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Stock Market Manipulation and Corporate Venture Capital Investments

By *Douglas Cumming, Yuan Li, and Yimeng Yu*

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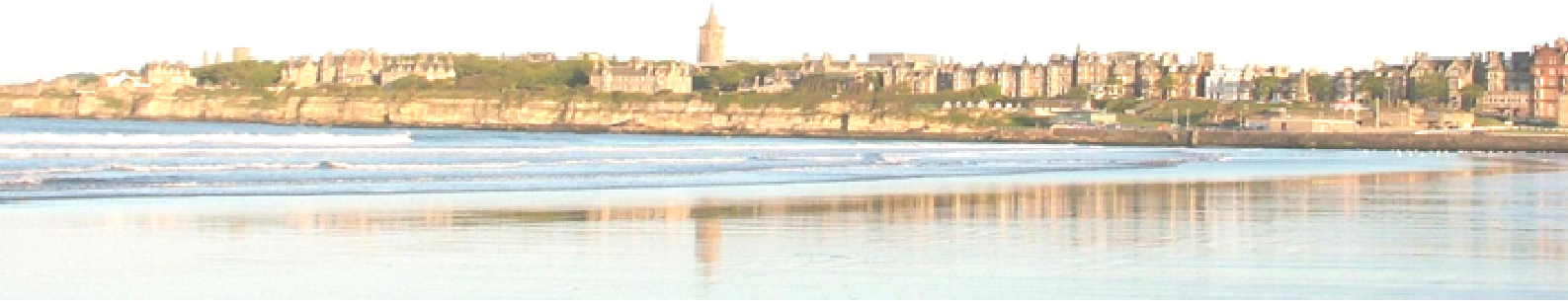

Stock Market Manipulation and Corporate Venture Capital Investments

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Abstract

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Keywords: Market microstructure, Market manipulation, Venture capital, Syndication, Exit

JEL Codes: G14, G24

1. Introduction

Stock manipulation poses significant challenges to the functioning and integrity of financial markets. This deceptive practice can distort stock prices, create uncertainty in the market, disrupt the efficient allocation of resources, and ultimately impact firm investment decisions, strategies, and performance. There are various types of stock manipulation tactics employed by market participants, including but not limited to pump-and-dump schemes, wash trades, spoofing, and layering. Allen and Gale (1992) provide a comprehensive framework for understanding stock manipulation, defining it as any action that artificially inflates or deflates the price of a security for personal gain.

Research in the domain of financial market manipulation offers an in-depth understanding of the multiple strategies companies use to artificially influence share prices, such as coordinated pricing, circular trading, and schemes that involve inflating and rapidly selling stock (Cumming et al.,2011; Aggarwal & Wu, 2006; Comerton-Forde and Putniņš, 2011, 2014). Such manipulative practices not only skew market data but also result in the inefficient allocation of capital and heightened vulnerability for investors (Brunnermeier & Oehmke, 2012). Engaging in deceptive conduct within the investment landscape comes with considerable damage to a firm's reputation (Karpoff et al., 2008a,b).

Reputation is very important for successful venture capital investing (Nahata, 2008). Corporate venture capital (CVC) investments have emerged as an essential tool for large corporations to drive innovation, access novel technologies, and diversify their portfolios. CVC investments are a form of external corporate venture in which established firms invest in external entrepreneurial ventures to access innovative technologies, markets, or resources (Dushnitsky & Lenox, 2005). The decision to engage in CVC investments is influenced by various factors, including the parent firm's internal resources, strategic goals, and external environment (Wadhwa & Basu, 2013). Research on CVC has primarily examined the determinants of CVC success (Gompers & Lerner, 2000), the relationship between CVC and innovation (Chemmanur & Fulghieri, 2014), and the role of the institutional environment in shaping VC outcomes (Block, Fisch, & Van Praag, 2017).

Despite the growing importance of CVC investments, little is known about how stock manipulation affects CVC activities. This research aims to fill this gap by examining the

relationship between stock manipulation and the entry, strategy, and performance of CVC investments. Using data from the U.S. over 2007-2018, we collectively present the stock manipulation levels before and after CVC entry, as measured by the continuous trading manipulations during rolling 30-minute windows of trading days, and the end-of-day manipulations. Our analyses of the relationship between stock manipulation and CVC investments employ panel regressions, taking into account industry and time-fixed effects. To ensure that all potential confounding factors are considered, we utilize the propensity score matching method to identify matched groups using all control variables and industry classifications. This approach allows us to examine the connection between stock manipulation and CVC investments more accurately and comprehensively, accounting for various factors that could impact the relationship.

Compared to firms without CVCs, the results indicate that firms with less frequent stock manipulation are more likely to engage in CVC investments. Firms with CVC investments have 16% fewer stock manipulations (using 6-month and one-year window measurements) compared to those without CVC investments. On a broad level, the findings are consistent with the view that CVC-involved firms are on average more transparent, accountable, and focused on long-term growth. Effective corporate governance is essential for financial market functionality, market stability, investor confidence, and efficient capital allocation.

In the short term, six months around the CVC entry, there is a discernible rise in stock manipulation, signaling the market's heightened sensitivity or reaction to such a strategic move. This could be attributed to various factors, including speculative trading or insider advantage. However, from one to two years post-CVC entry, the level of stock manipulation significantly decreases. This long-term decline suggests that CVC investments may positively impact corporate governance and operational efficiency, thus deterring manipulative stock market practices in the extended run. The finding points to the dual role of CVC investments: as a catalyst for short-term market irregularities and as a helper for long-term corporate stability and transparency.

We further examine how stock manipulation affects CVC's performance and strategy. The results indicate that firms with higher levels of stock manipulation are less likely to attract syndicated investors and less likely to achieve successful exits through IPOs or M&As. The findings are consistent with the view that market manipulation negatively affects reputational capital and trust, and brings potential regulatory scrutiny, distorted decision-making, financial

instability, and misaligned incentives, thereby impairing CVC's performance. The study underscores the importance of good governance practices, institutional quality, and transparency in fostering CVC investment success and collaboration opportunities.

Additionally, several tests are conducted to explore the potential mechanisms by which CVC investments might lead to stock manipulation. These mechanisms revolving around the parent firm's ownership structure, cash holding position, and the CVC fund size relative to the firm play as the moderator role. This includes the institutional ownership effect, where higher ownership mitigates short-term stock manipulation but may also lead to higher manipulation levels on its own. The effect of the liquidity status of the parent firm is discussed, demonstrating that higher cash holdings can act as a mitigating factor against stock manipulation associated with CVC investments. Finally, the short-term effect of CVC fund size is examined, with results indicating that a substantial fund size reduces the link between CVC investments and manipulation by emphasizing the parent firm's commitment to growth. Although it is tough to definitively prove the underlying mechanisms, the tests indicate the causal relationship between CVC investments and stock manipulation, with various factors moderating this association in the short term.

We also investigate the stock market's reaction to different types of CVC investments using the Difference in Differences (DiD) methodology. Early-stage CVC investments, perceived as higher risk, show an 11% increase in short-term stock manipulation but may also signal innovation commitment. Late-stage investments, seen as less risky, reveal a 15% decrease in manipulation but can lead to a 16% increase post-investment if perceived as financial opportunism. Syndicated investments, with a lower level of manipulation, show a 7% decrease post-investment, reflecting the market perception of reduced risk. These findings underscore the complex interplay between CVC investment types and stock manipulation, with variations in risk perception and strategic alignment influencing market reactions.

The study seeks to elucidate the long-term mechanisms that lead to the reduction in stock manipulation post-CVC entry, analyzing institutional ownership, Free Cash Flow to the Firm (FCFF), and Operating Cash Flow (OCF) within a window of [-2 years, +2 years]. The mediation effect reveals that institutional ownership rises by 1.5% after CVC entry, signaling a preference for innovative strategies, thus decreasing stock manipulation by 58% with one standard deviation increase of institutional ownership. This is associated with greater scrutiny and a stabilizing long-

term focus. FCFF's increase of 1.9% after CVC entry indicates alignment with the parent firm's goals, resulting in a 69% decrease in manipulation. The high FCFF/asset ratio also signifies the company's financial strength. Conversely, OCF shows a 0.5% decrease, reflecting a temporary dip in available cash, yet the interaction term indicates a complex positive correlation with stock manipulation post-CVC entry. This complexity might relate to investors' perception of the firm's financial health and innovation alignment. Overall, the tests support the hypothesis that CVC investments contribute to the long-term decrease in stock manipulation, corroborating the multi-faceted influence of CVC on the financial and operational aspects of the firm.

This research extends existing scholarly work on both corporate venture capital (CVC) investments and stock manipulation phenomena. By scrutinizing the nexus between stock manipulation activities and CVC engagements, the investigation sheds light on specific trading patterns that emerge in close temporal alignment with corporate venturing actions. Such insights are invaluable for investors, regulatory authorities, and policy architects, as they can inform the design of measures aimed at bolstering market transparency and stability. Additionally, this investigation has the potential to pave the way for innovative theoretical constructs elucidating the intricate mechanisms via which CVC initiatives exert influence on stock manipulation tendencies. The conclusions drawn from this research could enrich wider discourses on corporate governance, market effectiveness, and financial regulatory frameworks by emphasizing the pivotal role CVC undertakings play in molding corporate stock market behaviors and their capacity to minimize market manipulation.

2. **Hypothesis development**

2.1. The Effect of CVC Investments on Stock Manipulation

The role of stock manipulation in influencing corporate investment decisions has been well-established in the literature (Beneish, 1999; Erickson & Wang, 1999). Stock manipulation refers to the practice of artificially inflating or deflating the price of a security or otherwise influencing the behavior of the market for personal gain (Allen and Gale, 1992). It is a form of market abuse and can have detrimental effects on investors and the overall market (Cumming et al., 2011). Firms with lower levels of stock manipulation may be perceived as more transparent

and trustworthy, which could make them more attractive to CVC investors. Studies have shown stock manipulation harms various strategic investments, including mergers and acquisitions and innovation (Cumming et al., 2020a, b).

A primary driver for companies to participate in Corporate Venture Capital (CVC) investments lies in the quest to access groundbreaking technologies and expertise (Wadhwa & Kotha, 2006). Firms with lower levels of stock manipulation may have a more transparent and open culture, which could facilitate the integration of external knowledge and collaboration with entrepreneurial ventures and innovation (Cumming et al. 2020b). Such firms may also be better positioned to absorb the knowledge and capabilities of their portfolio companies (Teece, Pisano, & Shuen, 1997). Engaging in CVC investments is also seen as a strategy to mitigate innovation-related risks (Gompers & Lerner, 2000). Firms with lower levels of stock manipulation may have more effective risk management processes in place, which could enable them to better manage the uncertainties associated with CVC investments. In addition, firms with a reputation for transparency and good governance practices may be more likely to attract high-quality portfolio companies (Stuart, Hoang, & Hybels, 1999).

Prior research has shown that CVC investors are attracted to firms with better corporate governance, transparency, and financial performance (Chemmanur, Loutskina, & Tian, 2014; Dushnitsky & Shapira, 2010). Firms seeking CVC investments may be incentivized to reduce stock manipulation to improve their attractiveness to potential investors. The literature suggests that the involvement of CVC investors can lead to better corporate governance and increased transparency in their portfolio companies. CVC investors often play an active role in the firms they invest in, providing resources, expertise, and strategic guidance (Wadhwa & Kotha, 2006). This active involvement can contribute to a more robust governance structure and discourage market manipulation activities. CVC-backed firms may benefit from enhanced transparency as investors demand greater access to financial information and accountability (Gompers & Lerner, 2000).

The reputation and credibility associated with CVC investments can also act as a deterrent to market manipulators. Prior studies have highlighted the signaling effect of CVC investments, wherein affiliation with established corporate investors can enhance a firm's reputation in the market (Gompers & Lerner, 2000; Hsu, 2004). This positive perception can make firms with CVC investments less attractive targets for market manipulation.

A stronger financial position resulting from CVC investments can also contribute to reduced susceptibility to market manipulation. CVC investments provide firms with capital and resources to grow and improve their financial performance, making them less vulnerable to market manipulation. Companies with better financial performance are likely to withstand market volatility and maintain investor confidence, further reducing the appeal for market manipulators.

Monitoring and oversight by CVC investors play a crucial role in identifying and addressing potential market manipulation activities. CVC investors have a vested interest in the performance of their portfolio companies and often maintain close relationships with the management teams (Dushnitsky & Lenox, 2005). This close relationship can help detect and prevent market manipulation practices, minimizing the risk of such activities going unnoticed.

Finally, a diversified shareholder base, which is typical for firms with CVC investments, can make it more challenging for market manipulators to coordinate and execute manipulation schemes. The presence of a significant equity stake by CVC investors, alongside other shareholders, can create a more resilient market environment, discouraging market manipulation attempts (Dushnitsky & Lenox, 2005).

Therefore, we hypothesize that the presence of CVC investments in a firm reduces the likelihood of market manipulation due to the factors mentioned above, leading to a more stable and transparent market environment.

Hypothesis 1: Compared to firms without CVCs, the stocks of firms with CVCs are less likely to be manipulated.

2.2. Short- And Long-Run Impacts of CVC on Stock Manipulation

Market manipulation can be carried out either by a firm's insiders or by external investors. CVC investments attract investor attention. Insiders can trade on the release of CVC investment information in a way that enables personal short-run profits. Insiders regularly trade on corporate events, even if the information is proprietary (Agrawal and Cooper, 2015). Short-term manipulation around CVC may not be entirely harmful to CVC investments. Signaling theory (Spence, 1973) provides a useful framework for understanding the link between stock manipulation and CVC investments. Firms engaging in stock manipulation may use their artificially inflated market position as a signal to potential CVC partners that a short term bump

up in stock prices suggests the investment was innovative, growth-oriented, and enables stronger financial performance (Dushnitsky & Lenox, 2005). This can increase their chances of securing additional CVC investments and gaining access to the valuable resources and expertise provided by CVC partners (Chesbrough, 2002).

Once they have successfully entered the CVC market, these firms may continue to manipulate their stock to maintain or further improve their perceived market position, as the continuation of positive stock performance can be perceived as a signal of successful CVC investments (Dushnitsky & Lenox, 2005). In this regard, firms may use their CVC investments to further justify their manipulated stock prices, suggesting a virtuous cycle between stock manipulation and CVC investments. Firms with a strong track record of CVC investments may enjoy a positive reputation in the market (Gompers & Lerner, 2000). Reputational capital can make it more difficult for external parties to question the firm's financial performance and suspect stock manipulation activities.

The literature on the motivations behind CVC investments highlights that firms often pursue CVC investments to access external innovation and gain insights into emerging technologies and markets (Dushnitsky & Lavie, 2010; Van de Vrande et al., 2009). Firms engaging in stock manipulation may have a heightened interest in leveraging the knowledge and resources gained from their CVC investments to support their stock manipulation activities. This can be achieved by using the insights gained from CVC investments to identify new opportunities for stock manipulation or to develop more sophisticated stock manipulation techniques.

This relationship between CVC investments and stock manipulation can also be understood in light of the resource dependence theory (Pfeffer & Salancik, 1978), which posits that firms engage in strategic actions to reduce their dependence on external resources and improve their bargaining power. By entering the CVC market, firms can access valuable resources and expertise, which can, in turn, enable them to further manipulate their stocks with less risk of being detected (Beneish, 1999). The increased complexity of their financial activities and the involvement of CVC partners may make it more challenging for external parties to scrutinize their financial statements.

Hypothesis 2 (Short-Run Impact): CVC investments increase stock manipulation in the short run.

The presence of CVC investments can potentially reduce the level of stock manipulation over the long term. CVC investments can provide firms with access to valuable resources, expertise, and innovation opportunities, which can, in turn, contribute to their long-term growth and financial performance (Keil et al., 2008; Maula et al., 2005). As firms begin to realize the benefits of their CVC investments, they may become less reliant on stock manipulation to maintain or improve their market position and instead focus on creating value through their investments.

CVC investments can expose firms to new networks and collaboration opportunities, which can further enhance their innovation capabilities and market position (Dushnitsky & Lavie, 2010; Van de Vrande et al., 2009). These factors may lead to a shift in the firm's strategic priorities and a reduced emphasis on stock manipulation as a means to maintain its market position.

The involvement of external CVC partners may increase the level of scrutiny and monitoring faced by firms, which can make it more challenging for them to engage in stock manipulation activities without being detected (Beneish, 1999). CVC partners may also impose certain governance mechanisms, such as board representation or contractual agreements, which can limit the firm's ability to manipulate its stocks (Gompers & Lerner, 2000; Meuleman et al., 2009). This increased oversight can help deter stock manipulation and promote a greater focus on value creation through CVC investments.

The presence of CVC investments may have a positive impact on the firm's reputation, which can further discourage stock manipulation activities (Gompers & Lerner, 2000). A positive reputation in the market can make it more difficult for external parties to suspect stock manipulation activities and may also create pressure on the firm to maintain high ethical standards in their financial reporting practices (Hamm et al., 2021; Smith et al., 2022). CVCs normally seek to exit their investments as IPOs and acquisitions 2-5 years after the first investment, and lower levels of manipulation could facilitate better exit outcomes as discussed further in subsection 2.3.

Overall, CVC reduce the level of stock manipulation over the long term more than a year after CVC investment due to the access to valuable resources and expertise provided by CVC investments, the increased scrutiny and monitoring faced by firms, and the potential impact on the firm's reputation. CVC investments can help shift the firm's focus away from stock manipulation and towards value creation and innovation.

Hypothesis 3 (Long-Run Impact): CVC investments reduce stock manipulation in the long run.

2.3 Stock Manipulation and CVC Performance

The level of stock manipulation in a firm may affect a CVC's ability to attract syndicated investors and achieve successful exits though IPOs and acquisitions. Several empirical studies have found evidence that supports the hypothesis that firms with lower levels of stock manipulation are more likely to engage in CVC investments. For example, Basu et al. (2016) found that institutional factors, including governance quality and transparency, significantly influenced a firm's propensity to engage in CVC investments.

Successful exits, such as initial public offerings (IPOs) or mergers and acquisitions (M&As), are crucial for CVC investors to realize returns on their investments. Lower stock manipulation levels may increase the chances of favorable exit outcomes. Firms with a reputation for good governance practices, institutional quality and transparency may be more likely to establish trust and credibility with their partners, which can be critical for the success of CVC investments (Cumming et al. (2022).

Firms engaging in stock manipulation may lack the necessary resources, capabilities, and managerial focus required to successfully manage their CVC investments (Erickson & Wang, 1999). This lack of attention to CVC activities can lead to poor investment decisions, inadequate support for portfolio companies, and ultimately, lower CVC performance (Wadhwa & Kotha, 2006). On the other hand, stock manipulation may result in increased regulatory scrutiny, legal actions, and fines (Bebchuk et al., 2013). Such consequences can limit a firm's ability to make new CVC investments or engage in strategic partnerships, thus negatively impacting the performance of its existing CVC portfolio (Block et al., 2018).

Start-ups may be reluctant to accept investments from firms with a history of stock manipulation, as they may question the firm's intentions and commitment to their success (Hsu, 2004; Cumming, Mohammadi, & Zambelli, 2022). Consequently, these firms may struggle to secure high-quality investment opportunities, negatively impacting their overall CVC performance.

The level of stock manipulation in a firm may also affect the firm engage in CVC syndication. The presence of stock manipulation may signal a lack of financial transparency and weak corporate governance within the firm (Beneish, 1999). These factors can undermine the trust

and collaboration between the firm and its CVC partners, as well as the portfolio companies, potentially hindering the performance of CVC investments (Gompers & Lerner, 2000; Meuleman et al., 2009). Moreover, CVC syndicates may prefer to invest in firms with low stock manipulation levels to ensure they have access to accurate information and can make better-informed investment decisions. The lack of transparency can make it more difficult for firms to attract high-quality CVC partners or to participate in CVC syndication deals (Keil et al., 2008).

The literature on the performance implications of CVC investments suggests that firms with a strong track record of CVC investments may enjoy a positive reputation in the market, which can facilitate their ability to attract high-quality CVC partners and syndication deals (Gompers & Lerner, 2000; Hochberg et al., 2007). In contrast, firms engaging in stock manipulation may suffer from a negative reputation, which can hinder their CVC performance by limiting their access to valuable resources and collaboration opportunities.

We therefore propose a negative association between the level of stock manipulation in a firm and the performance of CVC investments. This relationship can be attributed to the potential lack of resources and capabilities, the negative signaling effect of stock manipulation, and the impact of reputation on collaboration opportunities. Together, these factors suggest that firms with lower levels of stock manipulation are more likely to achieve successful exits and engage in CVC syndication, leading to better overall performance of their CVC investments.

Hypothesis 4: Stock manipulation reduces the probability that CVCs attract syndicated investors and achieve successful IPO and M&A exits.

3. Data and sample

3.1 Data sources

We focus on U.S. public companies listed on NASDAQ and NYSE. We obtain stock manipulation data from SMARTS, Inc., and CMCRC (Capital Markets CRC), spanning the years 2007 to 2018. There are 4302 publicly listed firms in the US exchange included in our full sample. SMARTS and CMCRC compile data on potential stock manipulation incidents from more than fifty global stock exchanges, data that is subsequently employed by regulatory authorities in those

respective nations. The stock manipulation data are industry measures of manipulation and were not created for the purpose of this study.

Corporate venture capital (CVC) investment data are collected from the Thomson Reuters VentureXpert database. We identify CVCs through the following steps: first, we compile a list of CVC parent firms and their portfolio companies by filtering for the investor's "firm type" as "Corporate PE/Venture"; second, we exclude CVCs with undisclosed names; third, we manually verify and identify CVCs' parent firms primarily using Google and Bloomberg to minimize errors. Each CVC is associated with a unique publicly traded parent firm with available institutional ownership and fundamental financial data. We gather each firm's financial characteristics data annually from Compustat and I/B/E/S. Stock manipulation and CVC investments are identified for each date from 2007 to 2018, resulting in 9,885,366 firm-day level observations for our study.

3.2 Dependent variables

The dependent variables in this study, which indicate stock manipulation in the CMCRC database, are used to measure a firm's level of manipulation. We employ three distinct approaches to create proxies for stock manipulation. First, we tally the occurrences of "Continuous Trading Manipulation 30 mins Number of Alerts" for a firm within a specified time range. The metric for 'Continuous Trading Manipulation' (CTM) identifies unusual variations in liquidity, returns, and transaction costs over 30-minute intervals. Second, we count "End-of-Day (EOD) price dislocation" occurrences if the records show them on a given date. A dislocated EOD price is characterized as deviating from its mean price change by 4 standard deviations over the preceding 100 trading days, measured at the trading day's close. Third, we use the sum of "Continuous Trading Manipulation 30 mins Value Ratio" (CTM_ratio) to demonstrate the intensity of the manipulation. The detailed methods used to define these variables are shown in Appendix_1 and Appendix_2. In our sample, 21% of monthly manipulative activities (quantified by the "Continuous Trading Manipulation 30 mins Number of Alerts") are displayed, whereas a mere 0.8% or less of monthly manipulation instances, as measured by the "End-of-Day (EOD) price dislocation," are detected. In our sample, approximately 90% of the companies exhibit at least one alert involving "Continuous Trading Manipulation," while a smaller percentage, 38%, have at least one record of "End-of-Day (EOD) price dislocation."

3.3 Independent variables and control variables

We examine the impact of CVC investments on firms, utilizing variables related to CVC investments and various control variables reflecting financial conditions and CVC fund characteristics.

Our primary variables of interest are those related to Corporate Venture Capital (CVC) investments. We identify the date of CVC investment and create a binary variable, "CVC_dummy", to denote its presence. Additionally, we establish the date of CVC inception as the entry date for CVC. In cases where the date of CVC establishment is missing from the data, we utilize the date of the first CVC investment as the entry date for CVC. We also define various CVC investment windows, including time spans of 30 days, 90 days, 6 months, 1 year, and 2 years. To construct the variable for CVC success exit, we gather data on whether CVC investment results in one of the following exits: Initial Public Offering (IPO), acquisition, or leveraged buyout (LBO). We also designate CVC syndication for deals in which the investee company has other CVC investors within the given year.

The control variables encompass a range of financial conditions and CVC fund characteristics, including firm leverage, return on assets (ROA), market value, cash holdings, tangibility, book-to-market ratio (BtoM_Ratio), R&D expense, capital expenditure, analyst coverage, KZ Index, OCF/Asset, FCFF/Asset, Institutional Ownership, and CVC size/parent size[1]. Other variables that reflect the volatility of the market and the risk of the stock are included in each model such as stock liquidity, market beta, total volatility, and S&P500 Index Return. We also include the variables that measure the corporate culture from three dimensions such as innovation, integrity, and teamwork following Li, et al. (2021)[2]. All variables are defined in the Appendix.

[1] In determining the size of a Corporate Venture Capital (CVC) fund, a multi-step approach is employed to ensure the most accurate representation of the fund's financial capacity. Initially, the "Fund Size (USD Mil)" variable from VentureXpert is utilized. The "Firm Latest Fund Size (USD Mil)" is used as a substitute if the primary data is missing. In cases where the last two steps fail to provide the necessary information, the "Fund Size Category" is consulted, and the maximum value within the given category is assigned as the fund size. For example, if the category range is "$25 million to $50 million," the fund size would be set at $50 million. In the absence of information from these three steps, the "Firm Total Estimated Equity Invested in Company (USD Mil)" is used.
[2] In their study, Li et al. employ machine learning algorithms to analyze textual data from a range of corporate documents such as earnings conference calls and annual reports. Their methodology allows them to systematically identify and quantify aspects related to corporate culture, thereby creating a scalable and replicable framework for measuring the impact of culture on various corporate outcomes.

3.4 Descriptive statistics

Table 1 displays our sample construction. In our sample, stock manipulation, measured by the occurrence of "Continuous Trading Manipulation 30 mins Number of Alerts," occurs 125,097 times for all U.S. firms included in CMCRC. We identify 154 firms with CVC investments, and 3,102 deals are recorded in the VentureXpert database. Panel A provides the results. In Panel B, we report the number of manipulations and CVC investments for each of the 12 Fama French industry code classifications. The "Computers, Software, and Electronic Equipment" sector has the highest number of CVC investments in our sample, with 1,205 CVC investments, while the Utilities sector has the fewest, at only 8 deals.

[Insert Table 1 Here]

Table 2 presents the summary statistics of the primary variables for both full sample (all the publicly listed firms in US stock exchange) and the sample of CVC firms. The average number of "Continuous Trading Manipulation 30 mins Number of Alerts" for a firm over a 6-month period is 1.60, with a standard deviation of 1.2, while over a 1-year period, the average number is 3.11 with a standard deviation of 3.59. The mean value of "CTM_ratio_90d," reflecting the intensity of manipulation, is 0.15, indicating that, on average, 15% of the trading value of all 30-minute (j) intervals with Continuous Trading Manipulation alerts for security i occurs within 90 days. The data shows that CVC firms are larger and more profitable and has higher stock liquidity. The average leverage is 1.06. The mean cash holding as a percentage of the total asset is 21%, with a standard deviation of 24%.

Panel B presents key metrics pertaining to CVC activities. In the full sample, only 4.5% of the companies are engaged in CVC investments. The median fund size allocated for these CVC ventures stands at $250 million. Regarding the exit success of these investments, 34% of the CVC deals are either through the acquisition of the invested entity or an Initial Public Offering (IPO). In terms of investment types, 40% of these CVC deals are categorized as early-stage investments, while 22% are classified as late-stage investments.

[Insert Table 2 Here]

3.5 Stock manipulation before and after CVC entry

To show the relationship between the stock manipulation and the decision of CVC entry, we generate a two-way line chart to illustrate the level of stock manipulation before and after CVC entry. Figure 1 depicts the level of stock manipulation (measured by the average number of continuous trading manipulations within 30 days before the date) within [-180d, +180d] windows before and after the CVC entry. Around the CVC entry, there is a sudden increase in stock manipulation levels, potentially indicating the market's abnormal reaction to the CVC entry. The rise of stock manipulation happened about 60 days before the CVC entry, indicating that some insiders have prior knowledge of the event and are trading based on that information. It also shows that the level of stock manipulation dropped around 6 months after the CVC entry.

[Insert Figure 1 Here]

Figure 2 illustrates the level of stock manipulation (measured by the average number of continuous trading manipulations within 6 months before the date) for the two-year window before and after the CVC entry. The figure demonstrates that one year after the CVC entry, the level of stock manipulation for the firm is lower than the level observed prior to the CVC entry. The finding indicates that firms strategically strengthen their stock market position and reduce stock market manipulation prior to entering corporate venture capital (CVC) investments, in an effort to attract CVC investments by demonstrating a lower level of stock manipulation pre-entry compared to the post-entry period.

[Insert Figure 2 Here]

T-tests for the level of stock manipulation before and after the CVC entry and investments are presented in Table 3. Panel A displays the average number of manipulations (measured over 90 days, 6 months, 1 year, and 2 years, respectively) before and after the CVC entry[3]. The average number of manipulations within 6 months is 2.17 before the CVC entry and increases to 2.45 after the CVC entry. The difference in stock manipulation levels between the pre-entry and post-entry

[3] The level of stock manipulation is measured both before and after the entry (or investment) of a Corporate Venture Capital (CVC) fund. For the pre-entry (or pre-investment) phase, the manipulation level is determined by summing up all identified manipulations occurring up to the date of CVC entry (or investment). For the post-entry (or post-investment) phase, the manipulation level is computed by aggregating all identified manipulations within a specified time range following the CVC entry (or investment) date.

periods narrows when the average number of manipulations is measured over 1 year. The level of stock manipulation in two years decreased by 0.17 compared to that before the CVC entry. Notably, the average occurrence of EOP dislocation increases from 0.0015 to 0.2870, implying a higher likelihood of end-of-day price dislocation following the announcement of CVC entry. These findings also suggest that CVC entry has a short-term impact on stock market positions.

Table 3 Panel B reveals that the mean number of manipulations 90 days prior to CVC investment is 1.29, which has no significant difference from the number (that is 1.28) following the investment. The main reason is that stock manipulation arises around 30 days before the CVC investment and continues for at least 90 days after the investment. When measured within a 6-month window, the mean number of manipulations 6 months prior to CVC investment is 2.42, which then increases to 2.52 following the investment. However, this trend reverses when considering a longer time frame, such as one or two years. The mean number of manipulations before CVC investment is 9.92, while it drops to 9.28 within a two-year window after the investment, signifying a 6.5% decrease in stock manipulation levels in the long run following CVC investment. This pattern is also echoed by other metrics of stock manipulation measured by "CTM_ratio".

[Insert Table 3 Here]

4. **Multivariate Analyses**

4.1 The level of stock manipulation and firms with CVC investments

Table 4 shows the panel OLS regression results for the analysis conducted on the public listed firms in the US stock exchange between 2007 and 2018, with industry and year-fixed effects. Table 4 shows the overall impact of a CVC investment program on the level of stock manipulation compared to firms without a CVC.

Table 4 shows that for both the full sample and the propensity score matched sample, the coefficients for the CVC firm dummy variable (as "CVC_firm_dummy") are negative and significant at the 1% level in all columns. The results support the hypothesis suggesting that firms exhibiting lower levels of stock manipulation are indeed more likely to engage in CVC investments. From column (1) to (4) shows the results for the full sample. Specifically, in column (1), the coefficient of independent variable was -0.131, it shows that firms with CVC investments tend to

have 16% lower number of stock manipulation compared to firms without CVC investment, as measured by the number of times manipulation occurred within 90 days. In column (3) the coefficient of independent variable was -0.264 and it shows that firms with CVC investments tend to have 8.5% lower number of stock manipulation compared to firms without CVC investment, as measured by the number of times manipulation occurred within 1 year.

From column (5) to (8) shows the results for the matched sample generated by using propensity score method. In column (5), for the matched sample, firms with CVC investments tend to have 9.4% lower number of stock manipulation compared to firms without CVC investment, as measured by the number of times manipulation occurred within 90 days. In column (7), firms with CVC investments tend to have 5.3% lower number of stock manipulation compared to firms without CVC investment, as measured by the number of times manipulation occurred within 365 days.

The result indicates that firms that engage in corporate venture capital (CVC) investments tend to have better stock market practices and are less likely to manipulate their stock prices, which supports the Hypothesis 1. This suggests that companies with CVC investments may be more transparent, accountable, and focused on long-term growth, rather than short-term gains through stock manipulation. The association between CVC investments and reduced stock manipulation implies that companies participating in CVC activities might have stronger corporate governance structures in place. Strong corporate governance is crucial for the proper functioning of financial markets and can contribute to overall market stability, investor confidence, and capital allocation efficiency.

[Insert Table 4 Here]

4.2 CVC Presence and Short and Long Run Impacts on Manipulation

4.2.1 Stock manipulation before and after CVC entry

We explore the short-term effects of Corporate Venture Capital (CVC) entry on stock manipulation levels. Our primary objective is to determine if firms exhibit reduced stock manipulation prior to CVC entry in order to attract investment and to compare manipulation levels

before and after CVC entry[4]. Table 5 presents the results of our panel ordinary least squares (OLS) regression analysis, focusing on stock continuous trading manipulation levels while controlling for industry and year-fixed effects in a sample of firms with available CVC entry data. Standard errors are clustering at the year-month level.

Table 5, Panel A shows how the CVC entry affects the level of stock manipulation in the short run (within the 90-day and 6-month window). Stock manipulations are measured by the occurrence of Continuous Trading Manipulation alerts (CTM), the CTM ratio, and End-of-day price dislocation (EOP) respectively. The findings in columns (1) and (2) indicate that stock manipulation increases by 27% (relative to the average value of all CVC firms) and 21% respectively within 90 days after CVC entry. The results in column (4) show that stock manipulation increases by 14% (relative to the average value of all CVC firms) within 6 months after CVC entry. The results present strong evidence that CVC entry is correlated with a short-term increase in stock manipulation levels, lending support to Hypothesis 2. If firms perceive benefits in stock manipulation around CVC entry, it may be part of a broader strategic approach. It may reflect attempts to bolster stock prices temporarily to attract investment or create a favorable market perception.

Panel B presents the level of manipulation before and after the CVC entry in the long run (within a 2-year window). Columns (1) and (2) demonstrate a 10% (the coefficient -0.484) and 18% (the coefficient -0.076) decrease in stock manipulation, as measured by the occurrence of CTM alerts and the End-of-day price dislocation (EOP) respectively, within one year leading up to the given date post-CVC entry. Columns (4) to (6) also reveal lower stock manipulation levels after CVC entry for the two-year test window. Column (4) shows a 9.5% (for the coefficient -0.869) decrease in stock manipulation measured by the occurrence of CTM alerts. The result generally supports hypothesis 3 which states that CVC investments reduce stock manipulation in the long run. The long-term decrease might signify that firms involved in CVC investments are introducing or benefiting from better corporate governance, oversight, and internal control mechanisms over time.

[4] The entry date for the Corporate Venture Capital (CVC) fund is initially based on the fund's founded date, as supplied by VentureXpert. If this founding date is unavailable, the date of the CVC fund's first investment is used instead.

[Insert Table 5 Here]

4.2.2 Stock manipulation at CVC investee firm level

We investigate the short-term and long-term effects of CVC investments on stock manipulation at the CVC investee firm level. This investigation is conducted over three specific time intervals, namely, 90 days, 6 months, one year, and two years after the CVC investments[5].

Presented in Table 6, our analysis as delineated in columns (1) and (2) demonstrates that, in the short-term [-90d, +90d] window, stock manipulation levels are elevated post-CVC investment by 2.2% in column (1) for CTM alert and by 27% for EOP in column (2) compared to the pre-CVC investment period. Additionally, Columns (3) and (4) shows that, in short term [-6months, +6months] window, stock manipulation levels are elevated post-CVC investment by 7% in column (3) for CTM alert and by 44% for EOP in column (4) compared to the pre-CVC investment period. These findings generally support hypothesis 2.

However, in columns (5) to (8), as we extend our observation period to 1-year and 2-year window, the results turn out to be not significant. It indicates that the effect at each CVC investment level on the stock manipulation is significant only for the short run and can be traced within the 6-month window. The effects fade after 6 months.

[Insert Table 6 Here]

4.3 The level of stock manipulation and CVC performance and strategy

We explore the effect of the level of stock manipulation on the CVC performance and strategy. Successful exits, such as IPOs, mergers, or acquisitions, normally occur 2-7 several years after the initial investment. The results are provided in Table 7. In columns (1) to (4), the results show a negative association between the level of stock manipulation and the likelihood of successful CVC investment. The results indicate that factors such as reputational risk, regulatory scrutiny, distorted decision-making, financial instability, misaligned incentives, and loss of trust contribute to this negative relationship, ultimately reducing the probability of CVC portfolio companies achieving successful exits such as IPOs, mergers, or acquisitions.

[5] In instances where multiple CVC investments occur within the evaluation period under consideration, only the initial investment made during the specific time window is included in our analysis.

Table 7 columns (5) to (8) show a negative association between the level of stock manipulation and the likelihood of CVC syndication. The findings indicate that stock manipulation adversely impacts a firm's ability to engage in syndicated investments with other CVCs or institutional investors, as it raises concerns related to reputational risk, regulatory scrutiny, and trust. Consequently, this negative relationship can limit a firm's access to high-quality investment opportunities and collaborations, potentially hampering the overall performance and success of its CVC endeavors. Overall, our results support hypothesis 4.

[Insert Table 7 Here]

Table 8 displays the results of a Cox regression survival analysis, investigating the influence of a parent firm's stock manipulation level on the duration it takes for a CVC to go public. The independent variable is a dummy variable for high manipulation levels, set to 1 if the manipulation measurement value post-CVC entry is above the mean for each measurement. The manipulation measurements are considered within specified timeframes: 6 months, 1 year, and 2 years by using the sum of the number of 30-minute alerts for Continuous Trading Manipulation. In column (1), a hazard ratio of 0.537 signifies that firms with high stock manipulation have 53.7% less likely to go public for any given interval of time compared to firms with low manipulation. This result is significant at the 5% level when measuring the level of manipulation using the frequency of manipulations within 180 days after CVC entry. Similar patterns emerge when measuring the level of manipulation within 1-year and 2-year timeframes. These results, displayed in columns (2) and (3), are significant at 5% level.

The results indicate that lower stock manipulation levels can enhance the likelihood of favorable exit outcomes, such as IPOs, mergers, or acquisitions, by fostering a positive company reputation, increased financial stability, and better regulatory compliance. Companies with low stock manipulation levels are often perceived as more credible and reliable, making them more attractive to investors and potential acquirers. Financial transparency and stability may lead to improved investor confidence and better access to funding, facilitating successful exits. Overall, lower stock manipulation levels can contribute to a more favorable environment for successful exit outcomes, which supports hypothesis 4.

[Insert Table 8 Here]

5. Possible Mechanisms

In this section, we run several tests to examine the possible mechanisms through which the appearance of CVC investments may trigger stock manipulation. These mechanisms are from different perspectives of the parent firm, which include the ownership structure, the cash holding, and the CVC fund size of the firm. It is of course challenging to provide definitive proof of the underlying mechanisms; our tests are suggestive and indicate the causal effect between the CVC investments and stock manipulation.

5.1 The moderate factors that affect the short-term association between stock manipulation and CVC investment

5.1.1 The short-term moderator effect: institutional ownership

Institutional investors often have access to better information and analysis. Their significant trading might be interpreted as a sign of anticipated strategic moves like a CVC investment. This anticipation could create short-term trading opportunities for other market participants, potentially leading to manipulation as traders attempt to profit from the expected event. In addition, institutional ownership often means higher trading volumes and liquidity, which might make it easier to be labeled as manipulative trading practices. If short-term-oriented institutional investors dominate, their trading behavior might indirectly encourage or facilitate stock manipulation around significant events. Therefore, we expect a positive association between institutional ownership and stock manipulation.

However, in the long term, institutional investors usually possess significant market expertise and resources to engage in careful due diligence and monitoring of investment activities. Their presence and active role can increase transparency and reduce the opportunity for stock manipulation. Institutional investors often pursue diversified investment strategies and maintain rigorous risk management practices. When institutional investors are involved in a company that is forming a CVC, they may demand greater oversight and risk management controls, which can reduce market manipulation. We expect institutional ownership may mitigate the association between investments and short-term stock manipulation.

The result of column (1) in Table 9 shows that higher institutional ownership mitigates the association between CVC investments and short-term stock manipulation. It suggests that after a

CVC investment, higher institutional ownership leads to a decrease in stock manipulation or mitigates an otherwise positive association between the CVC investment and stock manipulation. The positive and significant coefficient of institutional ownership indicates that, on its own, higher institutional ownership is associated with higher levels of stock manipulation.

5.1.2 The short-term moderator effect: the cash holding of the parent firm

Excess cash might be associated with a lower need for external financing such as CVC, reducing the relationship between CVC investments and stock manipulation. High levels of cash can signal strong financial health, which could offset any potential negative perceptions stemming from CVC investments. This can reduce the perceived "need" to manipulate stock, as the firm is already viewed as financially stable. Companies with large cash reserves might feel less pressured to show immediate results from their CVC investments. Companies with substantial cash holdings often have better governance mechanisms, reducing the likelihood of stock manipulation, to begin with. Good governance can mitigate the risks associated with CVC investments being used for purposes like stock manipulation. The result of column (2) in Table 9 shows a negative coefficient, indicating that higher cash holding mitigates the association between CVC investments and short-term stock manipulation.

5.1.3 The short-term moderator effect: the CVC fund size

We also examine how the CVC fund size affects the association between CVC investments and stock manipulation. A substantial CVC fund size might boost investor confidence by showcasing the parent firm's commitment to future growth and innovation and may be perceived as evidence of the parent firm's financial robustness and higher risk tolerance. Therefore, a large CVC fund size might be interpreted as a strong endorsement of the firm's growth prospects, which indicates a more alignment between the CVC investment and parent firms' strategy and leads to a more straightforward trading environment with less stock manipulation. The result of column (3) in Table 9 shows that a higher CVC fund size to the parent size mitigates the association between the CVC investments and stock manipulation.

[Insert Table 9 Here]

5.2 DiD Analysis of different types of CVC investments

We next use the DiD methodology to examine if the stock market reacts to the different types of CVC investments differently to help establish causality as tests are conducted for different types of CVC investment that cause exogenous variation in stock manipulation before and after CVC investment.

The pattern of stock manipulation varies for different types of CVC investments. Panel A of Table 10 shows the t-tests on the level of stock manipulation for different types of CVC investments. For the early-stage CVC investments, the mean value of stock manipulation measured by short-term windows such as 90 days and 6 months is higher than those of non-early-stage investments by 11%. For the late-stage CVC investments, the mean value of stock manipulation measured by short-term windows such as 90 days and 6 months are lower than those of non-late-stage investments by 15%. The difference in the level of stock manipulation between the syndicated investment and non-syndicated investment is not as stark as early or late-stage investment, but it also shows lower level of stock manipulation for syndicated investment.

Early-stage investments generally involve higher risk and potential returns. These investments in nascent projects can create speculative interest, potentially making the stock more susceptible to manipulation as traders try to capitalize on future growth prospects. However, investing in early-stage ventures signals a commitment to innovation and conveys the parent firm's strategic direction towards new technologies or markets, which may create a positive perception to the investors and align with. investor's expectation. Therefore, we expect that early/seed stage CVC investments may mitigate the association between CVC investments and being the target of stock manipulation.

Late-stage investments are often seen as less risky and more financially oriented. This might create a perception of lower risk and return, potentially reducing the appeal for manipulation. On the other hand, if these investments do not align with the parent firm's strategic goals or core competencies, it may be perceived as a shift towards financial opportunism rather than strategic growth. Investors, analysts, and other market participants might interpret this shift as a lack of long-term vision or commitment to innovation. This perception could lead to a decline in confidence in the firm's management and a negative reaction in the stock market.

Table 10, Panel B presents the difference in differences regression results to show the effects of different types of CVC investments on the level of stock manipulation before and after CVC investments. "Early/Seed Investment", "Late-stage Investment", and "syndicated Investment" are dummy variables that are equal to 1 if the CVC investment is under the category and used as the treatment group respectively. The post group which is equal to 1 shows the status after CVC investment. Column (1) presents the results for early-stage CVC investment and shows that the effect of TREAT×POST is negative but not statistically significant. It indicates that the market participants see the early-stage investment convey the parent firm's strategy and do not perceive it as a risky investment and react strongly in the stock market. To compare, column (2) presents the results for late-stage CVC investment and shows that the effect of TREAT×POST is positive and statistically significant. It indicates that the level of stock manipulation is 16% higher after CVC investments for late-stage investment than non-late-stage investment relative to its average value. The result supports our prediction that market participants may perceive late-stage CVC investment as a more significant event with larger deal flow that may lead to a stronger reaction in the stock market. Column (3) presents the result for syndicated CVC investment and shows that the effect of TREAT×POST is negative and statistically significant. It suggests that the level of stock manipulation is 7% lower after CVC investments for syndicated investments relative to its average value as the market participants perceive it as a less risky investment.

[Insert Table 10 Here]

5.3 Possible mechanisms: Long-term mediation effect

We want to know the possible mechanisms that may explain the long-term decreasing stock manipulation after the CVC entry. We conduct the t-test for institutional ownership, FCFF, and OCF before and after CVC entry within the window [-2year, +2year] and also examine the mediation effect of these factors on the association of CVC entry and the level of stock continuous trading manipulation.

Table 11, Panel A presents the t-test results to compare the level of institutional ownership, FCFF, and OCF before and after CVC entry within the window [-2year, +2year]. It shows that institutional ownership increased after the CVC entry by approximately 1.8%. The OCF/Total Asset and increased by 3% compared to the ratio of before CVC entry. The FCFF/Total Asset

increased significantly from 4.7% to 7.3%. In addition, the innovation measure has substantially increased by 12.3% compared to those of pre-CVC entry.

[Insert Table 11 Here]

5.3.1 Institutional Ownership

Table 12, Panel A presents the results of the mediation effect of institutional ownership within the window [-2year, +2year]. Column (1) shows that there is a 1.5% increase in institutional ownership after CVC entry and statistically significant at 5% level. It indicates that institutional investors often seek companies with clear growth strategies and innovative approaches, and the CVC entry can be perceived as an embodiment of these qualities. Institutional investors often consider the reputation and industry standing of a company, and CVC activities can bolster the parent firm's appeal in this regard and increase market engagement and visibility.

From columns (2) to (4), the interaction term between the CVC entry dummy and institutional ownership is negative and significant at a 1% level with different measurements of stock manipulation respectively. In column (2), the coefficient of the interaction term is -2.943 indicating that a one standard deviation increase in institutional ownership is associated with a 58% decrease relative to the average value in the level of stock manipulation measured by the 1-year window. It suggests that enhanced scrutiny and greater liquidity due to the higher level of institutional ownership can deter attempts at manipulation. In addition, the long-term focus from the many institutional investors can stabilize the stock, as institutional investors are less likely to react impulsively to short-term market fluctuations, thereby reducing opportunities for manipulators to exploit temporary market inefficiencies or panic. The result also shows a negative and significant association between institutional ownership and stock manipulation, supporting the statement above.

5.3.2 Free Cash Flow to the Firm

Table 12, Panel B presents the results of the mediation effect of FCFF within the window [-2year, +2year]. In column (1), it shows that there is a 1.9% increase in FCFF/asset ratio after CVC entry and statistically significant at 1% level. It indicates that CVC investments often align with the parent firm's strategic goals and core competencies, leading to synergies that may improve operational efficiencies. Enhanced operational efficiencies may not increase the OCF immediately but may lower the capital expenditures, thus increasing FCFF.

From columns (2) to (4), the interaction term between the CVC entry dummy and FCFF is negative and significant at 1% level with different measurements of stock manipulation as dependent variables respectively. In column (2), the coefficient of the interaction term is -3.387 indicating that a one standard deviation increase in FCFF/asset ratio is associated with 69% decrease relative to the average value in the level of stock manipulation measured by 1-year window. It indicates that investors may perceive CVC entry as a more grounded and genuine approach, reducing opportunities for manipulation. While a high FCFF/asset ratio might be attractive for manipulators, the strategic alignment signaled by CVC entry may mitigate this effect. The positive and significant coefficient of FCFF/asset ratio resonates that a high FCFF/asset ratio is often perceived as a positive indicator of a company's financial strength and operational efficiency and might fuel speculative trading as investors chase perceived growth opportunities.

5.3.3 Operating Cash Flow

Table 12, Panel C presents the results of the mediation effect of operating cash flow within the window [-2year, +2year]. In column (1), it shows that there is a 0.5% decrease in OCF/asset ratio (that is 6% decrease relative to pre-CVC entry level) after CVC entry and statistically significant at 1% level. It may indicate that CVC can lead to a temporary decrease in available cash for core operations. An alternative explanation is that firms that experience deteriorations of internal innovation (Ma, S., 2020) and have downslope growth prospects are more likely to conduct CVC investment. It means the decreasing trend of OCF and the payoffs from CVC investments often have a longer-term horizon.

Columns (2) and (4), the negative and significant coefficient of OCF/Asset alone indicates that, generally, a higher OCF/asset ratio is associated with a lower level of stock manipulation in the absence of CVC entry. It could imply that firms with robust operational cash flow, reflecting strong core business operations, are less prone to stock manipulation. However, the interaction term between the CVC entry dummy and OCF/asset is positive and significant at the 5% level signifies that after CVC entry, a higher OCF/asset ratio is now associated with a higher likelihood of stock manipulation. In column (2), the coefficient of the interaction term is 3.089 indicating a one standard deviation decrease in OCF/asset ratio is associated with a 63% decrease relative to the average value in the level of stock manipulation measured by the 1-year window. The positive interaction might reflect the complex dynamics introduced by CVC investments.

The positive interaction might be tied to how investors interpret the firm's financial health and strategic alignment post-CVC entry. An increase in OCF might be viewed differently in the context of CVC investments, leading to different trading behaviors and manipulation opportunities. It may suggest that CVC investments, especially when driven by a need to rejuvenate innovation and growth, align with a longer-term perspective. This long-term focus might make the stock less appealing to short-term manipulators. A focus on CVC investments to enhance innovation has more, reducing incentives for manipulation. On the other hand, CVC investment may be associated with high risk, and a higher OCF/Asset ratio might enable the firm to exploit short-term trading advantages and reflect new speculative opportunities, leading to more manipulation.

[Insert Table 12 Here]

Overall, the tests for possible mechanisms that examine the long-term mediation effect support hypothesis 3 that CVC investments reduce stock manipulation in the long run.

6 Other robust tests: subsample analysis by CVC fund size

We used the Cox regression model analysis for survival to test the impact of a parent firm's stock manipulation level on the duration for a CVC to go IPO. Breaking down the analysis into subsamples by the CVC fund size can provide a deeper understanding of the underlying mechanisms and contextual nuances that drive this relationship. If smaller CVCs are less material investors in parent firms or in their investment portfolio, the level of manipulation might indeed matter less to them. They may have less at stake in the manipulation activities of the parent firm or their associated investments, which can result in a different reaction to manipulation compared to larger CVCs.

Table 13 presents the results of a Cox regression analysis for survival to test the impact of a parent firm's stock manipulation level on the duration for a CVC to go public using subsamples classified by the CVC fund size and the deal size of the CVC investment. The high manipulation level is a dummy variable set to 1 if the manipulation measurement value post-CVC entry is above the mean for each measurement. Panel A, column (1) shows that the hazard ratio of 0.5 signifies that firms with high stock manipulation in the small CVC fund category are 50% less likely to go public at any given time interval compared to firms with low manipulation. The negative t-statistic further emphasizes this negative relationship. Conversely, in columns (3) and (4), a hazard ratio of 5.342 in the large CVC fund category suggests that firms with high stock manipulation are more

than five times more likely to go public compared to those with low manipulation. The positive t-statistic supports this positive relationship. It suggests that large CVCs, being more material investors, might have more substantial stakes in their investments or the parent firm's activities, making manipulation more relevant to them.

[Insert Table 13 Here]

7 Discussions and limitations

There are possible limitations to our analysis of the relationship between CVC investments and stock manipulation. Accurately measuring the level of stock manipulation can be challenging due to the clandestine nature of these activities. While we use a composite index to capture various indicators of stock manipulation, it is possible that some instances of manipulation may not be detected or reported. The study examines the relationship between stock manipulation and CVC investments at specific points in time. However, both stock manipulation and CVC investments may evolve over time, and this dynamic aspect may not be fully captured in the analysis.

In this study, incumbent firms voluntarily and strategically disclose their CVC investments. These investments are primarily targeted at innovative, high-potential young firms to maintain the corporation's innovation trends and market leadership. To avoid competition, incumbent firms may choose to conceal their recent CVC investments. Mohamed & Schwienbacher (2016) found that publicly announced CVC investments account for approximately two-thirds of a firm's total investments, with minimal differences between announced and unannounced investment samples. Although the data used in our analysis may not encompass all CVC investments made by incumbent firms, it is still representative of the firm's CVC activities and captures the main characteristics of CVC investments.

The study could face endogeneity issues, such as reverse causality or omitted variable bias. For example, unobserved factors may influence both stock manipulation and CVC investments, leading to biased estimates. To address this concern, the study employs propensity score matching. We do not know who brought about manipulation events with the SMARTS manipulation data. Also, our sample may involve suspected manipulations. One of the principal limitations of this study stems from the inherent complexities associated with the data on stock manipulation and Corporate Venture Capital (CVC) investments. Specifically, the nature of stock manipulation activities presents a challenge in accurately capturing the full extent of such behaviors, potentially

leading to measurement and detection inaccuracies. Concurrently, the study is constrained by the strategic decisions of firms to either disclose or withhold information regarding their CVC investments, which may introduce an additional layer of opacity.

8 Conclusions

Stock manipulation has significant implications for the financial market's functioning, integrity, and resource allocation. This deceptive practice can disrupt the efficient allocation of resources and ultimately impact firm investment decisions, strategies, and performance. Our study fills a gap in the literature by examining the relationship between stock manipulation and CVC investments, strategy, and performance. The findings reveal a downward trend in stock manipulation before CVC entry, with an increase occurring immediately around entry, followed by a decrease one year after. This suggests that firms strategically improve their stock market position and reduce stock manipulation before engaging in CVC investments.

The study employs panel OLS regression, propensity score matching and Difference in Differences (DiD) methodology to examine the connection between stock manipulation and CVC investments, finding that firms with lower stock manipulation levels are more likely to engage in CVC investments. The long-term effects of CVC investments on stock manipulation show an initial spike followed by a reduction in manipulation levels, indicating improved firm governance and increased corporate activity monitoring. This has important implications for the role of CVC in shaping the governance landscape and discouraging stock manipulation practices in the long run.

Additionally, the study indicates that firms with lower levels of stock manipulation are more likely to engage in syndicated CVC investments and achieve successful exits through IPOs and M&As. The findings underscore the importance of good governance practices, institutional quality, and transparency in fostering CVC investment success and collaboration opportunities.

We also conduct an in-depth exploration of the mechanisms through which CVC investments might influence stock manipulation. Several tests highlight how the parent firm's ownership structure, cash holdings, and CVC fund size may affect this relationship. The research also employs the Difference in Differences (DiD) methodology to analyze the stock market's reaction to various CVC investment types.

Our study establishes a pioneering connection between the domains of corporate venture capital (CVC) investments and stock market manipulation. We present empirical evidence to suggest a discernible pattern in stock trading activities that arises in proximity to the engagement in CVC initiatives. These observations are particularly relevant for various stakeholders, including investors, regulatory authorities, and policymakers, as they assist in understanding the implications of CVC investments on stock manipulation behavior. Consequently, this knowledge can be instrumental in crafting targeted strategies to improve market transparency and foster stability.

We envisage that our work will serve as a catalyst for future scholarly endeavors aimed at creating new theoretical frameworks. These would ideally dissect the underlying mechanisms through which CVC investments impact stock manipulation patterns. Our findings also make a noteworthy contribution to the expansive literature on corporate governance, market efficiency, and financial market regulation, by emphasizing the role of CVC investments in shaping firm-level practices in stock markets, as well as their potential to influence the landscape of market manipulation.

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Figure 1: Market Manipulation Pre- and Post-CVC Entry, [-180d, +180d] Window

This figure shows the number of continuous manipulation alerts over the prior 90-day rolling window up to the date of establishing a corporate venture capital program. Variables are as defined in Appendices 1 and 2.

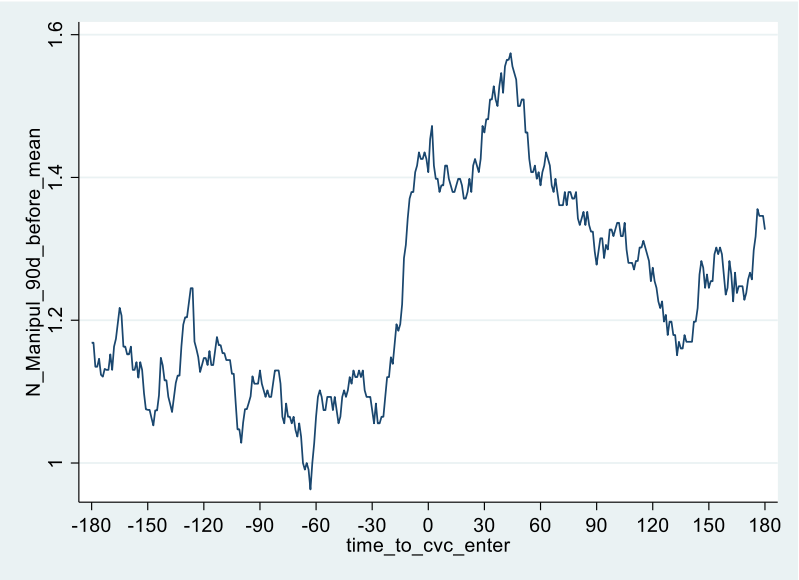

Figure 2: Market Manipulation Pre- and Post-CVC Entry, [-1 year, +1 year] Window

This figure shows the number of continuous manipulation alerts over the prior 6-month rolling window up to the date of establishing a corporate venture capital program. Variables are as defined in Appendices 1 and 2.

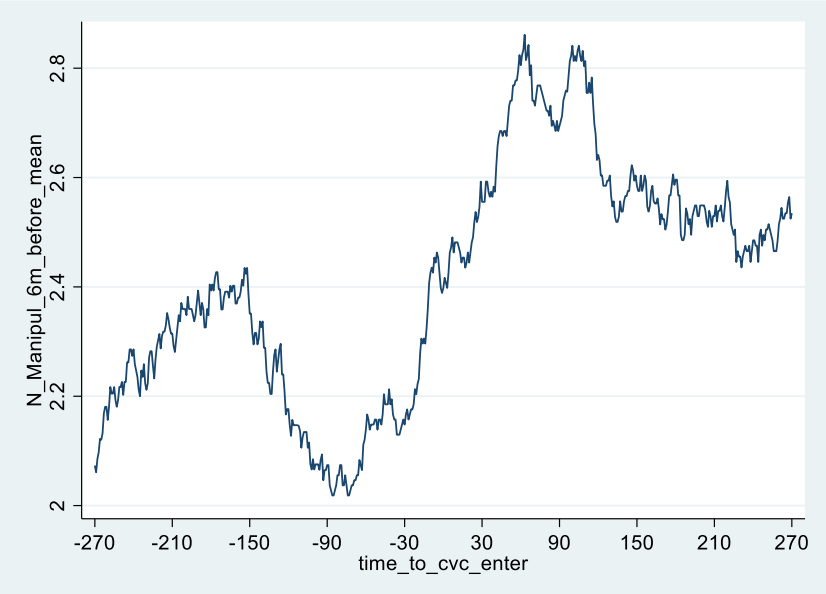

Table 1: Sample Construction
This table provides a sample that consists of the US public firms listed in the U.S. exchange markets NASDAQ and NYSE from 2007 to 2018.

Panel A:

Year	Num of stock manipulation	Num of Firms with CVC	Num of CVC investments
2007	8,995	143	262
2008	9,890	144	267
2009	9,130	142	166
2010	6,984	145	183
2011	8,145	147	234
2012	8,682	146	229
2013	9,577	145	239
2014	12,257	144	245
2015	13,531	142	332
2016	11,085	139	281
2017	13,716	137	320
2018	13,105	132	344
Total	125,097	1,706	3,102

Panel B:

12 Fama French Industry Code	Num of stock manipulation	Num of CVC investments	Industry description
1	6445	43	Consumer Nondurables -- Food, Tobacco, Textiles, Apparel, Leather, Toys
2	4021	12	Consumer Durables -- Cars, TV's, Furniture, Household Appliances
3	14449	153	Manufacturing -- Machinery, Trucks, Planes, Paper, Com Printing
4	4851	15	Energy Oil, Gas, and Coal Extraction and Products
5	4009	27	Chemicals and Allied Products
6	19167	1205	Business Equipment -- Computers, Software, and Electronic Equipment
7	3175	476	Telephone and Television Transmission
8	4470	8	Utilities
9	12609	106	Wholesale, Retail, and Some Services
10	14499	577	Healthcare, Medical Equipment, and Drugs
11	21604	298	Finance
12	15798	182	Other -- Mines, Construction, Trans, Hotels, Bus Service, Entertainment

Table 2: Summary statistics

Panel A:

	Full sample				Sample with only CVC firms			
Variables Names	N	Mean	p50	SD	N	Mean	p50	SD
Manipulation measurement variables								
N_Manipul_90d	9885366	0.8166	0	1.2057	445126	1.2549	1	1.4112
N_Manipul_6m	9885366	1.5974	1	2.0196	445126	2.4653	2	2.3264
N_Manipul_1y	9885366	3.1120	2	3.5948	445126	4.8540	4	4.1099
N_Manipul_2y	9885366	5.7410	3	6.4730	445126	9.1495	9	7.4750
EOP_90d	9885366	0.0210	0	0.1518	445126	0.0118	0	0.1227
EOP_6m	9885366	0.0411	0	0.2211	445126	0.0228	0	0.1883
EOP_1y	9885366	0.0804	0	0.3317	445126	0.0424	0	0.2972
EOP_2y	9885366	0.1507	0	0.4989	445126	0.0767	0	0.4670
CTM_90d	9885366	0.1537	0	0.2780	445126	0.2435	0.1087	0.3420
CTM_6m	9885366	0.3004	0.0348	0.4569	445126	0.4783	0.3124	0.5578
CTM_1y	9885366	0.5831	0.2119	0.7936	445126	0.9415	0.7542	0.9692
CTM_2y	9885366	1.0664	0.4356	1.3883	445126	1.7714	1.5137	1.7340
Control variables								
Market Value (Ln)	8952047	6.5768	6.5557	2.0236	419041	9.4070	9.6458	1.7578
Cashholdings	9883278	0.2121	0.1076	0.2461	445126	0.1958	0.1509	0.1590
R&D Exp.	9885366	0.0655	0	0.1538	445126	0.0479	0.0246	0.0561
Leverage	9831619	1.0607	0.4305	1.7799	441474	0.9247	0.6633	1.2557
BtoM	8947616	0.5862	0.4819	0.5514	419041	0.4101	0.3375	0.3544
CapEx	9837354	0.0386	0.0210	0.0657	445126	0.0315	0.0225	0.0320
ROA	9870230	-0.0553	0.0177	0.3066	445126	0.0475	0.0531	0.1123
Tangibility	9774481	0.1932	0.0978	0.2274	429471	0.1631	0.1057	0.1592
Stock Liquidity	8688129	0.8800	0.7143	0.8007	416947	1.4587	1.3552	0.6956
Analysts Coverage	9885366	0.1584	0	0.6493	445126	2.4403	2.8526	1.0586
S&P Index Return	9534983	0.0004	0.0007	0.0124	429352	0.0004	0.0007	0.0125
Beta_mkt	7944228	0.9186	0.9342	0.4717	394160	1.0387	1.0252	0.3302
Total Volatility	7944228	0.0289	0.0244	0.0187	394160	0.0209	0.0177	0.0190
KZ_index	6895030	0.9538	0.3810	3.1246	368159	1.3249	0.4975	3.1342
OCF/Asset	8836223	-0.0626	0.0807	2.6569	416425	0.1037	0.1077	0.0854
FCFF/Asset	7493555	-0.0557	0.0312	23.2797	388504	0.0610	0.0699	0.3125
Institutional Ownership	6511049	0.5884	0.6557	0.3050	278315	0.6293	0.7794	0.3092
s_innovation	6791977	4.6277	3.9678	2.7540	418772	6.1161	5.4962	3.4075
s_integrity	6791977	2.3449	2.0989	1.2289	418772	2.3404	2.1523	1.0346
s_teamwork	6791977	2.4603	1.9692	1.7515	418772	2.4685	2.2103	1.2883

Panel B: Variables related to CVC activities

Variables Names	N	Mean	p50	SD	Min	Max	p25	p75
CVC_firm_dummy	9885366	0.0450	0	0.2074	0	1	0	0
CVC_size_to_parent	437564	0.0110	0.0053	0.0206	0.00003	0.2655	0.0021	0.0109
Fund Size (USD_mil)	445126	780.9698	250	1113.6090	4.1500	6400.0	100	1000
CVC_enter_dummy	445126	0.6864	1	0.4640	0	1	0	1
CVC_success_exit	3102	0.3433	0	0.4749	0	1	0	1
CVC syndication	3102	0.5213	1	0.4996	0	1	0	1
Early_seed_invest	3102	0.3878	0	0.4873	0	1	0	1
Later_invest	3102	0.2202	0	0.4144	0	1	0	0
IPO_exit	3102	0.0906	0	0.2871	0	1	0	0

Table 3: T-test for the level of stock manipulation before and after the CVC entry and investments

Panel A: The level of stock manipulation before and after the CVC entry

The level of stock manipulation	**Before CVC entry**	**After CVC entry**	Diff.	Sig.	P-value
N_Manipul_90d, [-90d, +90d]	1.0565	1.2513	-0.1948	***	0.0000
N_Manipul_6m, [-180d, +180d]	2.1788	2.4526	-0.2738	***	0.0000
N_Manipul_1y, [-1year, +1year]	4.5145	4.7278	-0.2133	***	0.0000
N_Manipul_2y, [-2y, +2y]	9.7164	9.5448	0.1716	***	0.0005
EOP_6m, [-180d, +180d]	0.0015	0.287	-0.2855	***	0.0000
EOP_1y, [-1year, +1year]	0.0208	0.0246	-0.0038	***	0.0024
EOP_2y, [-2y, +2y]	0.0522	0.0637	-0.0115	***	0.0000
CTM_6m, [-180d, +180d]	0.3689	0.4759	-0.1069	***	0.0000
CTM_1y, [-1year, +1year]	0.7527	0.8265	-0.0737	***	0.0000
CTM_2y, [-2y, +2y]	1.4178	1.5091	-0.0912	***	0.0000

Panel B: The level of stock manipulation before and after the CVC investments

The level of stock manipulation	**Before CVC investment**	**After CVC investment**	Diff.	Sig.	P-value
N_Manipul_90d, [-90d, +90d]	1.2918	1.2855	0.0063		0.1865
N_Manipul_6m, [-180d, +180d]	2.4247	2.5281	-0.1035	***	0.0006
N_Manipul_1y, [-1year, +1year]	4.8778	4.9519	-0.0741	***	0.0003
N_Manipul_2y, [-2y, +2y]	9.9234	9.2848	0.6386	***	0.0000
EOP_6m, [-180d, +180d]	0.0154	0.0453	-0.0315	***	0.0000
EOP_1y, [-1year, +1year]	0.0371	0.0731	0.0121	***	0.0000
EOP_2y, [-2y, +2y]	0.0626	0.1051	0.0117	***	0.0000
CTM_6m, [-180d, +180d]	0.4836	0.5043	-0.0207	***	0.0000
CTM_1y, [-1year, +1year]	0.9723	0.8019	0.1704	***	0.0000
CTM_2y, [-2year, +2year]	1.7603	1.5152	0.2451	***	0.0000

Table 4: Stock Manipulation and Corporate Venture Capital Investments

This table presents panel OLS regression results of the level of stock continuous trading manipulation with industry and year-fixed effects for hypothesis 1. The full sample in columns (1) to (4) includes all the US publicly listed firms identified at CompStat from 2007 to 2018. Columns (5) to (8) are estimated for a propensity score matched sample based on all the control variables, Fama-French industry, and year. Standard errors are clustering at the year-month level. The dependent variable is the number of continuous trading manipulation in a given period. "N_Manipul_90d" and " N_Manipul_1y" are the number of times a manipulation occurred within the 90 days and 365 days leading up to the given date respectively. The main independent variable is the "CVC_firm_dummy" which is equal to 1 if there are CVC investments in the firm. All variables are as defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	Full sample				**PSM matched sample**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	N_Manipul_6m	EOP_6m	N_Manipul_1y	EOP_1y	N_Manipul_6m	EOP_6m	N_Manipul_1y	EOP_1y
CVC_firm_dummy	-0.131***	-0.007***	-0.264***	-0.011***	-0.077**	-0.007***	-0.166***	-0.011***
	(-4.779)	(-4.240)	(-6.526)	(-6.214)	(-2.563)	(-3.797)	(-3.616)	(-5.490)
Cashholding	-0.436***	-0.017***	-0.898***	-0.027***	-1.129***	-0.007	-2.127***	0.000
	(-9.446)	(-6.986)	(-10.348)	(-8.427)	(-9.621)	(-1.086)	(-10.695)	(0.039)
RD_expense	-0.451***	-0.003	-0.831***	-0.001	-0.997***	0.026*	-2.308***	0.052***
	(-10.194)	(-0.531)	(-12.414)	(-0.093)	(-6.970)	(1.784)	(-10.650)	(2.734)
Leverage	0.015***	0.000	0.030***	0.000	-0.078***	0.001	-0.159***	0.002**
	(3.699)	(0.293)	(4.406)	(0.930)	(-5.737)	(0.940)	(-6.551)	(2.510)
BtoM_ratio	0.048***	-0.003***	0.110***	-0.007***	-0.195***	0.007*	-0.350***	0.027***
	(3.411)	(-3.907)	(4.049)	(-6.425)	(-4.147)	(1.960)	(-5.061)	(4.708)
CapEx	-1.393***	-0.070***	-3.599***	-0.132***	0.321	0.246***	0.164	0.500***
	(-5.976)	(-6.012)	(-8.765)	(-8.501)	(0.629)	(4.092)	(0.201)	(6.053)
ROA	-0.610***	0.010***	-1.200***	0.023***	-0.291***	0.030***	-0.635***	0.046***
	(-15.815)	(2.893)	(-22.020)	(5.389)	(-3.035)	(3.367)	(-4.565)	(4.140)
Tangibility	0.052	0.019***	0.258***	0.034***	0.004	-0.038***	0.085	-0.078***
	(1.134)	(5.556)	(3.368)	(6.321)	(0.040)	(-4.297)	(0.621)	(-6.851)
Stock Liquidity	0.301***	-0.009***	0.596***	-0.016***	0.084***	-0.003*	0.188***	-0.005**
	(14.504)	(-9.133)	(15.479)	(-11.782)	(3.720)	(-1.848)	(5.032)	(-2.139)
Market Value	0.285***	-0.006***	0.556***	-0.012***	0.063***	-0.003***	0.110***	-0.006***
	(28.976)	(-12.156)	(32.527)	(-18.612)	(4.873)	(-3.433)	(4.906)	(-5.030)
Analyst Coverage	-0.105***	0.003***	-0.189***	0.005***	0.201***	0.002***	0.431***	0.003***
	(-11.777)	(4.079)	(-17.822)	(4.731)	(14.855)	(2.804)	(18.956)	(2.758)
SP500 Index Return	-0.381	0.012	-0.352	0.025	-0.535	-0.013	-0.577	0.003
	(-1.524)	(0.580)	(-1.111)	(1.278)	(-1.583)	(-0.781)	(-1.438)	(0.174)

Beta_mkt	0.376***	-0.031***	0.772***	-0.064***	0.286***	-0.012***	0.675***	-0.025***
	(17.776)	(-12.965)	(19.570)	(-14.189)	(5.821)	(-4.331)	(8.315)	(-6.207)
Total Volatility	5.671***	0.180***	9.798***	0.481***	10.968***	0.240**	19.931***	0.520***
	(8.185)	(2.788)	(14.153)	(4.581)	(5.364)	(2.318)	(6.936)	(4.893)
KZ_index	0.000*	0.000***	0.000	0.000***	0.000	-0.000***	0.000	-0.000***
	(1.759)	(7.346)	(1.093)	(8.176)	(0.264)	(-2.785)	(0.213)	(-3.120)
OCF/Asset	0.004***	0.000	0.006***	0.000	0.002***	-0.000	0.002	0.000
	(7.013)	(0.775)	(5.050)	(0.173)	(3.117)	(-0.709)	(1.104)	(0.283)
FCFF/Asset	-0.000***	-0.000*	-0.000***	-0.000	0.000	0.000	-0.000	0.000
	(-5.641)	(-1.936)	(-3.220)	(-1.555)	(0.776)	(0.218)	(-0.673)	(1.018)
Institutional Ownership	0.578***	-0.033***	1.158***	-0.066***	0.383***	-0.009	0.727***	-0.012
	(13.898)	(-10.165)	(15.963)	(-13.347)	(4.580)	(-1.404)	(5.521)	(-1.398)
s_innovation	-0.000	0.001***	-0.003	0.001***	-0.001	0.000	-0.001	0.001***
	(-0.354)	(4.292)	(-1.355)	(5.933)	(-0.287)	(1.215)	(-0.159)	(2.994)
s_integrity	0.035***	0.001	0.064***	0.001**	0.114***	-0.001**	0.214***	-0.002***
	(8.105)	(1.493)	(9.471)	(2.004)	(9.299)	(-2.118)	(10.732)	(-4.256)
s_teamwork	-0.016***	0.000	-0.032***	0.000	-0.044***	0.001	-0.086***	-0.001
	(-5.373)	(1.042)	(-6.185)	(0.022)	(-3.705)	(0.710)	(-5.980)	(-0.788)
Constant	-1.489***	0.125***	-3.912***	0.228***	0.809**	0.055***	0.310	0.082***
	(-6.720)	(19.284)	(-12.055)	(23.402)	(2.336)	(4.719)	(0.630)	(6.652)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.208	0.028	0.301	0.052	0.155	0.019	0.251	0.042
Observations	4865812	4865812	4865812	4865812	521867	521867	521867	521867

Table 5: Manipulation before and after the CVC entry

Panel A: The level of manipulation before and after the CVC entry in the short run (within 6 months window)

This table presents panel OLS regression results of the level of stock continuous trading manipulation with industry and year-fixed effects for the sample that only includes the firms with CVC investments. Standard errors are clustering at the year-month level. In columns (1) to (3), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred, the CTM ratio, and End-of-day price dislocation (EOP) respectively within 90 days leading up to the given date. In columns (4) to (6), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred, the CTM ratio, and End-of-day price dislocation (EOP) respectively within 180 days leading up to the given date. The main independent variable is the "CVC_After_Entry" which is equal to 1 if the CVC is in the duration after the entry date or after the date of the first CVC investment. All variables are as defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	N_Manipul_90d	CTM_90d	EOP_90d	N_Manipul_6m	CTM_6m	EOP_6m
CVC_entry_dummy	0.336***	0.051***	0.003	0.342**	0.039	0.029***
	(7.706)	(4.978)	(1.460)	(2.167)	(1.231)	(4.242)
CVC size to parent	-0.094***	-0.019***	0.001	0.025	0.001	0.011***
	(-6.571)	(-5.165)	(1.103)	(0.497)	(0.156)	(2.858)
Cashholding	-0.563***	-0.047	-0.006	-1.157*	-0.149	-0.018
	(-3.845)	(-1.586)	(-1.293)	(-1.897)	(-1.160)	(-1.392)
RD_expense	-1.204*	-0.679***	-0.003	0.299	-0.090	-0.124**
	(-1.966)	(-5.334)	(-0.645)	(0.188)	(-0.282)	(-2.593)
Leverage	-0.091**	-0.031***	-0.000	-0.364***	-0.064***	-0.004**
	(-2.368)	(-3.183)	(-0.292)	(-4.911)	(-4.158)	(-2.055)
BtoM_ratio	0.138***	-0.024	-0.004	0.160	0.049	-0.002
	(2.950)	(-1.057)	(-1.086)	(0.578)	(0.803)	(-0.204)
CapEx	4.126***	0.158	-0.022*	9.260***	1.051*	0.001
	(3.767)	(0.643)	(-1.696)	(2.879)	(1.732)	(0.010)
ROA	-2.183***	-0.696***	0.005	-3.901***	-0.616**	0.113**
	(-4.324)	(-7.013)	(0.486)	(-3.293)	(-2.280)	(2.562)
Tangibility	0.367	0.476***	-0.000	0.258	0.429***	-0.038***
	(1.429)	(7.313)	(-0.115)	(0.462)	(3.393)	(-2.686)
Stock Liquidity	-0.117**	-0.028***	-0.000	0.258**	0.027	0.012**
	(-2.616)	(-3.022)	(-0.674)	(2.189)	(1.082)	(2.510)
Market Value(Ln)	-0.014	-0.007	0.001	0.145	0.036	-0.005**
	(-0.414)	(-0.989)	(1.497)	(1.454)	(1.624)	(-2.547)
Analyst Coverage	-0.172***	-0.026**	0.001	-0.232	-0.054*	0.014**
	(-3.510)	(-2.411)	(1.361)	(-1.607)	(-1.834)	(2.522)
SP500 Index Return	-0.295	-0.108	-0.010	-0.326	0.007	-0.035
	(-0.535)	(-0.781)	(-1.278)	(-0.551)	(0.057)	(-1.475)
Beta_mkt	-0.432***	-0.194***	0.006	-0.219	-0.089**	0.024**
	(-3.062)	(-5.998)	(1.081)	(-1.172)	(-2.249)	(2.580)
Total Volatility	31.958***	8.447***	0.162	50.062***	10.998***	0.439
	(6.926)	(8.428)	(0.918)	(4.200)	(4.515)	(1.465)
Fund Size	0.134***	0.028***	-0.001	0.078	0.033**	-0.003
	(5.785)	(3.829)	(-1.496)	(1.517)	(2.580)	(-1.263)
KZ_index	-0.005***	-0.001***	-0.000	-0.002	-0.000	-0.000
	(-8.232)	(-9.827)	(-0.818)	(-1.190)	(-0.718)	(-1.335)
OCF/Asset	-1.928***	-0.486***	0.007	-1.455	-0.351	-0.130**
	(-2.721)	(-4.428)	(1.113)	(-0.958)	(-1.091)	(-2.451)
FCFF/Asset	-0.044	0.109***	-0.001	0.270	0.149*	-0.016*
	(-0.417)	(3.089)	(-0.852)	(0.924)	(1.744)	(-1.832)
Inst Ownership	-0.797***	-0.251***	-0.002	-1.217***	-0.256***	-0.047***
	(-6.007)	(-9.027)	(-1.432)	(-4.397)	(-3.754)	(-3.266)
s_innovation	0.068***	0.014***	0.000	0.077***	0.012***	0.001*
	(7.319)	(8.096)	(1.217)	(4.188)	(3.538)	(1.964)

s_integrity	0.174***	0.029***	-0.001	-0.011	0.003	-0.005
	(3.908)	(2.702)	(-1.454)	(-0.113)	(0.157)	(-1.191)
s_teamwork	-0.223***	-0.042***	-0.001	-0.309***	-0.050***	-0.009***
	(-9.548)	(-12.694)	(-1.526)	(-5.716)	(-4.462)	(-2.765)
Constant	1.358***	0.452***	-0.005	0.878	0.120	0.066***
	(5.398)	(7.945)	(-1.262)	(1.155)	(0.653)	(2.709)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.250	0.261	0.098	0.256	0.247	0.223
Observations	15805	15805	15805	30195	30195	30195

Panel B: The level of manipulation before and after the CVC entry in the long run (within 2-year window)

This table presents panel OLS regression results of the level of stock continuous trading manipulation with industry and year-fixed effects for the sample that only includes the firms with CVC investments. Standard errors are clustering at the year-month level. In columns (1) to (3), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred, the CTM ratio, and End-of-day price dislocation (EOP) respectively within 1 year leading up to the given date. In columns (4) to (6), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred, the CTM ratio, and End-of-day price dislocation (EOP) respectively within 2 years leading up to the given date. The main independent variable is the "CVC_After_Entry" which is equal to 1 if the CVC is in the duration after the entry date or after the date of the first CVC investment. All variables are as defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	N_manipul_1y	CTM_1y	EOP_1y	N_Manipul_2y	CTM_2y	EOP_2y
CVC_entry_dummy	-0.484***	-0.076**	0.017**	-0.869***	-0.130***	-0.004
	(-3.090)	(-2.189)	(2.569)	(-5.109)	(-2.714)	(-0.614)
CVC size to parent	-0.088**	0.001	-0.002	0.094***	0.064***	0.003***
	(-2.158)	(0.150)	(-0.978)	(2.682)	(6.767)	(3.110)
Cashholding	0.727	0.046	-0.035*	-0.480	-0.434***	-0.118***
	(1.548)	(0.339)	(-1.686)	(-0.808)	(-2.699)	(-6.586)
RD_expense	-4.558***	-0.990***	-0.025	-13.167***	-3.556***	-0.190***
	(-3.133)	(-3.120)	(-0.554)	(-13.563)	(-11.027)	(-4.269)
Leverage	-0.702***	-0.148***	0.002	-1.004***	-0.196***	-0.007**
	(-8.795)	(-6.488)	(0.534)	(-7.718)	(-6.594)	(-2.014)
BtoM_ratio	0.515	0.154*	0.018*	1.656***	0.295***	-0.037***
	(1.311)	(1.808)	(1.829)	(3.363)	(2.957)	(-4.438)
CapEx	10.506**	0.607	1.821***	15.889***	0.966	1.627***
	(2.302)	(0.668)	(3.565)	(3.016)	(0.825)	(4.099)
ROA	-6.631***	-1.066***	0.067*	-7.535***	-1.900***	0.212***
	(-4.219)	(-3.044)	(1.771)	(-4.692)	(-5.043)	(4.462)
Tangibility	2.796***	1.096***	-0.126**	3.539***	1.267***	-0.020
	(3.225)	(5.233)	(-2.606)	(3.175)	(4.942)	(-0.488)
Stock Liquidity	0.588***	0.097***	-0.018***	0.202	-0.030	-0.022***
	(3.257)	(2.743)	(-3.737)	(0.891)	(-0.656)	(-5.073)
Market Value(Ln)	0.122	0.064***	-0.029***	0.602***	0.182***	-0.030***
	(1.164)	(2.998)	(-4.817)	(5.013)	(7.729)	(-6.693)
Analyst Coverage	-0.505***	-0.140***	0.030***	-0.840***	-0.254***	0.002

	(-2.620)	(-4.173)	(3.727)	(-4.134)	(-6.639)	(0.594)
SP500 Index Return	-0.721	-0.244**	0.015	-0.399	-0.150	0.011
	(-1.339)	(-2.196)	(0.862)	(-0.473)	(-0.894)	(0.583)
Beta_mkt	0.082	-0.188**	-0.079***	2.272***	0.286***	-0.079***
	(0.259)	(-2.223)	(-4.574)	(7.615)	(3.978)	(-6.920)
Total Volatility	62.684***	17.671***	-0.538	75.929***	14.180***	-0.378
	(4.039)	(6.658)	(-0.960)	(4.126)	(3.702)	(-0.590)
Fund Size	0.077	0.017	0.019***	-0.031	-0.008	0.006*
	(1.328)	(1.452)	(3.541)	(-0.453)	(-0.548)	(1.921)
KZ_index	-0.010	-0.001	-0.000	-0.033***	-0.006***	-0.000
	(-1.434)	(-0.514)	(-0.404)	(-9.389)	(-7.340)	(-1.600)
OCF/Asset	-2.018	-0.591*	-0.110**	-2.818**	-0.461	-0.316***
	(-1.308)	(-1.680)	(-2.151)	(-2.182)	(-1.376)	(-7.739)
FCFF/Asset	1.237***	0.345***	-0.070***	0.395	0.083	-0.118***
	(3.155)	(3.351)	(-2.751)	(0.758)	(0.782)	(-6.797)
Inst Ownership	-2.683***	-0.645***	-0.079***	-2.554***	-0.648***	-0.010
	(-8.022)	(-7.016)	(-3.301)	(-5.545)	(-6.676)	(-0.581)
s_innovation	0.032	0.005	0.000	0.214***	0.031***	-0.000
	(1.341)	(0.920)	(0.313)	(5.831)	(4.104)	(-0.062)
s_integrity	-0.030	0.009	0.004	0.358***	0.171***	0.003
	(-0.298)	(0.412)	(0.649)	(2.724)	(6.083)	(0.589)
s_teamwork	-0.215**	-0.015	-0.003	-0.285***	-0.024	-0.003*
	(-2.596)	(-0.752)	(-0.926)	(-3.574)	(-1.389)	(-1.971)
Constant	1.471	0.138	0.176***	-2.533**	-0.432*	0.329***
	(1.591)	(0.700)	(4.037)	(-2.092)	(-1.919)	(8.434)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.353	0.350	0.316	0.456	0.426	0.245
Observations	35523	35523	35523	66708	66708	66708

Table 6: Stock manipulation before and after each CVC investment

This table presents panel OLS regression results of the level of stock continuous trading manipulation with firm-fixed and year-fixed effects for the sample that only includes the firms with CVC investments. Standard errors are clustering at the month-week level if the time frame of manipulation measurement is 90 days. Standard errors are clustering at the year-month level if the time frame of manipulation measurement is above 90 days. In columns (1) (3) (5) (7), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred within 90 days, 6 months, 1 year, and 2 years leading up to the given date respectively. In columns (2) (4) (6) (8), the dependent variable is the level of the stock manipulation measured by the number of times End-of-day price dislocation (EOP) occurred within 90 days, 6 months, 1 year, and 2 years leading up to the given date respectively. The independent variables are the dummy variables which are equal to 1 if the date is 90 days, 6 months, 1 year, or 2 years after CVC investments respectively; All variables are as defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	N_Manipul_90d	EOP_90d	N_Manipul_6m	EOP_6m	N_Manipul_1y	EOP_1y	N_Manipul_2y	EOP_2y
CVC_90d_after_dummy	0.028**	0.003**						
	(2.408)	(2.359)						
CVC_180d_after_dummy			0.171***	0.010**				
			(3.632)	(2.300)				
CVC_1y_after_dummy					0.304	0.014***		
					(1.585)	(3.324)		
CVC_2y_after_dummy							-0.212	-0.000
							(-0.515)	(-0.015)
CVC size to parent	0.007**	0.002***	0.017***	0.002	0.038***	0.006***	0.136***	0.009***
	(2.525)	(3.456)	(3.461)	(1.246)	(2.653)	(2.954)	(5.695)	(4.178)
Cashholding	-0.247**	-0.050***	-0.774***	-0.094***	-0.712*	-0.104***	-2.377***	-0.166***
	(-2.021)	(-8.722)	(-7.557)	(-5.422)	(-1.658)	(-7.656)	(-3.862)	(-14.427)
RD_expense	0.230	0.030*	2.523***	0.063	4.581***	0.108***	6.650***	0.072*
	(0.675)	(1.773)	(4.366)	(0.975)	(5.752)	(4.035)	(4.701)	(1.732)
Leverage	-0.041***	-0.008***	-0.003	-0.019**	0.112*	-0.022***	0.502***	-0.022***
	(-4.618)	(-4.971)	(-0.145)	(-2.510)	(1.719)	(-5.195)	(6.523)	(-8.410)
BtoM_ratio	0.030	0.002	-0.248**	-0.000	0.327*	0.036***	0.951***	-0.069***
	(0.680)	(0.505)	(-2.568)	(-0.032)	(1.664)	(2.864)	(4.769)	(-6.228)
CapEx	0.238	0.234***	2.468***	0.687***	6.856**	0.785***	15.251***	0.359*
	(0.418)	(5.294)	(2.743)	(3.723)	(2.495)	(3.743)	(3.555)	(1.861)
ROA	-0.012	-0.000	0.174	0.005	-0.378	0.039*	1.940***	0.027*
	(-0.111)	(-0.000)	(1.100)	(0.116)	(-0.946)	(1.866)	(3.687)	(1.927)
Tangibility	1.993***	-0.111***	3.105***	-0.277***	6.764***	-0.498***	2.395*	-0.635***
	(6.879)	(-6.454)	(23.761)	(-4.091)	(5.956)	(-7.958)	(1.771)	(-12.592)
Stock Liquidity	0.102***	0.006***	-0.025	0.006	-0.139	-0.013*	-0.478***	-0.007
	(3.604)	(3.785)	(-0.751)	(0.721)	(-1.383)	(-1.681)	(-3.195)	(-1.241)
Market Value(Ln)	-0.049*	-0.012***	-0.116**	-0.034***	0.015	-0.010*	0.667***	-0.049***
	(-1.912)	(-4.660)	(-2.009)	(-4.792)	(0.184)	(-1.927)	(4.042)	(-13.107)
Analyst Coverage	0.195***	-0.009***	0.233***	-0.015**	0.377***	-0.012**	0.692***	-0.003

	(6.962)	(-4.124)	(10.246)	(-2.103)	(3.127)	(-2.140)	(3.653)	(-0.431)
SP500 Index Return	0.007	-0.003	0.246	-0.003	0.542	0.016	0.617	0.002
	(0.019)	(-0.174)	(0.373)	(-0.152)	(0.872)	(0.952)	(0.982)	(0.151)
Beta_mkt	0.298***	0.025***	0.754***	0.052***	1.219***	0.019***	1.001***	0.039***
	(10.888)	(7.214)	(25.169)	(6.447)	(8.243)	(2.766)	(5.707)	(5.893)
Total Volatility	10.716***	-0.389***	-9.255***	-0.833***	-21.777***	-2.012***	-12.302	-1.027***
	(7.287)	(-5.907)	(-6.067)	(-3.479)	(-2.873)	(-8.533)	(-1.355)	(-3.871)
Fund Size	0.036***	0.006***	-0.013	0.010***	-0.047	0.010***	-0.246***	0.006
	(2.750)	(6.686)	(-0.872)	(3.108)	(-1.024)	(3.033)	(-4.469)	(1.396)
KZ_index	-0.003***	0.000***	-0.005***	0.000**	-0.015***	-0.000	-0.020***	-0.000
	(-7.331)	(4.443)	(-10.026)	(2.434)	(-4.469)	(-0.946)	(-6.661)	(-1.136)
OCF/Asset	0.119	-0.009	-0.907***	-0.008	1.577**	-0.100**	-0.957	0.006
	(0.519)	(-0.312)	(-3.011)	(-0.092)	(2.326)	(-2.242)	(-1.134)	(0.163)
FCFF/Asset	-0.380***	-0.004*	-0.777***	-0.021	-0.599**	-0.015*	-0.728**	-0.006
	(-6.537)	(-1.728)	(-7.549)	(-1.647)	(-1.982)	(-1.770)	(-2.214)	(-0.600)
Inst Ownership	0.017	-0.012**	-0.236**	-0.032*	-0.338	-0.042***	-1.254	0.013
	(0.281)	(-2.151)	(-2.344)	(-1.913)	(-0.907)	(-3.113)	(-1.495)	(1.095)
s_innovation	0.023***	-0.001***	0.051***	0.000	0.071***	0.002***	0.099***	0.003**
	(5.137)	(-3.371)	(9.025)	(0.087)	(4.113)	(2.659)	(3.535)	(2.460)
s_integrity	-0.000	-0.000	0.047***	-0.001	0.128***	-0.002	0.301***	0.004
	(-0.044)	(-0.738)	(2.893)	(-0.290)	(2.669)	(-0.642)	(5.936)	(1.591)
s_teamwork	-0.036***	0.001***	-0.082***	0.003*	0.019	-0.002	0.126**	-0.001
	(-7.132)	(3.254)	(-5.097)	(1.903)	(0.449)	(-0.920)	(2.414)	(-0.372)
Constant	-0.295	0.138***	1.493**	0.388***	-0.284	0.265***	-1.979	0.637***
	(-0.837)	(4.029)	(2.498)	(4.017)	(-0.284)	(3.936)	(-0.879)	(13.941)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.244	0.121	0.346	0.245	0.449	0.250	0.529	0.302
Observations	128005	127373	127373	127373	174811	174811	227436	227436

Table 7: Stock manipulation and CVC performance and strategy

The presented table provides results from a logit regression analysis with industry and year-fixed effects, conducted to examine the impact of stock manipulation levels on the likelihood of successful exits and syndication in Corporate Venture Capital (CVC) investments while accounting for all control variables. The dependent variables in columns (1) to (3) represent "CVC Success Exit", a binary variable assigned the value of 1 if the CVC investment results in a successful exit, such as an Initial Public Offering (IPO), acquisition, or leveraged buyout (LBO). In columns (4) to (6), the dependent variable is "CVC Syndication", a binary variable assigned the value of 1 for deals involving investee companies with other CVC investors in the specified year. The independent variables represent stock manipulation levels, measured by the frequency of manipulation occurrences within 6 months, 1 year, and 2 years leading up to the given date, respectively. All variables are defined in detail in the Appendix. The significance levels are denoted as follows: *** for 1%, ** for 5%, and * for 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CVC Success Exit				CVC Syndication			
N_Manipul_1y	-0.032**				-0.027***			
	(-2.539)				(-2.631)			
CTM_1y		-0.085*				-0.093**		
		(-1.737)				(-2.307)		
N_Manipul_2y			-0.025***				-0.029***	
			(-3.094)				(-4.349)	
CTM_2y				-0.062**				-0.092***
				(-2.039)				(-3.653)
CVC size to parent	0.024	0.025	0.024	0.025*	0.013	0.014	0.012	0.014
	(1.603)	(1.644)	(1.586)	(1.676)	(0.801)	(0.868)	(0.742)	(0.887)
Fund Size	0.475***	0.479***	0.474***	0.480***	0.477***	0.479***	0.477***	0.482***
	(16.649)	(16.727)	(16.598)	(16.752)	(20.669)	(20.681)	(20.609)	(20.773)
Cashholding	0.938***	0.985***	0.887***	0.956***	0.398	0.415	0.309	0.345
	(2.917)	(3.077)	(2.747)	(2.977)	(1.480)	(1.547)	(1.144)	(1.280)
RD_expense	-2.317***	-2.347***	-2.428***	-2.423***	-2.035***	-2.136***	-2.142***	-2.283***
	(-2.624)	(-2.641)	(-2.736)	(-2.712)	(-2.946)	(-3.077)	(-3.101)	(-3.271)
Leverage	0.081*	0.085*	0.077	0.081*	-0.014	-0.014	-0.024	-0.023
	(1.732)	(1.816)	(1.639)	(1.734)	(-0.320)	(-0.315)	(-0.552)	(-0.541)
BtoM_ratio	1.140***	1.140***	1.129***	1.137***	0.909***	0.903***	0.884***	0.887***
	(6.906)	(6.908)	(6.849)	(6.900)	(6.490)	(6.461)	(6.316)	(6.358)
CapEx	8.458***	8.509***	8.161***	8.432***	2.776	2.738	2.375	2.545
	(3.880)	(3.903)	(3.746)	(3.873)	(1.539)	(1.517)	(1.314)	(1.410)
ROA	-0.264	-0.237	-0.296	-0.222	-0.506	-0.514	-0.573	-0.528

	(-0.426)	(-0.379)	(-0.478)	(-0.354)	(-0.917)	(-0.926)	(-1.051)	(-0.952)
Tangibility	-0.921*	-0.955*	-0.842	-0.927*	-0.054	-0.068	0.059	-0.019
	(-1.767)	(-1.832)	(-1.613)	(-1.778)	(-0.127)	(-0.161)	(0.139)	(-0.046)
Stock Liquidity	-0.094	-0.095	-0.094	-0.095	-0.070	-0.073	-0.067	-0.072
	(-1.212)	(-1.215)	(-1.214)	(-1.213)	(-1.040)	(-1.084)	(-0.998)	(-1.073)
Market Value(Ln)	0.453***	0.459***	0.447***	0.457***	0.473***	0.477***	0.460***	0.468***
	(8.981)	(9.110)	(8.859)	(9.057)	(10.824)	(10.921)	(10.531)	(10.733)
Analyst Coverage	-0.343***	-0.352***	-0.336***	-0.349***	-0.359***	-0.366***	-0.340***	-0.356***
	(-5.904)	(-6.077)	(-5.772)	(-6.019)	(-7.078)	(-7.248)	(-6.699)	(-7.044)
SP500 Index Return	-1.720	-1.720	-1.765	-1.745	0.457	0.460	0.435	0.442
	(-0.668)	(-0.668)	(-0.682)	(-0.676)	(0.200)	(0.201)	(0.189)	(0.192)
Beta_mkt	0.685***	0.680***	0.670***	0.666***	0.457***	0.448***	0.442***	0.427***
	(4.136)	(4.104)	(4.051)	(4.012)	(3.468)	(3.402)	(3.359)	(3.237)
Total Volatility	1.329	1.120	2.682	1.980	14.692**	14.462**	16.005***	15.469***
	(0.191)	(0.160)	(0.384)	(0.283)	(2.523)	(2.478)	(2.747)	(2.647)
KZ_index	-0.002*	-0.002*	-0.002*	-0.002*	-0.002*	-0.002*	-0.002	-0.002*
	(-1.835)	(-1.912)	(-1.812)	(-1.925)	(-1.749)	(-1.842)	(-1.628)	(-1.801)
OCF/Asset	-1.668*	-1.703*	-1.615*	-1.730*	-0.818	-0.818	-0.786	-0.862
	(-1.881)	(-1.918)	(-1.821)	(-1.946)	(-1.062)	(-1.060)	(-1.024)	(-1.116)
FCFF/Asset	0.732**	0.748**	0.706*	0.745**	0.592*	0.607*	0.554*	0.604*
	(2.006)	(2.047)	(1.940)	(2.045)	(1.770)	(1.815)	(1.660)	(1.811)
Inst Ownership	-0.030	-0.015	-0.051	-0.028	0.244*	0.247*	0.210	0.217*
	(-0.198)	(-0.097)	(-0.330)	(-0.186)	(1.903)	(1.926)	(1.636)	(1.690)
s_innovation	0.046***	0.046***	0.047***	0.046***	0.052***	0.052***	0.055***	0.053***
	(3.232)	(3.205)	(3.303)	(3.215)	(4.913)	(4.895)	(5.140)	(5.019)
s_integrity	0.039	0.037	0.041	0.040	0.061	0.059	0.064	0.065
	(0.755)	(0.718)	(0.803)	(0.787)	(1.530)	(1.474)	(1.620)	(1.622)
s_teamwork	0.135***	0.136***	0.133***	0.134***	0.143***	0.145***	0.139***	0.142***
	(3.832)	(3.862)	(3.769)	(3.814)	(5.182)	(5.243)	(5.017)	(5.122)
Constant	-13.636***	-13.734***	-13.579***	-13.708***	-14.482***	-14.498***	-14.357***	-14.406***
	(-21.620)	(-21.769)	(-21.579)	(-21.773)	(-25.834)	(-25.854)	(-25.662)	(-25.737)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.128	0.128	0.129	0.128	0.137	0.136	0.137	0.137
Observations	327906	327906	327906	327906	327906	327906	327906	327906

Table 8: Stock Manipulation and Time to CVC IPO Exit

The table presents the results of a Cox regression analysis for survival to test the impact of a parent firm's stock manipulation level on the duration for a CVC to go public. The hazard ratios are displayed as the results. The survival time is measured in months as "Time to IPO," with IPO_exit=1 defining the failure status variable. The independent variable is a dummy variable for high manipulation levels, set to 1 if the manipulation measurement value post-CVC entry is above the mean for each measurement. The manipulation measurements are considered within specified timeframes: 6 months, 1 year, and 2 years by using the sum of the number of 30-minute alerts for Continuous Trading Manipulation. Covariates consist of all control variables, year, and industry dummies. Variable definitions are provided in the Appendix. t statistics in parentheses. Significance at the 1,5,10 percent level is indicated by ***, **, and *.

	(1)	(2)	(3)
		Time to IPO	
High_manipul_6m	0.537**		
	(-2.126)		
High_manipul_1y		0.549**	
		(-2.057)	
High_manipul_2y			0.522**
			(-2.179)
cvc_size_to_parent	0.738	0.737	0.740
	(-1.440)	(-1.444)	(-1.420)
Market_value	1.007	1.009	1.005
	(0.052)	(0.068)	(0.039)
Cashholding	4.235	4.470	4.261
	(1.418)	(1.482)	(1.432)
RD_expense	2629.5**	2763.1**	2305.7**
	(2.415)	(2.435)	(2.358)
Leverage	0.773	0.776	0.773
	(-1.291)	(-1.273)	(-1.290)
BtoM_ratio	1.560	1.604	1.642
	(0.697)	(0.744)	(0.781)
CapEx	0.560	0.573	0.385
	(-0.086)	(-0.083)	(-0.142)
ROA	10.75	10.82	11.24
	(0.758)	(0.762)	(0.765)
Tangibility	9.678	9.898	11.20
	(1.080)	(1.093)	(1.147)
Liquidity	0.886	0.884	0.873
	(-0.404)	(-0.414)	(-0.453)
Analyst_Coverage	0.942	0.944	0.937
	(-0.336)	(-0.324)	(-0.364)
Ln_Fund_Age	1.199	1.198	1.206
	(1.343)	(1.340)	(1.379)
Fund_Size	1.091	1.090	1.096
	(0.719)	(0.717)	(0.758)
KZ_index	0.994	0.994	0.994
	(-0.525)	(-0.521)	(-0.520)
OCF_at	0.0115	0.0109	0.0127
	(-1.128)	(-1.144)	(-1.098)
FCFF_at	0.837	0.867	0.863
	(-0.142)	(-0.114)	(-0.117)
Inst Ownership	1.135	1.133	1.095
	(0.308)	(0.304)	(0.222)
s_innovation	1.031	1.031	1.033
	(0.853)	(0.840)	(0.889)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
pseudo R-sq	0.088	0.088	0.088
N	1718	1718	1718

Table 9: Robust test: Short-term moderate factors ,[-90d,+90d]window

This table presents panel OLS regression to show the short-term moderate effect of institutional ownership, cash holding, FCFF/Asset, OCF/Asset, KZ_index, and CVC size/parent size on the association of CVC investments and the level of stock continuous trading manipulation with firm-fixed effect and year-month-fixed effect for the sample that only includes the firms with CVC investments. Standard errors are clustering at the week level. In columns (1) to (6), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred within 90 days leading up to the given date. The independent variable is the dummy variable which is equal to 1 if the date is 90 days after a CVC investment. All control variables are included and defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)
		N_Manipul_90d	
cvc_90d_after_dummy=1 # Inst Ownership	-0.225**		
	(-2.610)		
cvc_90d_after_dummy=1 # Cashholding		-0.190*	
		(-1.866)	
cvc_90d_after_dummy=1 # cvc_size_to_parent			-0.054***
			(-3.290)
cvc_90d_after_dummy=1	0.182**	0.062**	0.031*
	(2.602)	(2.272)	(1.934)
Inst Ownership	0.398***		
	(5.038)		
Cashholding		0.171	
		(1.224)	
CVC size to parent			0.014
			(0.821)
Other Control variables	Yes	Yes	Yes
Year month FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
R-squared	0.309	0.309	0.309
Observations	82270	82270	82270

Table 10: The effect of different types/stages of CVC investments

Panel A: T-test on the level of stock manipulation for different type of CVC investments

Variable	Early/Seed_invest_dummy=0	Early/Seed_invest_dummy=1	diff	sig	p_value
N_Manipul_90d	1.2288	1.3540	-0.1252	***	0.0000
N_Manipul_6m	2.3851	2.6785	-0.2934	***	0.0000
EOP_90d	0.0107	0.0247	-0.0140	***	0.0000
EOP_6m	0.0196	0.0472	-0.0276	***	0.0000

Variable	Late_stage_dummy =0	Late_stage_dummy =1	diff	sig	p_value
N_Manipul_90d	1.4000	1.1942	0.2058	***	0.0000
N_Manipul_6m	2.7439	2.3462	0.3977	***	0.0000
EOP_90d	0.0249	0.0117	0.0131	***	0.0000
EOP_6m	0.0453	0.0239	0.0214	***	0.0000

Variable	Syndicated_invest_dummy=0	Syndicated_invest_dummy=1	diff	sig	p_value
N_Manipul_90d	1.3033	1.2943	0.0090		0.2714
N_Manipul_6m	2.5823	2.5306	0.0517	***	0.0002
EOP_90d	0.0163	0.0190	-0.0027	***	0.0028
EOP_6m	0.0084	0.0285	-0.0201	***	0.0000

Panel B: Difference in Differences Analysis of different types of CVC investments

This table presents the difference in differences regression results to show the effects of different types of CVC investments on the level of stock manipulation before and after CVC investments. "Early/Seed Investment", "Late stage Investment", and "syndicated Investment" are dummy variables that are equal to 1 if the CVC investment is under the category and used as the treatment group respectively. The post group which is equal to 1 shows the status after CVC investment. The dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred within 90 days leading up to the given date. All control variables (including CVC activity control variables) are included and defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	(1)	(2)	(3)
		N_Manipul_90d	
CVC_90d_after_dummy=1 # Early/Seed Investment=1	-0.054		
	(-0.835)		
CVC_90d_after_dummy=1 # Late stage investment=1		0.206***	
		(4.262)	
CVC_90d_after_dummy=1 # Syndicated Investment=1			-0.088*
			(-1.930)
CVC_90d_after_dummy=1	0.054	-0.020	0.106***
	(1.484)	(-0.548)	(3.517)
Early/Seed Investment=1	0.176***		
	(5.460)		
Late stage investment=1		-0.272***	
		(-8.685)	
Syndicated Investment=1			-0.051**
			(-2.374)
Control variables	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
R-squared	0.277	0.278	0.277
Observations	127373	127373	127373

Table 11: T-tests for important factors before and after CVC entry

Panel A: T-tests for important factors before and after CVC entry within [-2 years,+2 years] window

Variable	CVC_enter_dummy=0	CVC_enter_dummy=1	Diff.	Sig.	P-value
Institutional ownership	0.6675	0.6858	-0.0183	***	0.0000
Innovation	6.0880	6.8305	-0.7425	***	0.0000
OCF/Total Asset	0.0855	0.0881	-0.0026	***	0.0001
FCFF/Total Asset	0.0467	0.0727	-0.0261	***	0.0000
Stock Total Volatility	0.0204	0.0228	-0.0024	***	0.0000

Panel B: T-tests on the level of manipulation for different categories of CVC size/ parent size

Variable	CVC size/Parent firm size<Median	CVC size/Parent firm size>Median	Diff.	Sig.	P-value
N_Manipul_90d	1.2003	1.2765	-0.0762	***	0.0000
N_Manipul_6m	2.3627	2.5060	-0.1433	***	0.0000
N_Manipul_1y	4.6540	4.9333	-0.2794	***	0.0000

Panel C: T-tests on the level of manipulation for different categories of CVC fund size

Variable	CVC fund size <Median	CVC fund size >Median	Diff.	Sig.	P-value
N_Manipul_90d	1.168405	1.226423	-0.058018	***	0.0000
N_Manipul_6m	2.284023	2.548502	-0.264479	***	0.0000
N_Manipul_1y	4.709778	5.321398	-0.61162	***	0.0000

Table 12: Robust test: Long-term mediation effect

This table presents panel OLS regression to show the long-term mediation effect of institutional ownership, FCFF, and OCF on the association of CVC entry and the level of stock continuous trading manipulation with industry-fixed effect and year-fixed effect for the sample that only includes the firms with CVC investments. Standard errors are clustering at the year-month level. In column (1) from panels A, B and C, the dependent variable is the mediation factors shown as institutional ownership, FCFF, and OCF respectively. In columns (2) to (4), the dependent variable is the level of the stock manipulation measured by the number of times a manipulation occurred, End-of-day (EOD) price dislocation, and CTM ratios respectively within one year leading up to the given date. The independent variable is the dummy variable which is equal to 1the CVC is in the duration after the entry date or after the date of the first CVC investment if the entry date is not stated. All control variables are included and defined in the Appendix. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

Panel A: The mediation effect of Institutional Ownership within the window [-2year,+2year]

	(1) Inst Ownership	(2) N_manipul_1y	(3) EOP_1y	(4) CTM_1y
CVC_entry_dummy	0.015**			
	(2.114)			
CVC_entry_dummy=1 # Inst Ownership		-2.943***	-0.127***	-0.548***
		(-8.052)	(-3.611)	(-6.410)
CVC_entry_dummy=1		1.586***	0.102***	0.293***
		(6.370)	(3.860)	(4.639)
Inst Ownership		-0.751**	0.029*	-0.291***
		(-2.598)	(1.671)	(-5.071)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R-squared	0.429	0.352	0.262	0.341
Observations	63501	63501	44162	63501

Panel B: The mediation effect of FCFF within the window [-2year,+2year]

	(1) FCFF/Asset	(2) N_manipul_1y	(3) EOP_1y	(4) CTM_1y
CVC_entry_dummy	0.019***			
	(4.100)			
CVC_entry_dummy=1 # FCFF/Asset		-3.387***	-0.232***	-0.594***
		(-4.461)	(-3.531)	(-3.854)
CVC_entry_dummy=1		-0.224*	0.027***	-0.046
		(-1.914)	(2.933)	(-1.482)
FCFF/Asset		2.636***	0.099**	0.561***
		(4.276)	(2.306)	(4.350)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R-squared	0.326	0.348	0.261	0.338
Observations	63501	63501	44162	63501

Penal C: The mediation effect of Operating Cash Flow within the window [-2year,+2year]

	(1)	(2)	(3)	(4)
	OCF/Asset	N_Manipul_1y	EOP_1y	CTM_1y
CVC_entry_dummy	-0.005***			
	(-3.447)			
CVC_entry_dummy=1 # OCF/Asset		3.089**	-0.046	0.528**
		(2.248)	(-0.992)	(2.289)
CVC_entry_dummy=1		-0.740***	0.017**	-0.135***
		(-4.660)	(1.998)	(-3.806)
OCF/Asset		-3.792***	-0.156***	-0.595**
		(-3.008)	(-3.060)	(-2.029)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R-squared	0.811	0.344	0.256	0.336
Observations	63501	63501	44162	63501

Table 13: Stock Manipulation and Time to CVC IPO Exit (Subsample analysis)

The table presents the results of a Cox regression analysis for survival to test the impact of a parent firm's stock manipulation level on the duration for a CVC to go public using subsamples. The hazard ratios are displayed as the results. The survival time is measured in months as "Time to IPO," with IPO_exit=1 defining the failure status variable. The independent variable for both panel A and B is a dummy variable for high manipulation levels, set to 1 if the manipulation measurement value post-CVC entry is above the mean for each measurement. The manipulation measurements are the mean value of the sum of the overall number of 30-minute alerts for Continuous Trading Manipulation within specified timeframes: 1 year, and 2 years after CVC investment. In Panel A, the subsamples are classified by CVC fund size. Columns (1) to (2) used the subsample for the "CVC Fund Size" that is lower than the median; Columns (3) to (4) used the subsample for the "CVC size to its parent size" that is higher than the median. In Panel B, the subsamples are classified by CVC deal Size/total invested equity in the company by all VCs. Columns (1) to (2) used the subsample for the "deal_size_to_company" that is lower than the median; Columns (3) to (4) used the subsample for the"deal_size_to_company" that is higher than the median. Covariates consist of all control variables and industry dummies. Variable definitions are provided in the Appendix. t statistics in parentheses. Significance at the 1,5,10 percent level is indicated by ***, **, and *.

Panel A: Subsamples classified by CVC Fund Size

	The sample for cvc_size <=$250mil (Median)		The sample for cvc_size >$250mil (Median)	
	(1)	(2)	(3)	(4)
	Time to IPO		Time to IPO	
High_manipul_1y	0.500*		5.342**	
	(-1.935)		(2.048)	
High_manipul_2y		0.270***		5.473**
		(-2.851)		(2.082)
cvc_size_to_parent	0.720	0.655	0.183	0.185
	(-1.165)	(-1.395)	(-1.246)	(-1.240)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
pseudo R-sq	0.105	0.111	0.091	0.091
N	941	941	777	777

Panel B: Subsamples classified by CVC deal Size/total invested equity in company by all VCs

	The sample for deal_size_to_company <Median		The sample for deal_size_to_company >Median	
	(1)	(2)	(3)	(4)
	Time to IPO		Time to IPO	
High_manipul_1y	0.421		0.466**	
	(-1.596)		(-2.054)	
High_manipul_2y		0.338**		0.486**
		(-1.992)		(-1.962)
deal_size_to_company	0.994	0.994	0.438***	0.434***
	(-0.856)	(-0.844)	(-3.796)	(-3.850)
Control variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
pseudo R-sq	0.142	0.144	0.128	0.128
N	993	993	725	725

Appendix1: Manipulation measurements in SMARTS, Inc., and CMCRC database

Variable names (in CMCRC)	Definitions/ Descriptions
Continuous Trading Manipulation 30 mins Number of Alerts	The Continuous Trading Manipulation metric identifies unusual 30-minute changes in liquidity, returns, and transaction costs using the following steps: a) For each 30-minute interval (j) after the opening of the current trading day (t), calculate the following metrics for every security in the market: 1-Total trading value in the past 30 minutes (Val); 2-Total trading volume in the past 30 minutes (Vol); 3-Return in the past 30 minutes (Ret); 4-Average effective spread in the past 30 minutes (EffSpr); 5-Average quoted spread in the past 30 minutes (QuotedSpr). b) For every security in the market, compute the average value of the metrics above for each 30-minute interval (j) over the previous 30 trading days (t-1 to t-31). c) For the j-th 30-minute interval of the current trading day (t): For security i, determine the difference (Security_Deltai,j,t,m) between metric m for the current interval (j) and the average metric value for the same interval (j) over the past 30 trading days. For trading volume and trading value metrics, calculate the percentage change instead. Compute the average value of Deltai,j,t,m across all securities (Mkt_Deltaj,t,m). For the 30-minute return metric, use index returns to calculate the average delta. Determine the difference between (Security_Deltai,j,t,m) and (Mkt_Deltaj,t,m) for the current trading day (Current_Security_Deltai,j,t,m) and the average daily difference over the past 30 trading days (Hist_Security_Deltai,j,t,m). If there are three or more metrics where (Current_Security_Deltai,j,t,m) is more than three standard deviations away from Hist_Security_Deltai,j,t,m, increment the Continuous Trading Manipulation alert count by one.
End-of-day (EOD) price dislocation	A dislocated End-of-Day (EOD) price is defined as one that deviates from its mean price change by 4 standard deviations over the previous 100 trading days, measured at the close of trading. The following morning, this price typically reverts back to the mean. The EOD price dislocation value signifies the trading value in the final 15 minutes for a security (i) experiencing EOD price dislocation on a specific day (t).
Continuous Trading Manipulation 30 mins Value Ratio (bps)	The metric represents the proportion of trading value for all 30-minute (j) intervals with Continuous Trading Manipulation alerts, in relation to the total trading value for security i on day t.

Appendix 2: Variable definition

Variable name	Description	Data Source
Dependent Variables		
Manipul_dummy	Dummy=1 if the manipulation shown for the date. The "manipulation" is identified as at least one "Continuous Trading Manipulation 30 mins Number of Alerts" for the date.	SMARTS, Inc. and Capital Markets CRC (CMCRC)
N_Manipul_30d	The number of times a manipulation occurred within the 30 days leading up to the given date	
N_Manipul_90d	The number of times a manipulation occurred within the 90 days leading up to the given date	
N_Manipul_6m	The number of times a manipulation occurred within the 180 days leading up to the given date	
N_Manipul_1y	The number of times a manipulation occurred within the 365 days leading up to the given date	
N_Manipul_2y	The number of times a manipulation occurred within the 365 days leading up to the given date	
EOP_90d	The number of times the End-of-day (EOD) price dislocation occurred within the 90 days leading up to the given date	
EOP_6m	The number of times the End-of-day (EOD) price dislocation occurred within the 180 days leading up to the given date	
EOP_1y	The number of times the End-of-day (EOD) price dislocation occurred within the 365 days leading up to the given date	
EOP_2y	The number of times the End-of-day (EOD) price dislocation occurred within the 2 years leading up to the given date	
CTM_90d	The sum of "Continuous Trading Manipulation 30 mins Value Ratio" within the 90 days leading up to the given date	
CTM_6m	The sum of "Continuous Trading Manipulation 30 mins Value Ratio" within the 180 days leading up to the given date	
CTM_1y	The sum of "Continuous Trading Manipulation 30 mins Value Ratio" within the 1 year leading up to the given date	
CTM_2y	The sum of "Continuous Trading Manipulation 30 mins Value Ratio" within the 2 years leading up to the given date	
Independent variables		
CVC_dummy	Dummy=1 if there is a CVC investment for the date.	VentureXpert
CVC_enter_dummy	Dummy=1 if the CVC is in the duration after the entry date or after the date of the first CVC investment if the entry date is not stated.	VentureXpert
CVC_firm_dummy	Dummy=1 if there are CVC investments in the firm.	VentureXpert

CVC_90d_after_dummy	Dummy=1 if the date is 90 days after a CVC investment; and =0 for dates before the investment.	VentureXpert
CVC_6m_after_dummy	Dummy=1 if the date is 6 months after a CVC investment; and =0 for dates before the investment.	VentureXpert
CVC_1y_after_dummy	Dummy=1 if the date is 1 year after the CVC investment; and =0 for dates 1 year before the investment.	VentureXpert
CVC_2y_after_dummy	Dummy=1 if the date 2y after a CVC investment; and =0 for dates before the investment.	VentureXpert
CVC Success Exit	Dummy=1 if the CVC investment has one of the exits such as IPO, acquisition, or LBO exit.	VentureXpert
CVC Syndication	Dummy=1 for the deals in which the investee company has other CVC investors in the given year	VentureXpert
High_manipul_6m_dummy	Dummy=1 if the manipulation measurement value exceeds the mean of manipulation measurements, calculated using the number of days featuring abnormal 30-minute fluctuations in the Continuous Trading Manipulation metric within 180 days following the CVC entry date.	SMARTS & CMCRC
High_manipul_1y_dummy	Dummy=1 if the manipulation measurement value exceeds the mean of manipulation measurements, calculated using the number of days featuring abnormal 30-minute fluctuations in the Continuous Trading Manipulation metric within 1 year following the CVC entry date.	SMARTS & CMCRC
High_manipul_2y_dummy	Dummy=1 if the manipulation measurement value exceeds the mean of manipulation measurements, calculated using the number of days featuring abnormal 30-minute fluctuations in the Continuous Trading Manipulation metric within 2 years following the CVC entry date.	SMARTS & CMCRC
Control variables		
Cashholding	Cash and short-term investment / Total assets	Compustat
ROA	Operating income before depreciation/ Total assets	Compustat
Market value (Ln)	Stock price* shares outstanding for the year	Compustat
Cashholding	Cash and short-term investment / Total assets	Compustat
Tangibility	Total net property, plant, and equipment / Total assets	Compustat
BtoM_Ratio	Total common/ordinary equity/ Market value in the fiscal year	Compustat
R&D Expense	Research and development (R&D) expenditure / Total assets	Compustat
CapEx	Capital expenditure/ Total asset	Compustat
Leverage	(Total long-term debt + Debt in current liabilities)/(Total assets-Total long-term debt and debt in current liabilities)	Compustat
Stock Liquidity	1/AMIHUD_yearly, calculated as the average ratio of daily return and daily dollar trading volume for the stock	Compustat
Analyst Coverage	The number of analysts following	I/B/E/S
Fund size	Total Estimated Equity Invested in Fund in USD mil.	VentureXpert
cvc_size_to_parent	Total Estimated Equity Invested in fund/ Market value of its parent firm	VentureXpert/ Compustat

KZ Index	Developed by Steven Kaplan and Luigi Zingales (1997). KZ Index = -1.002 * (Cash Flow / Total Assets) - 39.368 * (Dividends / Total Assets) + 3.139 * (Leverage Ratio) - 1.315 * (Cash / Total Assets) + 0.282 * (Market-to-Book Ratio)	Compustat
OCF/Asset	(Net earnings+Depreciation-Taxes)/Total asset	Compustat
FCFF/Asset	[OCF– Capex– (Current Liability-Current asset)]/Total asset	Compustat
Institutional Ownership	The percentage of shares held by institutional owners in the quarter of a given year	Thomson Reuters' 13F
s_innovation	Measure corporate culture from the innovation dimension using machine learning following Li, et al. (2021)	Li, et al. (2021)
s_integrity	Measure corporate culture from the integrity dimension using machine learning following Li, et al. (2021)	Li, et al. (2021)
s_teamwork	Measure corporate culture from the teamwork dimension using machine learning following Li, et al. (2021)	Li, et al. (2021)
Beta_mkt	The market beta is calculated based on the Fama/French 3 Factors model and takes the coefficient of the excess return on the market, value-weight return of all CRSP firms incorporated in the US and listed on the NYSE, AMEX, or NASDAQ.	Beta Suite by WRDS
Total Volatility	Total Volatility (TVOL) is calculated straightforwardly as the volatility of the realized returns of the underlying security.	Beta Suite by WRDS
S&P500 Index Return	Daily value-weighted return for S&P500 index	CRSP
Early/Seed Investment	Dummy =1 if the CVC investment is under the early or seed investment category.	VentureXpert
Late stage Investment	Dummy =1 if the CVC investment is under late stage investment category.	VentureXpert
Syndicated Investment	Dummy =1 if the CVC investment involves additional CVC investors beyond the parent company in the deal.	VentureXpert
deal_size_to_company	The measurement is calculated by dividing the total equity contribution from the CVC in the deal by the total equity invested in the target company from all VCs.	VentureXpert
Industry	12 Fama French industry classification	Fama French database

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