qualified targets. Furthermore, having a better reputation also means that the VC/PEs are more likely to select better target firms. As those VC/PEs with a better reputation tend to have broader networks and more professional management teams, they can more quickly help firms to grow and improve their quality upon entry. The effect of VC/PE reputation on firm performance is supported by the literature. Nahata (2008) finds that VC reputation can improve investment returns. The higher the reputation of the VC, the higher the probability of its successful exit, the faster the invested firms can achieve IPO and the higher the asset productivity upon IPO. Nahata (2008) further examines the source of the value generated when VC/PE reputation improves investment returns and finds that the value comes from both ex ante effective screening and ex post adequate monitoring experience. Krishnan et al. (2011) also find that the better the reputation of the VC, the more likely it is to select well-qualified targets. In addition, VCs can provide high-quality services to promote firms' corporate governance and improve post-IPO firm performance in the long run. Although outsiders (the acquirers) are less likely to know much about the detailed information of the firms in which VC/PEs invest, they are aware that VC/PEs pay attention to managing and enhancing their reputation, selecting superior targets and providing better value-added services. Therefore, the better the reputation of the VC/PE, the more prominent its "certification" role and the stronger the signal of the targets being high quality. Based on this, we propose our second hypothesis.

Hypothesis 2. When VC/PEs have a better reputation, it sends a signal that target firms are higher quality, and the market reacts more positively.

Collective rationality behavior refers to the concerted action taken by the majority of the community under the guidance of "common faith". When a target has more participating VC/PEs, it suggests that more different VC/PEs have a "common belief" in the screening process, and that these VC/PEs are unanimously optimistic about the targets' potential market prospects. Hence, such investment behavior is a result of collective rationality behavior. Pence (1982) points out that VC/PEs usually invite other investors to make assessments when they find a valuable investment target. If other VC/PEs are also willing to invest, the leading VC/PE is very likely to make the investment decision. Given that different VC/PEs make the same investment choices, their investment behavior is essentially mutually confirmed and recognized (Perez, 1986), which further proves that they identify high-quality targets. Lerner (1994) argues that in the presence of asymmetric information, two or more VC/PEs are more effective in gathering information and assessing value than one. As a result, the quality of the investment projects jointly identified by multiple VC/PEs is higher. Meanwhile, multiple VC/PEs can offer more complementary professional knowledge and management experience for investing in target firms (Casamatta and Haritchabalet, 2007), are more likely to increase target firms' R&D investments (Guo and Jiang, 2013) and eventually enhance the value of the targets (Brander et al., 2002). This means that based on collective rationality behavior, the larger the number of VC/PEs a target firm has, the more likely it is to deliver the signal that it is high quality. This leads to the following hypothesis.

Hypothesis 3. When target firms have more VC/PEs, it sends a signal that they are higher quality, and the market reacts more positively.

3. Research design

3.1. Sample selection and data sources

We first sort out the initial sample of VC/PEs exiting through M&As from the “China PEVC database” in the Wind database. Based on this sample, we then use the “Chinese M&A database” to find M&A events started by A-share listed firms and match them with the initial sample of VC/PEs exiting through M&As. Meanwhile, combined with the M&A announcements made by <http://www.cninfo.com.cn>, which is the information disclosure Website designated by the China Securities Regulatory Commission, we obtain 135 M&A events with VC/PEs involved in target firms. Due to the special characteristics of the financial industry and the treatment from the prior literature, we exclude acquirers and targets from the financial industry. We lose five observations when calculating the CARs. Finally, we have 130 observations (M&A events) with M&A sellers backed by VC/PEs. It should be noted that these M&A events mainly occurred during 2013–2014. To test our hypotheses, we create a control sample group by selecting M&A events in which ownership was transferred and the transactions were completed during 2013–2014 from the Wind M&A database. At the same time, we collect the financial data of target firms from the M&A announcements of CNINF, and exclude observations with missing financial data for the target firms. We obtain our financial data for the acquirers from the China Stock Market & Accounting Research database. Finally, we obtain 384 observations for the control sample group. Therefore, our total regression sample contains 514 observations. To mitigate the effect of outliers, we winsorize continuous variables at the 1% level in both tails.

3.2. Model specification and variable definitions

3.2.1. Model specification

Following McNichols and Stubben (2015) and Liu et al. (2015), we use regression models (1) and (2) to test whether VC/PEs have information content and the difference in information content resulting from the heterogeneity of the VC/PEs during M&As. We include industry and year dummies to control for the effects of industries and years in all of the regressions. In addition, we report *t*-values based on robust standard errors clustered by individual firms.

$$CAR = \alpha + \beta_1 \times VC/PE + \delta \times Control + \xi \quad (1)$$

$$CAR = \alpha + \beta_1 \times Reputation/Syndicate + \delta \times Control + \xi \quad (2)$$

3.2.2. Variable definitions

CARs are the cumulative abnormal returns at the M&A event date. We use the market model (Brown and Warner, 1985) to calculate CARs, that is, $R_{i,t} = \alpha_i + \beta_i \times R_{m,t} + \xi$. $R_{i,t}$ is the daily yield of stock *i* for period *t* including cash dividend reinvestment and $R_{m,t}$ is the daily rate of return of market *m* for period *t* including cash dividend reinvestment. Following Tian et al. (2013), we use the period between 180 and 30 trading days before the M&A announcement date as the estimation period to calculate α and β for each transaction in the sample. We then calculate the expected return values from 30 trading days before to 30 trading days after the announcement date based on the preceding model, and use the actual values minus the expected values to calculate the abnormal returns from 30 trading days before to 30 trading days after the M&A announcement date. Finally, we use the estimated parameters to calculate CARs over the three-day (−1, +1) event window centered on the M&A announcement date (Huang et al., 2014).

Following Huang et al. (2014) and Liu et al. (2015), we control for other variables that affect CARs, including the natural logarithm of the book value of acquirers' total assets in year *t*−1 ($Size_{t-1}$); firm's return on net assets in year *t*−1 (ROA_{t-1}); investment opportunities in year *t*−1 (Tobin's q_{t-1}); revenue growth in year *t*−1 ($Growth_{t-1}$); financial leverage in year *t*−1 ($Risk_{t-1}$); firm's free cash flow in year *t*−1 ($Cashflow_{t-1}$); transaction value amount (Expense); ownership concentration (Top and Top²); CEO duality (Dual); and target's assets, ROA and age. The definitions of the main variables are presented in Table 1.

Table 1
Variable definitions.

Variable type	Variable name	Symbol	Definition
Dependent variables	Cumulative abnormal return	CAR	Cumulative abnormal return for the acquirer before and after the M&A announcement event-day window
Explanatory variables	Venture capital/private equity fund	VC/PE	Dummy variable that equals 1 if there is a VC/PE-backed target and 0 otherwise
	Reputation of VC/PE	Reputation	Age of the lead VC/PE ^a
Control variables	Syndicated VC/PE	Syndicate	Number of VC/PEs in the target
	Firm asset	Size	Natural logarithm of the book value of the acquirers' total assets
	Firm performance	ROA	Net income/total assets
	Operating income growth rate	Growth	(Amount of revenue this year – Amount of revenue previous year)/ Amount of revenue previous year
	Investment opportunities of firm	Tobin's q	Market value of total assets/book value of total assets
	Financial leverage	Risk	(Net profit + Income tax Expense + Finance charge)/(Net profit + Income tax expense)
	Free cash flow	Cashflow	(Net profit + Interest expense + Non cash expense – Working capital supplement – Capital expenditure)/Total assets at the beginning of the year
	Transaction value	Expense	Natural logarithm of the value of M&A transactions
	Related M&A	Relative	Dummy variable that equals 1 if there is a related M&A and 0 otherwise
	Target asset	Target_asset	Natural logarithm of the book value of the target's total assets
	Target age	Target_age	Natural logarithm of (1 + Target age)
	Target performance	Target_roa	Net profit divided by total assets
	Ownership concentration	Top	Proportion of the first largest shareholder
	Square of ownership concentration	Top ²	Square of the proportion of the first largest shareholder
CEO duality	Dual	Firm's CEO duality, equal to 1 if the CEO also holds the position of board chair and 0 otherwise	

^a Lerner (1994), Gompers (1996) and Gompers and Lerner (1999) use the firm's age as a proxy for its reputation.

Table 2
Descriptive statistics.

Variables	Obs.	Mean	Median	Stdev	Min	Max
CAR[−1, 1]	514	0.060	0.030	0.100	−0.150	0.270
VC/PE	514	0.250	0	0.440	0	1
Size	514	21.66	21.57	1.060	19.57	24.91
Risk	514	1.190	1.020	0.880	−2.680	5.240
ROA	514	0.050	0.050	0.050	−0.100	0.200
Tobin's q	514	2.270	1.820	1.730	0.170	9.350
Growth	514	0.250	0.150	0.580	−0.520	4.650
Cashflow	514	0.010	0.020	0.090	−0.300	0.260
Dual	514	0.310	0	0.460	0	1
Top	514	0.343	0.318	0.147	0.106	0.708
Top ²	514	0.140	0.100	0.110	0.010	0.500
Relative Expense	514	0.350	0	0.480	0	1
Target_roa	514	19.14	19.27	1.510	16.12	22.43
Target_asset	514	0.080	0.060	0.180	−0.630	0.640
Target_age	514	18.93	18.95	1.510	14.43	22.59
		2.090	2.200	0.740	0	3.500

Table 3
Univariate tests of acquirers' CARs distinguished by VC backing status.

Variables	Obs.	CAR[−1, 1]
VC/PE-backed targets	130	0.117
Non-VC/PE-backed targets	384	0.040
Combined	514	0.053
Diff		0.077***

4. Empirical results

4.1. Descriptive statistics

Table 2 presents the descriptive statistics for the main variables. Table 3 lists the difference in average CARs between the VC/PE-backed targets and non-VC/PE-backed targets. There is a significant difference in stock market reactions based on whether the M&A activities involve VC/PE-backed targets. Compared with the scenario where the targets are not backed by VC/PEs, the stock market has a positive reaction to the M&A transactions in which the targets are backed by VC/PEs, and the acquirers receive higher CARs, providing preliminary support for Hypothesis 1.

4.2. Multivariate regression analysis

4.2.1. Results of Hypothesis 1

Table 4 reports the regression results of Hypothesis 1. Column (1) presents the regression result based on the sample excluding VC/PEs. The estimated coefficients of Target_roa and Target_asset are both insignificant, suggesting that the target firms' financial information does not convey significant information content for acquirers to distinguish the quality of the target firms. Column (2) includes the regression results with VC/PEs, not controlling for Target_roa and Target_asset. The results show that the coefficient of VC/PE is significantly positive at the 1% level (t -statistic = 3.05). Column (3) includes VC/PE, Target_roa and Target_asset, and the coefficient of VC/PE is still significantly positive at the 1% level (t -statistic = 3.20). This suggests that VC/PEs contain significant information content in the M&A process and send a favorable signal that the target firms are high quality. Thus, the market has positive feedback for M&A activities involving VC/PE-backed target firms. That is, relative to M&A transactions without VC/PE-backed target firms, those with VC/PE-backed targets yield higher CARs for investors. Overall, the results support Hypothesis 1.

Firms invested in by VC/PEs usually possess abundant heterogeneous resources, with high growth and potential market prospects. These resources function as “fresh blood” for the acquirers, and they play an important role in achieving transformation and upgrades for listed firms. In terms of the control variables, the size of the transaction is significantly positive at the 1% level, implying that the bigger the size of the transaction, the stronger the effect it has on the acquirers’ value. As a result, the stock market has a significant positive response. The coefficient of related M&A (Relative) is not significant, indicating an insignificant difference in the effect on acquirers’ value depending on whether the acquisitions are related. Firm size is significantly negative at the 1% level in all of the regressions, consistent with studies by Huang et al. (2014) and Liu et al. (2015).

Table 4
Hypothesis 1 results.

Variable	(1) Full sample CAR[−1, 1]	(2) Full sample CAR[−1, 1]	(3) Full sample CAR[−1, 1]
Constant	0.116 (1.07)	0.126 (1.18)	0.148 (1.39)
VC/PE		0.037*** (3.05)	0.038*** (3.20)
Size	−0.036*** (−7.83)	−0.035*** (−8.09)	−0.034*** (−7.39)
Risk	0.002 (0.53)	0.001 (0.36)	0.001 (0.34)
ROA	−0.141 (−1.35)	−0.144 (−1.42)	−0.133 (−1.30)
Growth	−0.003 (−0.41)	−0.002 (−0.33)	−0.004 (−0.57)
Tobin’s <i>q</i>	−0.008*** (−2.45)	−0.008*** (−2.64)	−0.008*** (−2.60)
Cashflow	0.027 (0.62)	0.027 (0.63)	0.0200 (0.45)
Dual	0.012 (1.37)	0.009 (1.09)	0.011 (1.22)
Top	−0.161 (−1.35)	−0.189 (−1.60)	−0.193 (−1.64)
Top ²	0.272* (1.81)	0.317** (2.13)	0.326** (2.20)
Relative	0.012 (1.30)	0.011 (1.20)	0.013 (1.43)
Expense	0.027*** (6.55)	0.022*** (6.80)	0.022** (4.74)
Target_roa	0.028 (1.08)		0.038 (1.58)
Target_asset	−0.003 (−0.68)		−0.002 (−0.54)
Target_age	0.001 (0.18)	−0.001 (−0.19)	−0.000 (−0.07)
Year	YES	YES	YES
Industry	YES	YES	YES
<i>N</i>	514	514	514
Adj. <i>R</i> ²	0.311	0.327	0.329

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

4.2.2. Further analysis of Hypothesis 1

Table 4 shows that the stock market responds positively to M&A transactions in which acquirers acquire VC/PE-backed targets. What is the mechanism underlying the effect of VC/PEs on the stock market? If VC/PEs play the role of an information mechanism in the M&A process, then we should observe that the more difficult it is for acquirers to obtain information to identify high-quality targets, the more significant VC/PEs' "certification" role is. To further verify that the information transmitted by VC/PEs during M&A serves as "certification", we choose two specific aspects to examine the question: the acquirers' M&A experience and the information environment of the target firms. First, we look at the acquirers' M&A experience. Organizational learning theory holds that experiential learning is a process of organizations acquiring, understanding, spreading, developing and using their experience (Huber, 1991). Sophisticated M&A experience can enable firms to continuously improve their M&A management process and apply the improved M&A knowledge to future strategic decisions (Guo et al., 2011). Such a process can effectively enhance the ability of firms to identify M&A targets and lead to better M&A performance (Fowler and Schmidt, 1989). When the acquirers lack M&A experience, it is more difficult to identify high-quality targets. At this time, if VC/PEs can transfer information, their "certification" role should be strengthened. Second, we investigate the information environment in which the targets are located. From the perspective of information dissemination, when a region has a higher degree of marketization, the information flow mechanism is smoother and communication costs are lower. This also makes it more efficient for outsiders to obtain business information (Yu et al., 2012) and encourages more standardized information disclosure. On the contrary, in areas with lower levels of marketization, it is more difficult and costly for outsiders to obtain information. Therefore, the worse the information environment is for target firms, the more difficult it is for acquirers to obtain effective information and identify high-quality targets. In this case, VC/PEs should be able to play a more significant "certification" role.

Accordingly, depending on the M&A experience of the acquirers, we divide the M&A sample into experienced and inexperienced groups.¹ We measure the information environment based on the government intervention index in the areas where target firms are located (Yu et al., 2012).² Using the level of government intervention, we sort the sample into two groups: targets with a better information environment for the targets and targets with a worse information environment. Table 5 lists the results. Columns (1) and (2) report the regression results of the groups sorted by M&A experience. The coefficient of VC/PE is significantly positive at the 1% level in the inexperienced group and insignificant in the experienced group, indicating that it is more difficult for acquirers to identify high-quality targets when they lack M&A experience and supporting the notion that VC/PEs provide stronger "certification". Columns (3) and (4) report the group results based on information environment. The coefficient of VC/PE is significantly positive at the 1% level in the bad information environment group and insignificant in the good information environment group. This means that VC/PEs play a more important role in the M&A process when acquirers are faced with a worse information environment. Thus, the results of Table 5 further support Hypothesis 1.

4.2.3. Results of Hypotheses 2 and 3

Table 6 presents the results of Hypotheses 2 and 3. Columns (1) and (2) report the regression results including VC/PE reputation. Column (2) includes the target firms' financial information, Target_roa and Target_asset. The results show that the coefficient of Reputation is significantly positive at the 5% level, suggesting that the better the VC/PE reputation, the more prominent its "certification" and consequently the stronger the stock market's reaction. This supports Hypothesis 2. Columns (3) and (4) report the results related to the number of VC/PEs. The coefficient of the number of VC/PEs is significantly positive at the 10% level. That is, the more VC/PEs there are, the stronger the "certification" is, supporting Hypothesis 3. For the same target, firm evaluation is more accurate when there are two or more VC/PEs involved compared with one single VC/PE. As a result, the target firm conveys a signal of having higher quality when it receives more recognition from multiple VC/PEs, and the acquirer obtains higher CARs when conducting M&A transactions.

¹ Acquisition experience is a proxy for the number of successful acquisitions. The higher the number of acquisitions, the more abundant the accumulated experience.

² The higher the amount of government intervention, the lower the degree of marketization, the higher the cost of obtaining a firm's information and the more difficult it is for the acquirer to obtain the target information.

Table 5
Cross-sectional analyses of different groups.

Variables	(1) Lack M&A experience CAR[−1, 1]	(2) Rich M&A experience CAR[−1, 1]	(3) Bad information environment CAR[−1, 1]	(4) Good information environment CAR[−1, 1]
Constant	0.157 (1.06)	0.546*** (2.69)	0.268* (1.66)	0.282* (1.82)
VC/PE	0.040*** (3.10)	0.028 (1.09)	0.058*** (3.37)	0.024 (1.50)
Size	−0.034*** (−5.88)	−0.026*** (−3.13)	−0.043*** (−7.06)	−0.029*** (−4.37)
Risk	0.002 (0.45)	0.003 (0.49)	0.005 (1.11)	0.006 (0.88)
ROA	−0.129 (−1.03)	−0.097 (−0.58)	−0.092 (−0.70)	−0.189 (−1.16)
Growth	−0.005 (−0.63)	0.012 (1.25)	−0.005 (−0.05)	−0.007 (−1.13)
Tobin's <i>q</i>	−0.010*** (−2.71)	−0.006 (−0.92)	−0.012** (−2.56)	−0.006 (−1.35)
Cashflow	0.013 (0.25)	0.110 (1.36)	−0.007 (−0.09)	−0.030 (−0.58)
Dual	0.013 (1.34)	0.011 (0.59)	0.013 (1.08)	0.013 (1.18)
Top	−0.232* (−1.76)	−0.246 (−0.87)	−0.233 (−1.35)	−0.144 (−0.86)
Top ²	0.425** (2.51)	0.276 (0.77)	0.366* (1.72)	0.242 (1.12)
Relative	0.023** (2.17)	−0.002 (−0.14)	−0.011 (−0.93)	0.045*** (3.41)
Expense	0.023*** (4.52)	0.018* (1.84)	0.017*** (2.66)	0.022*** (3.73)
Target_roa	0.065** (2.23)	0.002 (0.03)	−0.013 (−0.40)	0.086** (2.53)
Target_asset	−0.004 (−0.89)	−0.001 (−0.08)	0.005 (1.00)	−0.008 (−1.43)
Target_age	0.007 (1.16)	−0.009 (−0.84)	−0.002 (−0.28)	0.003 (0.34)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
<i>N</i>	337	177	261	253
Adj. <i>R</i> ²	0.425	0.122	0.366	0.360

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

5. Robustness checks

We also conduct the following robustness tests to further strengthen our results.

5.1. Propensity score matching (PSM)

As using an unbalanced sample may cause certain deviations in the regression results, we use the propensity score matching (PSM) method to match and construct a balanced sample for the regressions. Based on the characteristics of the target firms (e.g., Target_asset, Target_roa and Target_age), we use the near matching method to conduct one-to-one matches and create the control sample. This way, we find 120 observations in the control group (VC/PE = 0) based on the 120 observations in the treatment group (VC/PE = 1); thus,

Table 6
Results of Hypotheses 2 and 3.

Variables	(1) VC/PE = 1 CAR[-1, 1]	(2) VC/PE = 1 CAR[-1, 1]	(3) VC/PE = 1 CAR[-1, 1]	(4) VC/PE = 1 CAR[-1, 1]
Constant	0.767*** (3.57)	0.665*** (2.67)	0.710*** (3.24)	0.631** (2.49)
Reputation	0.028** (2.10)	0.027** (2.07)		
Syndicate			0.009* (1.85)	0.009* (1.66)
Size	-0.047*** (-4.64)	-0.048*** (-4.86)	-0.041*** (-3.82)	-0.042*** (-4.10)
Risk	0.022* (1.67)	0.021 (1.51)	0.021* (1.68)	0.021 (1.53)
ROA	0.202 (0.80)	0.204 (0.81)	0.117 (0.48)	0.124 (0.50)
Tobin's <i>q</i>	-0.011** (-2.14)	-0.010** (-1.99)	-0.010** (-1.99)	-0.009* (-1.78)
Growth	-0.033*** (-3.83)	-0.034*** (-3.87)	-0.036*** (-3.95)	-0.036*** (-3.94)
Expense	0.002 (0.15)	-0.006 (-0.33)	-0.002 (-0.16)	-0.009 (-0.53)
Cashflow	-0.042 (-0.50)	-0.032 (-0.37)	-0.062 (-0.78)	-0.051 (-0.61)
Target_roa		0.018 (0.26)		0.040 (0.56)
Target_asset		0.013 (1.03)		0.012 (0.86)
Relative	0.034 (1.16)	0.031 (1.09)	0.045 (1.57)	0.042 (1.46)
Target_age	0.036** (2.20)	0.030* (1.74)	0.046*** (2.66)	0.039** (2.17)
Dual	0.022 (1.02)	0.022 (0.98)	0.011 (0.55)	0.013 (0.60)
Top	-0.374 (-1.12)	-0.477 (-1.35)	-0.279 (-0.82)	-0.387 (-1.09)
Top ²	0.588 (1.22)	0.734 (1.43)	0.481 (0.98)	0.639 (1.24)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
<i>N</i>	117	117	117	117
Adj. <i>R</i> ²	0.384	0.378	0.375	0.368

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

the total sample size is 240. We re-run the regression for [Hypothesis 1](#), and the regression results are shown in [Table 7](#). Although their significance level slightly decreases, the coefficients remain significant, indicating that our results are consistent.

5.2. Using the Heckman correction

To mitigate the self-selection problem, we use the Heckman two-step method ([Heckman, 1979](#)) to adjust for self-selection. As firms with technological innovation are more likely to become the investment targets of VC/PEs and Guangdong, Beijing, Shanghai and Zhejiang are areas with more VC/PEs, and we create variables based on whether the target firms have technological innovation and whether they are located in Guangdong, Beijing, Shanghai or Zhejiang. The first-step regression results show that whether the target firms are technologically innovative and whether they are located in the preceding provinces have strong explanatory power

Table 7
Results of Hypothesis 1 (PSM).

Variables	(1) Full sample CAR[−1, 1]	(2) Full sample CAR[−1, 1]	(3) Full sample CAR[−1, 1]
Constant	0.295** (2.06)	0.312** (2.22)	0.310** (2.17)
VC/PE		0.028* (1.83)	0.028* (1.78)
Size	−0.042*** (−7.19)	−0.042*** (−7.38)	−0.041*** (−6.78)
Risk	0.008 (0.90)	0.007 (0.86)	0.007 (0.83)
ROA	−0.117 (−0.71)	−0.133 (−0.83)	−0.128 (−0.78)
Growth	−0.015*** (−2.66)	−0.016*** (−2.75)	−0.017*** (−2.84)
Tobin's <i>q</i>	−0.009** (−2.41)	−0.010** (−2.54)	−0.010** (−2.48)
Cashflow	0.057 (0.87)	0.055 (0.87)	0.049 (0.76)
Dual	0.027* (1.93)	0.024* (1.85)	0.025* (1.82)
Top	−0.146 (−0.74)	−0.179 (−0.91)	−0.174 (−0.89)
Top ²	0.260 (1.01)	0.315 (1.21)	0.309 (1.20)
Relative	0.016 (1.18)	0.018 (1.29)	0.019 (1.35)
Expense	0.026*** (3.55)	0.020*** (3.43)	0.020** (2.29)
Target_roa	0.012 (0.20)		0.026 (0.46)
Target_asset	−0.004 (−0.40)		−0.001 (−0.06)
Target_age	0.005 (0.60)	0.006 (0.63)	0.006 (0.68)
Year	YES	YES	YES
Industry	YES	YES	YES
<i>N</i>	240	240	240
Adj. <i>R</i> ²	0.315	0.329	0.324

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

toward the likelihood of targets having VC/PEs (not reported). We then include the inverse Mills ratio obtained from the first step in regression model 1. Table 8 lists that the inverse Mills ratio is significantly negative and that the VC/PE coefficients remain significantly positive, which again supports the validity of our results.

5.3. Alternative proxy for CAR

According to the literature, the commonly used window periods also include [−1, 0] and [−1, 2], and the estimated period also includes [−150, −30]. Therefore, we use these new window periods and estimated period to calculate new price reactions and re-run the regressions. The main results remain unchanged (not reported).

Table 8
Results of Hypothesis 1 (Heckman two-step).

Variables	(1) Full sample CAR[−1, 1]	(2) Full sample CAR[−1, 1]
Constant	0.160 (1.49)	0.169 (1.57)
VC/PE	0.027** (2.35)	0.029** (2.50)
Size	−0.033*** (−7.45)	−0.032*** (−7.05)
Risk	0.001 (0.26)	0.001 (0.25)
ROA	−0.147 (−1.44)	−0.140 (−1.36)
Growth	−0.004 (−0.58)	−0.005 (−0.72)
Tobin's <i>q</i>	−0.008** (−2.42)	−0.008** (−2.38)
Cashflow	0.026 (0.62)	0.022 (0.51)
Dual	0.010 (1.23)	0.011 (1.31)
Top	−0.185 (−1.58)	−0.189 (−1.61)
Top ²	0.312** (2.12)	0.320** (2.17)
Relative	0.011 (1.30)	0.013 (1.42)
Expense	0.022*** (6.76)	0.021*** (4.52)
Target_roa		0.026 (1.09)
Target_asset		−0.001 (−0.09)
Target_age	−0.001 (−0.25)	−0.001 (−0.22)
Inverse Mills ratio	−0.051*** (−3.78)	−0.048*** (−3.37)
Year	YES	YES
Industry	YES	YES
<i>N</i>	514	514
Adj. <i>R</i> ²	0.343	0.342

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

5.4. Controlling for other corporate governance variables

We include executive compensation and board size to test [Hypotheses 1–3](#), and the results of the main explanatory variables remain the same (not reported).

6. Complementary test: The effect of VC/PEs on M&A premiums

In theory, if VC/PEs convey the signal that target firms are high quality, then the sellers in M&A transactions should have more negotiating power over pricing and may in turn ask for higher M&A prices. A large number of studies have shown that a high M&A price is often an important reason for the failure of an M&A,

causing the acquirers to encounter a “winner’s curse” situation. In this case, the market may respond negatively to such M&A activities (Gompers and Xuan, 2012). However, our empirical results show that the CAR is significantly positive. Therefore, the acquirers do not fall into the “winner’s curse” situation, which means that the acquirers do not pay an excessive premium. To verify this inference, we use the M&A premium regression model following Huang et al. (2014). Table 9 lists the results. Column (1) contains the results without controlling for year and industry, and Column (2) controls for year and industry. Column (3) controls for the corporate governance variables. The results show that regardless of whether we control for the industry, year or corporate governance variables, the VC/PE coefficients are significantly negative, suggesting that acquirers do not need to pay a higher premium when acquiring VC/PE-backed targets; in fact, they actually pay a lower M&A premium. The results indicate that acquirers who acquire VC/PE-backed targets do not

Table 9
Results of M&A premiums.^a

Variables	(1) Full sample Premium	(2) Full sample Premium	(3) Full sample Premium
Constant	−3.014 (−1.25)	−2.328 (−0.98)	−6.541* (−1.95)
VC/PE	−0.487** (−2.12)	−0.483* (−1.88)	−0.571** (−2.26)
Size	0.052 (0.53)	−0.014 (−0.14)	−0.032 (−0.27)
ROA	−1.242 (−0.60)	−1.950 (−0.92)	−2.279 (−1.00)
Tobin’s <i>q</i>	0.033 (0.44)	0.012 (0.16)	0.003 (0.04)
Growth	0.028 (0.19)	0.019 (0.11)	0.028 (0.17)
Cashflow	0.627 (0.83)	0.881 (1.04)	1.035 (1.22)
Target_age	−0.090 (−0.76)	−0.104 (−0.85)	−0.098 (−0.80)
Target_roa	2.017*** (2.93)	1.939*** (2.75)	1.838** (2.40)
Target_asset	−1.274*** (−10.65)	−1.292*** (−9.98)	−1.265*** (−9.67)
Expense	1.510*** (11.86)	1.530*** (11.37)	1.529*** (11.27)
Dual			0.113 (0.57)
Top			0.039 (1.43)
Top ²			−5.755 (−1.65)
Dir_num			−0.068 (−1.05)
Pay			0.264 (1.38)
Year	NO	YES	YES
Industry	NO	YES	YES
<i>N</i>	435	435	435
Adj. <i>R</i> ²	0.442	0.454	0.457

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

^a Excluding negative net assets and missing data, the regression sample decreases to 435 firms.

encounter a “winner’s curse” situation. In terms of control variables, the acquirers’ characteristics and corporate governance have little influence on M&A premiums, which is consistent with the findings by Huang et al. (2014). However, the characteristics of target firms have a significant effect on M&A premiums. In addition, the scale of M&A transactions has a significant positive effect on M&A premiums.

Why do VC/PEs not ask for higher purchase prices when they seem to have the advantage in negotiations? We offer two possible explanations. First, from the information perspective, VC/PEs may communicate more with acquirers in the M&A process, thus decreasing the degree of information asymmetry on the acquirers’ side and making the M&A transaction process more effective. As a result, the acquirers do not pay a higher premium. Second, VC/PEs face the pressure of liquidity in China. Based on the reality of China’s VC/PE investments, the almost feverish stock market before 2007 attracted a large number of VC/PEs to invest in non-listed firms, which helped the VC/PEs to obtain high returns through IPOs. However, after 2007, China’s stock market experienced a long bear market. Furthermore, IPO approvals and listings were shutdown during 2012 and 2013. These events led to inventory accumulation for many VC/PEs.³ Faced with severe pressure from liquidity, VC/PEs can only change their exiting channel to exit M&As.

Therefore, VC/PEs convey the signal that a target is high quality, and effective communication with acquirers decreases the information asymmetry in target pricing. In addition, VC/PEs face liquidity pressure, causing target firms to make concessions in price negotiations.⁴ This suggests that acquiring VC/PE-backed targets is a “cheap but fine” transaction. As a result, acquirers not only obtain high-quality targets, but also benefit from not paying excessively high premiums.

7. Conclusions and implications

Due to the information gap faced by many acquirers in the M&A process, identifying high-quality target firms has become a crucial step in M&A transactions for firms to generate value. In this study, we examine the characteristics of M&A sellers and find that VC/PEs have significant information content in the M&A market. Our specific findings are detailed as follows.

First, VC/PEs have a very significant “certification” role during M&As. Based on the short-term reactions of the stock market, investors respond positively when bidders acquire VC/PE-backed targets. Second, when acquirers lack M&A experience and targets are located in inferior information environments, bidders face a greater information gap, and the “certification” role of VC/PEs becomes more prominent. Third, there is a significant difference in the information content due to the heterogeneity of VC/PE features. The higher the reputation of the VC/PE and the more involved it is in the target firm, the stronger its information content. Finally, acquirers do not pay premiums when acquiring high-quality targets, suggesting that the acquisition of VC/PE-backed targets is a “cheap but fine” transaction.

Our study has three practical implications. First, through VC/PEs’ signaling, acquirers can select high-quality targets in the M&A market. At present, China’s many firms are facing the dilemmas of transformation and upgrading. Their main problem lies in the lack of core competitiveness gained from heterogeneous resources. M&As, as an important way to achieve rapid transformation and upgrading, have been accepted and favored by an increasing amount of firms. However, determining how to identify high-quality targets has been an ongoing struggle for acquirers. According to our findings, it is a wise investment to acquire VC/PE-backed targets. As acquirers face a serious information gap when searching for target firms with potentially high growth (e.g., technological innovation firms), it is difficult for them to evaluate the future market value of targets. Relying on “certification” from VC/PEs, acquirers can more easily screen out high-quality targets from the large pool of potential target firms.

Second, investors can obtain higher returns from investments by purchasing the stocks of firms that acquire VC/PE-backed targets. Based on our findings, bidders who acquire targets with VC/PE holdings can receive

³ China’s first investment research report shows that since 2000 PEs have invested in more than 9000 projects and failed to exit from more than 7500 projects. Those who did not withdraw from projects invested a total of more than 600 billion yuan.

⁴ *Chongqing Business Newspaper* provides a realistic annotation titled “How VC/PE see profit is almost equal to the ‘flesh’ as the IPO blocked”. According to statistics, the total transaction amount was \$355 million in 2012 with 140 cases of M&A exit. The average book return is only 1.1 times, which means that the M&A transaction price for VC/PEs is very low.

higher abnormal returns from the market. Therefore, investors who buy the stocks of such firms can make more investment profits in the stock market. In addition, market reactions differ depending on the heterogeneity of the VC/PE characteristics, which also help investors to better identify and discover the value of stocks after M&As.

Third, our study shows that an active M&A market not only provides acquirers with the opportunity to gain heterogeneous resources externally and quickly improve the core competitiveness of firms, but also develops VC/PEs. VC/PEs search for valuable start-ups on the entrepreneurial market in which to invest so they can gain reasonable returns through M&A exits. Meanwhile, large firms acquire these high-quality targets through the M&A market to achieve rapid development. As a result, a benign “ecosystem” is formed from the interaction between mature firms, VC/PEs and start-ups.

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