ABSTRACT

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This paper exploits the recent rise in corporate venture capitalists (CVC) to examine the effect of shareholders' strategic incentives on firms' IPO disclosure. CVCs' investments are often driven by both financial and strategic incentives. I argue that, due to their strategic incentives, CVCs may influence their portfolio firms' disclosure choices to protect proprietary information and avoid competitive harm not only to the portfolio firm but also to the CVC parent. Using a sample of venture capital (VC)-backed IPO firms from 1996 to 2014, I find that CVC-backed firms are more likely to redact material information in IPO prospectuses through confidential treatment orders than firms not backed by CVCs—the likelihood of redaction is 16% higher when a CVC is present. This result is robust to using propensity score matching and an instrumental variables approach. Furthermore, the disclosure effect is more pronounced for CVCs in the same industry as the portfolio firm, CVCs with a formal strategic

partnership with the portfolio firm, and CVCs with fewer portfolio firms. These findings suggest that CVCs' strategic incentives play an important role in their portfolio firms' disclosure choices. CVC-backed firms are also more likely to redact information contained in agreements with collaborative partners, customers, or suppliers and in agreements associated with the CVC parents, which tend to contain proprietary information about the CVC. Taken together, this study offers new insights on how a previously unexplored factor—large shareholders' strategic incentives—affects corporate disclosure decisions.

STRATEGIC SHAREHOLDERS AND IPO DISCLOSURE: EVIDENCE FROM CORPORATE VENTURE CAPITAL

By

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Chapter 1: Introduction

A large literature examines how managers' incentives affect corporate disclosure choices. The role of shareholders in managers' disclosure choices, however, has received relatively less attention. Evidence from recent research (e.g., Ertimur et al., 2014) suggests that large shareholders exert an influence on firms' disclosure decisions. In this study, I examine the disclosure effect of a particular group of shareholders – corporate venture capitalists (CVC). Unlike most shareholders, CVCs have not only financial incentives, but also strategic incentives. Together these two sets of incentives capture the tradeoff between the capital market benefits and the proprietary costs of disclosure, and thus offer a unique setting to examine the effect of shareholder incentives on disclosure choices. Specifically, I examine how the strategic incentives of CVCs influence firms' decisions to redact information in IPO prospectuses through confidential treatment orders.

CVC is an investment practice whereby corporations take an equity stake in early-stage entrepreneurial ventures.[1] Unlike independent venture capitalists (IVCs), whose sole investment goal is to earn high financial returns, CVCs pursue

[1] CVC investment by U.S. corporations started as early as the 1960s and has been on the rise in recent years. According to the National Venture Capital Association, in 2015 corporate venture groups deployed over $7.5 billion to high-growth startups in 905 deals, with these figures accounting for 13% of all venture capital dollars invested and 21% of all deals completed in 2015. More than 1,000 U.S. firms now have corporate venture arms, which represents an increase of nearly 80% from 2011 to 2015, and this number continues to grow (Gage, 2016).

both financial and strategic objectives.[2] For example, in addition to profiting from a venture's share valuation, CVCs may seek to exploit potential synergies with the venture or to extend their research and development (R&D) activities externally (Chesbrough, 2002; MacMillan et al., 2008; Benson and Ziedonis, 2010; Chemmanur et al., 2014). CVC investments often lead to information-sharing and technological collaboration between the CVC and the venture (Dushnitsky and Lenox, 2005; Dushnitsky and Lenox, 2006; Ma, 2016). As a result, the release of certain information through the venture's disclosures can negatively impact the competitive advantage of not only the venture itself but also the CVC parent.[3] CVCs may therefore try to influence their portfolio firms' disclosure choices in a way that protects this proprietary information.

It is not clear, however, whether CVCs have significant influence over their ventures' disclosure choices or whether their strategic incentives dominate their short-term financial goals. First, CVCs are generally not the only investors in a firm – most VC-backed IPOs are funded by IVCs or by a combination of CVCs and IVCs, and thus IVCs also influence ventures' disclosure decisions. As noted above, IVCs' sole investment objective is to earn high financial returns. Moreover, most IVCs have a relatively short-term outlook that is driven by a need to quickly build value and exit through a liquidity event (Chemmanur et al., 2014). Given these financial incentives, IVCs are likely to encourage firms to disclose more

[2] Lantz et al. (2011) find that almost 70% of CVC investors pursue a combination of strategic and financial objectives, while 15% (16%) invest only for strategic (financial) purposes.
[3] Such information includes, for example, innovation-related details that the CVC learns from the venture as well as technological expertise and market information that the CVC shares with the venture.

information, as such disclosure supports a higher market valuation. Second, although CVCs often have strategic motivations behind their investments, the pursuit of financial returns is still an important objective for most CVCs and thus it is unclear which set of incentives (strategic or financial) dominates. Given these arguments, the extent to which CVCs' strategic incentives affect firm disclosure is an empirical question.

To shed light on the effect of CVCs' strategic incentives on firm disclosure, I study the disclosure choice of two sets of VC-backed IPO firms: firms backed by at least one CVC (hereafter, CVC-backed firms) and firms not backed by a CVC (hereafter, non-CVC-backed firms).[4] IPOs represent a particularly attractive setting in this context because IPO disclosures through SEC filings represent the first set of mandated communication most U.S. firms have with the public capital market, which allows researchers to systematically compare the disclosure choices of CVCs-backed firms with those of other firms. Further, because newly public firms are characterized by a high degree of information asymmetry (Ertimur et al., 2014), one would expect the marginal effect of disclosure on market participants to be higher for IPO disclosures relative to other disclosures such as 10-Ks.[5] I limit attention to VC-backed IPO firms because these firms are likely to differ significantly from non-VC-backed IPO firms along a number of dimensions,

[4] In my final sample, CVC-backed firms are backed by both CVCs and IVCs, while non-CVC-backed firms are only backed by IVCs.

[5] I also focus on IPO firms as data on private firms' accounting information are not available and thus one cannot control for important determinants of these firms' disclosure behavior.

resulting in an apples-to-oranges comparison between CVC-backed IPOs and non-VC-backed IPOs and in turn biased inferences.[6]

To capture IPO firms' disclosure choices with respect to proprietary information, I examine decisions to redact material information from their SEC registration filings through confidential treatment orders. Information redaction results when the SEC grants a firm's request to withhold proprietary information from its material contract filings (Boone et al., 2016; Lee, 2016). While more transparent disclosure in the IPO prospectus can reduce the severity of adverse selection, enhance the accuracy of the IPO offer price, and reduce underpricing (e.g., Verrecchia and Weber, 2006, Hanley and Hoberg, 2010; Boone et al., 2016), it can reduce a firm's competitive advantage (e.g., Bhattacharya and Ritter, 1983; Darrough, 1993; Maksimovic and Pichler, 2001; Verrecchia and Weber, 2006; Tang, 2012). Given the CVC's role as strategic shareholder of the portfolio firm, proprietary information protection is thus a relevant dimension of IPO disclosure over which CVCs are likely to exert influence.

Using a sample of 1,164 VC-backed (453 CVC-backed and 711 non-CVC-backed) IPOs from 1996 to 2014, I find that CVC-backed firms are more likely to redact proprietary information from their IPO disclosure. Specifically, 60% of CVC-backed IPO firms redact information from their registration statements, compared with 40% of non-CVC-backed firms. In regression analyses I find that

[6] IPO firms backed by CVCs are also likely to be significantly different from those backed only by IVCs, a concern that I address in later analyses. However, to the extent that CVC-backed IPOs are more similar to IPOs backed only by IVCs than to non-VC-backed IPOs, a comparison between CVC-backed IPOs and IPOs backed only by IVCs is less likely to lead to biased inferences.

this difference continues to hold after controlling for other determinants of redaction choice, such as accounting performance, R&D intensity, competition, and IPO wave.

The above results are consistent with two possible interpretations: (1) CVCs have strategic incentives to encourage their portfolio firms to withhold proprietary information (i.e., treatment effect), and (2) CVCs are more likely to fund firms that have more proprietary information and hence a greater propensity to redact information from their public disclosure (i.e., selection effect). To disentangle these two effects, I first use propensity score matching (PSM) to minimize differences in observable characteristics between the two types of firms. Specifically, I match non-CVC-backed firms to CVC-backed firms based on a list of dimensions known to affect IPO disclosure behavior. The PSM results are consistent with the main findings above – CVC-backed firms' IPO prospectuses are associated with more information redaction than those of non-CVC-backed firms. I also employ the availability of CVC investors as an instrument for CVC backing and continue to find a significant effect of CVCs on portfolio firms' redaction choices. Taken together, these results suggest that differences in IPO prospectuses are to some extent due to the treatment effect, that is, CVCs encourage protection of their portfolio firms' proprietary information at the IPO stage.

If the influence of CVCs on disclosure is indeed driven by their strategic incentives, such disclosure effect should be more pronounced for firms backed by CVCs with stronger strategic objectives and for agreements that are more likely to include proprietary information. CVCs' strategic incentives are likely to dominate

if the CVC parent (1) operates in a similar product market as the IPO firm, (2) has developed a formal partnership with the IPO firm through a joint venture or strategic alliance, or (3) has fewer portfolio firms. Limiting attention to CVC-backed IPOs, I find that firms backed by CVCs whose strategic objectives are more likely to dominate redact more information from their prospectuses. This finding suggests that CVCs' strategic incentives play an important role in their portfolio firms' disclosure choices.

I next examine the nature of the redacted information by studying the types of material agreements as well as the content contained in these agreements. Following prior studies (Boone et al., 2016; Lee, 2016), I classify material agreements into supplier/customer, research/alliance, credit/leasing, employment, and stockholder categories. I find that the effect of CVCs on IPO firms' disclosure is more pronounced for material agreements related to the research/alliance or supplier/customer areas. Given that CVC investment is strongly driven by strategic goals, these results reinforce the view that CVCs discourage the disclosure of portfolio firms' information in order to shield proprietary information from industry competitors. Furthermore, CVC-backed firms are more likely to redact information contained in agreements with the CVC relative to those with other corporations or institutions, which provides further evidence that CVCs' strategic goals give rise to incentives to limit the disclosure of their portfolio firms' information.

In additional analysis on CVCs' influence over their ventures' disclosure choices, I examine whether IPO firms' disclosure strategy mirrors that of their CVC parent. Specifically, restricting attention to IPO firms backed by public CVC

parents, I find that firms are more likely to redact information if the CVC parent has redacted information in its own 10-K filings prior to the portfolio firm's IPO. This finding is consistent with CVCs concerned about proprietary information themselves encouraging their portfolio firms to protect information through confidential treatment orders.

Lastly, I document one source of costs associated with the information protection driven by strategic shareholders – IPO underpricing. In particular, I find that redacting information in prospectuses is associated with greater IPO underpricing and this relation is more pronounced for CVC-backed IPOs, presumably because the research- and product market-related information that CVCs encourage to protect is particularly useful for potential investors in assessing the value of VC-backed IPOs. Taken together, these findings suggest that while the redaction choice driven by strategic shareholders facilitates the protection of proprietary information for one group of shareholders (i.e., the CVC), it causes a capital market tradeoff that can be costly to other shareholders.

This study contributes to several literatures. First, this paper adds to the literature on the influence of shareholders on firms' disclosure behavior (Ertimur et al., 2014) by showing that shareholders' strategic incentives can have significant effects on firms' disclosure strategies. Second, this study complements the large literature on the tradeoff between the capital market benefits and the proprietary costs of disclosure by taking the perspective of shareholders. Specifically, this is the first study to provide evidence that the proprietary costs of disclosure can be present for a firm's large shareholders with strategic incentives. Third, this paper

contributes to the literature on the effect of VCs on portfolio companies (Barry et al., 1990; Morsfield and Tan, 2006; Nahata, 2008; Chemmanur et al., 2011; Wongsunwai, 2013; Cumming et al., 2015) by showing that CVCs influence the IPO disclosures of their portfolio firms. Finally, this study complements prior research on the differences between CVCs and IVCs (Maula et al., 2005; Chemmanur et al., 2014) by providing evidence on their different disclosure incentives.

The rest of the paper is organized as follows. Section 2 provides a brief review of related literature and develops the paper's main hypotheses. Section 3 discusses the sample, variables, and research design. Section 4 presents the main empirical results, while Section 5 reports results of additional analyses and robustness tests. Section 6 concludes.

Chapter 2: Literature Review

2.1 IPO Disclosure

A firm that conducts an IPO is subject to mandatory disclosure requirements as prescribed by SEC rules. IPO firms must publicly disclose certain financial and nonfinancial information, such as existing material agreements that would otherwise be confidential if the firm stayed private. Such disclosure can result in both benefits and costs to firms. On the one hand, disclosure can reduce information asymmetry and lower the cost of capital (Diamond and Verrecchia, 1991; Botoson, 1997; Easley and O'Hara, 2004; Lambert et al., 2007). In the IPO context, disclosure can reduce IPO underpricing (Beatty, 1989; Schrand and Verrecchia, 2005; Leone et al., 2007; Hanley and Hoberg, 2010; Boone et al., 2016), which represents a transfer of wealth to new shareholders (Lee and Wahal, 2004).

On the other hand, disclosure can reduce a firm's competitive advantage by revealing proprietary information to product market competitors (e.g., Bhattacharya and Ritter, 1983; Darrough, 1993; Maksimovic and Pichler, 2001; Verrecchia and Weber, 2006; Tang, 2012). Not surprisingly, the revelation of sensitive information to competitors is a primary concern to managers when setting disclosure policies (Graham et al., 2005). In line with this view, Ellis et al. (2012) show that proprietary information costs are an important factor in firms' disclosure choices regarding large customers. Guo et al. (2004) similarly show that proprietary information costs affect biotech firms' product-related disclosures.

2.2 Corporate Venture Capital

Prior literature documents that large shareholders such as VCs can affect corporate disclosures in the IPO process (Ertimur et al., 2014). VCs are typically active shareholders: not only do they finance the start-ups, but they also play a monitoring and advisory role and are involved with the strategic planning and managerial recruitment and training functions (Berlin, 1998; Gorman and Sahlman, 1989; Hellmann and Puri, 2000, 2002; Lerner, 1995; Cadman and Sunder, 2014). VCs therefore command greater influence over management than passive institutional investors (Ertimur et al., 2014). A large literature provides evidence on the value provided by VCs for their portfolio companies (e.g., Gorman and Sahlman, 1989; Sapienza, 1992; Steier and Greenwood, 1995; Gompers and Lerner, 2000b; Hellmann and Puri, 2002; Dushnitsky and Lenox, 2006; Chemmanur et al., 2011).

VC activity has traditionally taken the form of IVCs, which are usually structured as limited partnerships. However, in recent years VC is increasingly coming from CVCs, which are stand-alone subsidiaries of corporations that invest in start-up ventures on behalf of their corporate parents. There are several important differences between CVCs and IVCs besides their corporate structures (Gompers and Lerner, 2000b; Dushnitsky and Lenox, 2006; Chemmanur et al., 2014). First, IVCs are generally restricted by a contractually enforced ten-year lifespan, while CVCs have an almost unlimited (at least initially unrestricted) lifespan. CVCs therefore tend to have longer investment horizons. Second, IVCs tend to adopt a performance-based compensation structure for fund managers (e.g., 2% of

management fees and 20% of carried interest), whereas CVC fund managers usually receive a fixed salary plus bonuses that are tied to the parent company's financial performance. Third, as mentioned above, IVCs' sole investment goal is to earn financial returns, whereas CVCs pursue both financial and strategic objectives on behalf of their parent company.

Research examining outcomes of CVC activity focuses largely on the venture's exit outcomes, financial performance, and innovation. Gompers and Lerner (2001) find that relative to non-CVC-backed ventures, ventures that are funded by CVCs are more likely to result in an IPO. Ginsberg et al. (2003) and Maula and Murray (2001) further show that CVC-backed ventures have higher valuations at the IPO compared to ventures funded solely by IVCs. Using a sample of computer, semiconductor, and wireless ventures, Park and Steensma (2012) find that CVC backing is particularly beneficial for new ventures that require specialized complementary assets or that operate in an uncertain environment. Chemmanur et al. (2014) show that CVCs are superior to IVCs in supporting innovation due to CVCs' greater industry knowledge and tolerance for failure.

Chapter 3: Hypothesis Development

CVCs pursue strategic goals when investing in new ventures (Chesbrough, 2002; MacMillan et al., 2008; Chemmanur et al., 2014). For instance, established corporations may invest in new ventures to gain access to new technologies or practices through licensing or acquisition. Alternatively, supporting new ventures that develop complementary products or services may increase demand for the CVC parent's own products. CVC investments with a strategic objective typically involve a high degree of knowledge-transfer between the venture and the CVC (Dushnitsky and Lenox, 2006).[7] Such information-sharing works in both directions, with the CVC receiving innovation-related knowledge from the venture while the venture obtains business expertise and market information from the CVC. CVCs therefore have strong incentives to protect the venture's as well as their own proprietary information from industry rivals by redacting information from IPO prospectuses.[8][9]

These arguments lead to the following hypothesis:

[7] For example, the Agilent Technologies CVC group "works closely with the company's existing businesses to share information, qualify investment opportunities, and connect portfolio companies to Agilent's own initiatives" (Chesbrough, 2002).

[8] Large shareholders hold considerable influence over managerial decisions through their ownership stakes, board membership and relationships with management (Barry et al., 1990; Lerner, 1995; Gompers and Lerner, 2004; Brav et al., 2008; Klein and Zur, 2009). Moreover, newly public VC-backed firms, which tend to be based on innovative technology and still have relatively high growth potential, are aligned with CVC corporate parents in terms of withholding proprietary information, which creates the possibility that IPO firms are willing to apply the disclosure strategy that CVCs suggested.

[9] Consistent with CVCs having concerns that certain activities by their portfolio firms might cause competitive harm to the corporate parents, some CVCs were considered as restrictive business partners, preventing their portfolio firms from engaging with competitors who may have been useful customers (Foster and Davison, 2017).

Hypothesis 1. *CVC-backed firms are more likely to redact proprietary information from their IPO prospectuses than non-CVC-backed firms.*

It is not clear, however, whether CVCs have significant influence over their portfolio firms' disclosure choices. First, IVCs also influence ventures' disclosure decisions. Because IVCs' investment objective is to earn high financial returns and achieve a liquidity event quickly (Chemmanur et al., 2014), IVCs are likely to encourage firms to disclose more information, as such disclosure supports a higher market valuation.[10] Second, although CVCs often have strategic motivations behind their investments, the pursuit of financial returns is still an important objective for most CVCs and thus it is an open question as to which set of incentives (strategic or financial) dominates.

To test whether the influence of CVCs on disclosure, if any, is indeed driven by their' strategic motivations, I explore circumstances under which CVCs' strategic incentives are likely to dominate. Specifically, I consider three sources of variation in the disclosure effect of CVCs' strategic objectives: 1) whether the industry focus of the venture is the same as that of the CVC parent, 2) whether the venture has a formal partnership with the CVC parent, and 3) whether the venture is backed by a CVC parent with a smaller number of portfolio firms.

First, the ability of one firm to learn from another depends on the degree of domain similarity between the two firms (Lane and Lubatkin, 1998; Ahuja and

[10] Specifically, theoretical models (e.g., Kyle, 1985) predict that when investors believe they are informationally disadvantaged, there is a greater price impact of selling. Consistent with this prediction, Bradley et al. (2001) and Ofek and Richardon (2000) find that negative returns following lockup expirations are more pronounced for firms characterized by higher information uncertainty.

Katila, 2001), which includes similarities in industry focus. CVCs parents that operate in the same industry as the venture may have stronger strategic objectives such as gaining access to emerging technologies. In addition, CVC parents that operate in the same technological space as the venture can offer the venture more relevant expertise such as organizational know-how, R&D and production support, and assistance identifying partners and customers (McNally, 1997; Gompers and Lerner, 2000b; Lantz et al, 2011). Such knowledge-sharing likely involves proprietary information that the CVC parent would like to withhold from industry competitors. Taken together, these arguments suggest that, compared to CVCs with a different industry focus than the venture, CVCs in a similar product space as the IPO firm are likely to have stronger strategic incentives and as a result be more concerned about redacting proprietary information from IPO prospectuses. More formally:

Hypothesis 2. *CVC-backed firms operating in the same industry as the CVC parent are more likely to redact proprietary information from their IPO prospectuses than CVC-backed firms operating in a different industry than the CVC parent.*

Inter-organization partnerships represent another important mechanism for knowledge-sharing (Dushnitsky and Shaver, 2009). When CVC parents form a strategic alliance or joint venture with their portfolio firms, the degree of information- or technology-sharing between the two firms will be more extensive, further increasing CVC parents' incentives to discourage the release of proprietary information from portfolio firms' IPO disclosure. Formally:

Hypothesis 3. *CVC-backed firms that have a formal partnership with the CVC parent are more likely to redact proprietary information from their IPO prospectuses than CVC-backed firms without a formal partnership with the CVC parent.*

The effect of CVCs' strategic objectives on IPO firms' disclosure of proprietary information may also be influenced by the portfolio size of CVC parents. CVCs that have larger portfolios may have less incentive to exert influence over a given venture's disclosure behavior due to greater diversification of risk. Moreover, CVCs with smaller portfolios are likely to have greater need for the technology developed by a given venture and thus should be more motivated to prevent proprietary information from being released to competitors.[11] These arguments thus lead to the following hypothesis:

Hypothesis 4. *CVC-backed firms that are backed by a CVC parent with a small number of portfolio firms are more likely to redact proprietary information from their IPO prospectuses.*

Hypotheses 2 and 3 predict that IPO firms are more likely to redact information if their CVC parents operate in the same industry or if the venture shares a strategic alliance with its CVC parent. These hypotheses in turn imply that some types of information included in the IPO prospectus are likely to be more important to CVC parents than others. By investing in new ventures, CVCs can

[11] On the other hand, CVCs that back more ventures have a stronger reputation and thus more power to influence the disclosure behavior of their portfolio firms, which would suggest that CVC-backed firms that are backed by CVC parents with a large number of portfolio firms are more likely to redact proprietary information from their IPO prospectuses.

access new technologies and extend their R&D externally while offering portfolio firms access to customer-supplier relationships as well as marketing and distribution know-how. CVC parents' incentives to encourage portfolio firms to shield information from industry rivals should thus be particularly pronounced for information related to R&D, strategic partnerships, and customers or suppliers. These arguments lead to the following prediction:

Hypothesis 5. *The effect of CVCs on IPO information redaction is more pronounced for information contained in material agreements related to R&D, strategic partnerships, and customers or suppliers than for other types of agreements.*

Furthermore, CVCs' incentives to encourage information redaction should be more pronounced if, at the agreement level, the CVC parent is involved with the material agreement that the venture is required to report in the IPO disclosure. More formally:

Hypothesis 6. *IPO Information redaction is likely to be more pronounced in material agreements involving the CVC parent than those involving other corporations or institutions.*

Chapter 4: Sample and Variable Measurement

4.1 Sample

I start with a sample of 1,617 VC-backed IPOs from 1996 to 2014 as reported by the VentureXpert Venture Capital Firms database (accessed through Thomson Reuters SDC Platinum). The sample starts in 1996 because this is when registration statements became publicly accessible on the SEC EDGAR website.[12] In line with other IPO studies, I remove listings of financial institutions (SIC between 6000 and 6999) and regulated utilities (SIC between 4900 and 4999) as well as IPOs with an offer price below $5. I also eliminate American Depository Receipts, unit issues, Real Estate Investment Trusts, and closed-end funds. For each IPO that survives these initial filters, I download the initial prospectuses (S-1 or SB-2). An IPO firm must have a machine-readable SEC Edgar filing available online to remain in the sample.

VentureXpert collects basic information on the investors behind each VC-backed IPO firm. Using multiple sources of information (Google, LexisNexis, etc.), I manually identify CVCs with a unique corporate parent. I then follow prior studies (Chemmanur et al., 2014; Ma, 2016) and drop CVCs that are funded by financial companies, partnerships, or an unknown parent.[13] I classify a VC-backed IPO firm

[12] I use the terms "IPO prospectuses", "registration statements", and "registration filings" for the main SEC filings used by firms going public to register their securities, including S-1 and SB-2 (for small issuers).

[13] Chemmanur et al. (2014) also drop CVC firms that have a foreign parent. While I keep those CVCs in order to maximize my sample size, the results continue to hold when I remove foreign CVCs.

as a CVC-backed firm if it receives financing from at least one CVC; otherwise it is classified as a non-CVC-backed firm. After ensuring that the issuing firms are present in the Compustat annual database in the fiscal year prior to their public listing, I obtain a final sample of 1,164 VC-backed IPO firms, of which 453 are CVC-backed IPO firms.

For each CVC-backed IPO firm, I identify the industry membership of the CVC parent. To do so, I first match the CVCs to Compustat to identify the industries of the publicly traded corporate parents. For the privately held corporate parents, I identify industry membership by searching multiple online sources including the EDGAR company database and Google to increase information accuracy. I use the SDC Joint Ventures and Alliances database to determine whether the IPO firm has formed a formal partnership (strategic alliance or joint venture) with the CVC parent either before or in the two-year period after the IPO.[14]

4.2 Measuring Information Redaction in IPO Prospectuses

To capture disclosure choices with respect to proprietary information, I examine whether an IPO firm redacts material agreements from its IPO prospectus. Redaction is widely used by IPO firms that want to avoid the disclosure of proprietary information (Boone et al., 2016). Specifically, IPO firms can request a confidential treatment (CT) order with respect to the proprietary information

[14] VCs typically retain a large fraction of their equity holdings subsequent to an IPO (Megginson and Weiss, 1991). They usually sell their shares in secondary offerings over a two-year period after the IPO.

contained in its material agreements. If such an order is granted by the SEC, the firm can redact this information from the public filing.[15]

Appendix B provides an example of information redaction in Gevo, Inc.'s S-1 filing. The redacted content might relate to the firm's product or service, trade secrets, or pricing terms, the release of which would negatively impact the firm's competitive advantage relative to industry peers. However, the partial disclosure of material information means that investors cannot observe certain details that may be value-relevant (Boone et al., 2016). IPO redaction may therefore affect the IPO firm's ability to sell its equity successfully.

[Insert Appendix B]

To identify whether firms redact information from their IPO prospectuses, I search firms' IPO registration statements (S-1 or SB-2) for the term "confidential request" or "confidential treatment".[16] An IPO firm is classified as having redacted information if it has redacted portions of at least one material agreement from the registration filing.

[15] Certain types of information that are material to investors must be disclosed even if they are proprietary, such as the name of a key supplier, material contingency clauses, indemnification clauses, and financial covenants in material financing or credit agreements.

[16] After May 2008, the SEC started to release CT order filings that present the dates and exhibits for firms granted information redaction. Following Boone et al. (2016), I continue to use the original prospectuses to identify redacting firms even after the public release of CT order filings to keep the identification process consistent.

Chapter 5: Research Design

5.1 Test of Hypothesis 1

To investigate the effect of CVCs on their portfolio firms' IPO information disclosures, I start by estimating the following specification using cross-sectional data on IPO firm observations:

$$REDACT = f(\beta_0 + \beta_1 CVC + \beta_2 Controls), \quad (1)$$

where *REDACT* is a dummy variable equal to one if an IPO firm redacted information from its prospectus and zero otherwise, and *CVC* is a dummy variable equal to one if the firm is classified as a CVC-backed IPO and zero if classified as a non-CVC-backed IPO.[17]

The vector of controls includes firm and market characteristics previously shown to affect firms' IPO disclosure choices. At the firm level, I control for firm size (*SIZE*), measured as the natural logarithm of total assets, financial performance (*ROA*), R&D expenses (*R&D*), leverage (*LEVERAGE*), asset tangibility scaled by total assets (*PP&E*), capital expenditures scaled by total assets (*CAPEX*), and firm age (*AGE*), measured as the number of years since the firm's founding year and taken from SDC if available otherwise from the Field-Ritter database.[18] The degree

[17] In robustness tests (untabulated), I follow Chemmanur et al. (2014) and capture the level of CVC participation using two alternative measures: (1) the number of CVCs in an investing VC syndicate, and (2) the percentage investment made by the CVCs in a VC syndicate. Because the ownership stake of each VC investor is not reported in VentureXpert, and firms are not required to report owners with less than a 5% ownership stake in their IPO prospectus, I am not able to compute the VC ownership stake for every IPO firm. The main results are robust to using these two proxies for CVC participation.

[18] I thank Jay Ritter for generously providing IPO firms' founding dates on his website.

of competition a firm faces also affects the disclosure choice (Guo et al., 2004; Li, 2010; Hanley and Hoberg, 2010; Boone et al., 2016), with firms facing more severe competition likely to disclose less information. I use three proxies for the intensity of the competitive environment: the Herfindahl–Hirschman Index (*HHI*), the sum of the squares of firms' market shares for firms in a given industry, market size (*MKTSIZE*) — total industry sales, and product substitutability (*PRODSUB*) — total industry sales divided by operating costs, where operating costs are defined as the sum of the costs of goods sold, selling, general, and administrative expenses, and depreciation, depletion, and amortization. I next control for the potential impact of IPO waves on the information content of prospectuses by including *IPOWAVE,* a dummy variable equal to one if the number of offerings in a given Fama-French industry is greater than or equal to five, and zero otherwise (Chemmanur and He, 2011; Boone et al., 2016).[19] Finally, because CVCs may be more efficient in nurturing innovation than IVCs, in which case CVC-backed portfolio firms may have more proprietary information than non-CVC-backed firms at the IPO stage, it is important to control for the level of proprietary information. While R&D expenditures, capital expenditures, and firm age capture the level of proprietary information to some extent, I further include the number of material agreements in a firm's prospectus (*NUMAGMT*) and the length of the prospectus (*LENGTH*) as additional controls.

[19] The controls *SIZE*, *ROA*, *LEVERAGE*, *R&D*, *PPE*, *CAPEX*, *HHI*, *MKTSIZE*, and *PRODSUB* are measured in the fiscal year prior to the IPO offering. On average, an IPO occurs 162 days after the initial registration filing with the SEC. The results are robust to alternatively measuring these variables in the IPO year.

I estimate Equation (1) using probit regressions. To control for confounding effects, I conduct four regressions: one without fixed effects, one with year fixed effects, one with year and industry fixed effects, and one with year, industry, and underwriter fixed effects. Standard errors are clustered by industry to correct for unobserved heteroskedasticity. Hypothesis 1 predicts that β_1 is positive.

5.2 Tests of Hypotheses 2 to 4

To test whether the proprietary information redaction by CVC-backed portfolio firms is driven by CVC parents operating in the same industry as the portfolio firm (Hypothesis 2), CVC parents that have formed a partnership with the portfolio firm (Hypothesis 3), and CVC corporate parents with fewer portfolio firms (Hypothesis 4), I estimate the following specification:

$$REDACT = f(\gamma_0 + \gamma_1 SAMEIND + \gamma_2 ALLIANCE + \gamma_3 PSIZE + \gamma_4 Controls), \quad (2)$$

where *SAMEIND* is a dummy variable equal to one if an IPO firm operates in the same industry as at least one CVC parent company and zero otherwise, *ALLIANCE* is a dummy variable equal to one if an IPO firm has formed a strategic alliance or joint venture with at least one CVC parent and zero otherwise, and *PSIZE* is the average portfolio size of CVC parents backing the IPO firm. To calculate the latter measure, I first count the number of IPO firms in each CVC parent's portfolio in the three years around the IPO and then aggregate the portfolio size of CVC parents at the IPO level by taking the average portfolio size across all CVC parents. The control variables are as previously defined, and standard errors are clustered by

industry.[20] Hypotheses 2 and 3 predict that CVCs operating in the same industry as the portfolio firm and CVCs that have formed a partnership with the portfolio firm have more extensive information-sharing with the venture and thus are more likely to encourage the redaction of proprietary information, while Hypothesis 4 predicts that CVCs that have larger venture portfolios have less incentives to encourage information redaction. These hypotheses thus predict that γ_1 and γ_2 are positive while γ_3 is negative.

5.3 Test of Hypothesis 5

To test whether the effect of CVCs on IPO redaction is more pronounced for information related to R&D, strategic partnerships, or customers and suppliers (Hypothesis 5), I estimate the following specification:

$$REDACT\_CONTENT = f(\theta_0 + \theta_1 CVC + \theta_2 Controls), \quad (3)$$

where $REDACT\_CONTENT$ is a dummy variable that capture firms' redaction choices based on one of the five types of information reported as material agreements in IPO prospectuses. Following prior studies (Boone et al., 2016, Lee, 2016), I classify material agreements in registration filings into five categories: supplier/customer, research/alliance, credit/leasing, employment, and stockholder. I therefore estimate five regressions based on whether the IPO firm has redacted

[20] The results continue to hold if I estimate Equation (2) using two-way clustering by industry and CVC investor.

any information belonging to the given category. All other variables are as previously defined.

5.4 Test of Hypothesis 6

For each CVC-backed IPO firm, if a material agreement is associated with corporations or institutions (rather than people such as executives, directors, or employees), I manually check whether any CVC parent of the portfolio firm is the other party of the material agreement. I then examine whether material agreements related to CVC parents are more likely to contain redacted information by estimating the following specification:

$$REDACT\_AGMT = f(\delta_0 + \delta_1 AGMT\_CVC + \delta_2 Controls), \quad (4)$$

where *REDACT_AGMT* is a dummy variable equal to one if a material agreement in the IPO prospectus contains redacted information and zero otherwise, and *AGMT_CVC* is a dummy variable equal to one if a material agreement in the IPO prospectus explicitly states the involvement of a CVC parent and zero otherwise. All other variables are as previously defined. Hypothesis 6 predicts that δ_1 is positive.

Chapter 6: Empirical Results

6.1 Descriptive Statistics

Table 1 presents descriptive statistics on CVC-backed IPO firms. In Panel A, I report summary statistics on VC-backed IPO activity by year. As can be seen, CVC's share of VC activity varies over time. It is most intense around 2000, when approximately 53% of VC-syndicated IPOs were funded by at least one CVC, and around 2013, when this percentage reached a high of 57%. This pattern is consistent with the existence of "CVC waves" as identified by prior studies (Gompers and Lerner, 2000b; Dushnitsky and Lenox, 2006; Ma, 2016).

In Table 1 Panel B I report the industry distribution of CVC-backed IPO firms, where industries are based on the Fama-French 49 industry classification.[21] CVC investment in IPO firms was most active in the computer software industry during the sample period, with 154 IPO firms operating in this sector. The second-most active investment sector for CVCs was pharmaceutical products, with 117 CVC-backed firms completing public offerings over the sample period. Other industries witnessing active CVC investment over the sample period include electronic equipment, business services, and medical equipment.

Table 1 Panel C summarizes the industry composition of CVC parents. Among the 240 CVCs that backed the sample IPO firms, 32 CVC parents operate

[21] The Fama-French 49 industry classifications come from Kenneth French's website, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

in the pharmaceutical products industry, followed by 31 in electronic equipment, 29 in communication, and 24 in computer software. Comparing these results with those in Panel B, the most active sectors for IPO firms and their CVC parents are largely the same, which implies that CVC firms are likely to operate in the same industry as their portfolio firms and thus might have incentives to influence these firms' disclosures.

Panel D of Table 1 presents information on the change in VC ownership stake in the year after the IPO. Following prior literature (Ertimur et al., 2014), I measure VC selling/distribution as the change in VC ownership, which I hand collect from IPO firms' prospectus and first post-IPO proxy statement. These firms are required to report the percentage of beneficial ownership of stockholders that own 5% or more of its stock as well as that of certain executive officers and directors. I am able to compute the change in VC ownership for a sample of 2,731 IVCs and 274 CVCs. On average, IVCs own a higher stake than CVCs prior to the offering.[22] In the year after the IPO, both IVCs and CVCs sell a significant part of their ownership. Specifically, the average change in ownership for CVCs (IVCs) is -5.83% (-8.05%). In percentage terms, CVCs (IVCs) sell 49.8% (59.63%) of their ownership.

[Insert Table 1]

[22] At the IPO firm level, the mean (median) total ownership of IVC investors is 43% (40%) for non-CVC-backed firms and 40% (39%) for CVC-backed firms, with the difference being economically insignificant. Given that the ownership of IVC investors is similar across the two groups, non-CVC-backed firms could be a good benchmark to gauge the effect of CVC investors.

Table 2 presents descriptive statistics on the main variables used in our analysis. Detailed variable definitions are provided in Appendix A. Panel A reports summary statistics. As can be seen, approximately 38% of VC-backed IPOs receive funding from CVC firms.[23] Moreover, among the full VC-backed IPO sample, 45% of IPO firms redact information from their prospectuses. This number is comparable to the 40% documented by Boone et al. (2016), who examine all IPOs in the U.S. over the 1996 to 2011 period. In terms of the control variables, VC-backed IPO firms have mean (median) assets of 28.39 (27.91) million, and on average do not make a profit in the IPO year, with a mean (median) ROA of -0.514 (-0.339). The average IPO firm has an R&D intensity of 0.34 and capital expenditures (scaled by assets) of 0.08. VC-backed ventures go public on average eight years after their establishment, while prior studies document that the average firm age as of the IPO year is approximately 13 (Hanley and Hoberg, 2010; Boone et al., 2016). Nearly 90% of VC-backed IPOs occur during industry IPO waves.

Panel B of Table 2 presents the correlation matrix among the main variables. I find that information redaction from IPO prospectuses is significantly positively related to CVC participation. Specifically, the correlation between *REDACTION* and *CVC* is 0.195 and statistically significant at the 1% level. This result provides preliminary evidence that CVC backing is associated with greater information redaction from portfolio firms' IPO disclosures.

[23] This number is greater than that in prior literature (e.g., Chemmanur et al., 2014), for perhaps two reasons. First, Chemmanur et al. (2014) consider the 1980 to 2004 period while the sample in this paper spans 1996 to 2014, which includes the most recent CVC waves. Second, Chemmanur et al. (2014) omit CVC firms that have a foreign parent while this paper does not, which results in a larger sample of CVC-backed IPOs.

[Insert Table 2]

6.2 Baseline Results

Univariate Analysis

Table 3 Panel A compares the prevalence of information redaction across CVC- and non-CVC-backed IPO firms. As can be seen, CVC-backed firms are more likely to redact information, with 57% (37%) of CVC-backed (non-CVC-backed) firms redacting proprietary information. The difference is statistically significant at the 1% level. In a first attempt to minimize potential biases, I match CVC- and non-CVC-backed firms based on IPO year, Fama-French 49 industry, and total assets.[24] After the matching, the difference in the extent of information redaction between CVC- and non-CVC-backed firms remains large and significant. The univariate evidence again supports the view that CVCs are more likely than their IVC counterparts to encourage IPO firms to shield the proprietary information in their registration filings.

Multivariate Analysis

Table 3 Panel B reports regression results for Equation (1), which examines the effect of CVCs on the information redaction choices of their portfolio firms. The coefficient on the CVC backing dummy is positive and statistically significant in column (1). This result continues to hold when industry, year, and underwriter

[24] In Section 4.3 below, I use propensity-score matching to minimize differences in characteristics between CVC- and non-CVC-backed IPO firms.

fixed effects are included in columns (2) through (4).[25] These findings suggest that CVC engagement is associated with a higher likelihood of information protection in the IPO process. In terms of economic significance, the marginal effects show that the presence of CVC backing increases the probability of IPO redaction by about 16%.[26] Taken together, this evidence shows that CVC backing leads to greater redaction of information from portfolio firms' IPO prospectuses.

[Insert Table 3]

In an additional test (untabulated), I re-estimate Equation (1) on several broadly defined industry groups to examine whether the effect of CVC backing on IPO firms' information redaction concentrates in particular industries. To ensure the explanatory power of the test, I follow prior literature (Atanassov et al., 2007; Tian and Wang, 2014) and classify sample firms into four industry groups based on their underlying technological nature: (1) pharmaceutical, medical equipment, and chemicals (classified as pharmaceutical), (2) electrical equipment, communication, computer hardware (classified as computers/electrical), (3) software, and (4) others (classified as low-tech). I find that the effect of CVC backing on IPO firms'

[25] The model with industry and underwriter fixed effects has a smaller sample size because some industries have only zeros or only ones as the dependent variable. These observations are excluded from the probit estimation because they perfectly predict outcomes.

[26] A potential concern with using a dummy variable to capture information redaction is that, while CVC-backed firms have a higher likelihood of redacting information, those non-CVC-backed firms that choose to redact information may redact more information from their prospectuses. To address this concern, I use a continuous measure (*REDACT_RATIO*, equal to the proportion of material agreements that a firm redacts from its prospectus) to capture the amount of information redacted. Untabulated results show that CVC backing leads to a significantly higher *REDACT_RATIO*. Economically, CVC-backed firms redact information from 4.3% more material agreements than non-CVC-backed firms.

information redaction is stronger in the pharmaceutical and low-tech categories, while less pronounced in the computers/electrical and software categories.

6.3 Propensity Score Matching

While the documented difference in IPO disclosure between CVC- and non-CVC-backed firms is likely driven by CVCs' incentives to discourage information release during their portfolio firms' IPOs, the main results above could be due to other explanations. For example, CVCs and IVCs might invest in different types of ventures. If, compared to IVCs, CVCs have greater propensity to select entrepreneurial firms that have more proprietary information and thus are more likely to redact information from prospectuses, the finding that CVC-backed IPO firms redact more information could be due to a selection effect rather than a treatment effect.

In Table 4 Panel A, columns (1) to (3), I provide evidence on the extent to which CVC- and non-CVC-backed firms differ along observable characteristics. The results show that CVC-backed firms are on average younger than non-CVC-backed firms at the time of the IPO. Further, while both groups of firms experience a loss at the IPO stage, CVC-backed firms are relatively less profitable. However, CVC-backed firms invest more in R&D, hold less fixed assets, and come from more competitive industries (i.e., lower HHI, larger market size, and greater degree of product substitutability). Moreover, CVC-backed firms are more likely to go public during an IPO wave and have a lower market share among IPO firms that went

public in the same industry-year. Finally, the prospectuses of CVC-backed firms are longer than those of non-CVC-backed firms, possibly because CVC-backed firms have more proprietary information. Taken together, these results suggest that CVC- and non-CVC-backed firms differ along various dimensions, which implies that the previous regression analyses could lead to biased estimates of CVCs' influence on IPO firms' disclosure choices.

To disentangle treatment and selection effects, one would ideally compare the disclosure choices of IPO firms under the random assignment of CVCs. Since such an approach is not possible, I employ propensity score matching (PSM) to minimize the effect of selection based on observable characteristics. Specifically, I use the nearest-neighbors matching method of PSM. To calculate propensity scores, I estimate a probit model at the IPO firm level with the dependent variable being a dummy equal to one for CVC-backed firms and zero for non-CVC-backed firms. Matching variables include the set of control variables used in the main regression. I also require that IPOs of matched non-CVC- and CVC-backed firms be in the same industry and year. Industry and year fixed effects are included to absorb any industry- or year-specific heterogeneity that is not captured by firm characteristics.

Results from the "pre-matched" probit model are reported in Table 4 Panel A, column (4). Consistent with the univariate comparison in columns (1) to (3), the regression results show CVC- and non-CVC-backed firms are significantly different across observable characteristics. The pseudo-R^2 from the estimation reveals that the firm characteristics considered together capture about 9% of the variation in the choice of CVCs.

Based on the propensity scores from the "pre-matched" probit model, I next conduct PSM with a caliper of 0.05 and with replacement. I use the non-CVC-backed firms from the same industry-year IPO group as the control firms.[27] Under this research design I am able to match at least one non-CVC-backed firm for 226 CVC-backed IPOs. Table 4 Panel B reports results of diagnostic tests used to evaluate the accuracy of the matching procedure. Specifically, it reports the univariate comparison between matched CVC- and non-CVC-backed firms. After the matching process, there is no significant difference in any of the observable characteristics between matched CVC- and non-CVC-backed firms. The diagnostic tests therefore suggest that the matching procedure removes meaningful differences between CVC- and non-CVC-backed IPO firms along the set of observable dimensions considered.

Finally, I rerun the main regression on the PSM sample. Table 4 Panel C reports the results. Although the sample size declines due to the restrictions applied in the matching process, the effect of CVC backing on IPO firms' disclosure choices remains qualitatively unchanged. Specifically, after non-parametrically controlling for observable firm characteristics, I continue to find that CVC-backed firms are more likely to redact information from their IPO prospectuses than their non-CVC-backed counterparts. The PSM analysis therefore indicates that the lower information disclosure of CVC-backed IPO firms is likely driven by CVCs' active

[27] The results are robust to conducting PSM based on (1) matching without replacement, (2) choosing one, two, or three nearest neighbors, and (3) applying a caliper of 0.1 or 0.25.

influence rather than merely by intrinsic differences between CVC- and non-CVC-backed firms.

It is worth noting that because the researcher can observe firm characteristics only after ventures file for IPOs, one cannot match CVC- and non-CVC-backed firms based on pre-treatment (before the venture receives VC funding) firm characteristics. As a result, one cannot fully rule out superior CVC selection ability as an alternative explanation for the main results above. However, a selection effect is not likely to dominate the treatment effect for two reasons. First, entrepreneurial firms with highly innovative technology have a natural bias against partnering with CVCs due to potential conflicts of interest (Hellmann, 2002; Chemmanur et al., 2014). Second, CVCs typically co-invest with IVCs that act as the lead investor of the VC syndicate. Thus, while one cannot fully isolate the magnitude of the treatment effect, the PSM results suggest that CVCs exert active influence over their portfolio firms' IPO disclosures.[28]

[Insert Table 4]

6.4 Instrumental Variables

To further mitigate concerns that CVC- and non-CVC-backed ventures are not randomly distributed, I test Hypothesis 1 using a bivariate probit model

[28] It may also be the case that CVCs support innovation to a greater extent than IVCs, leading to more proprietary information in CVC-backed firms than non-CVC-backed firms at the IPO stage. This concern is mitigated by controlling for the level of proprietary information at the IPO stage (controlling for *R&D*, *CAPEX*, *AGE*, *NUMAGMT*, and *LENGTH* serve this purpose) and by conducting PSM analysis.

(Wooldridge, 2002; Greene, 2003). A bivariate probit model is appropriate for making causal inferences when both the dependent variable and endogenous explanatory variable are dichotomous. Specifically, a bivariate probit model jointly calculates maximum likelihood estimates (MLE) of two seemingly unrelated equations:

$$y_1 = \alpha_0 + \alpha_1 y_2 + \alpha_2 x + \varepsilon_1, \quad (5)$$

$$y_2 = \beta_0 + \beta_1 z + \beta_2 x + \varepsilon_2, \quad (6)$$

where y_1 is the dependent variable (i.e., *REDACT*), y_2 is the endogenous explanatory variable (i.e., *CVC*), x is the previously identified set of control variables used in the baseline regression, and z is a set of instrumental and explanatory variables used in the selection equation. For the selection equation, a good instrument should be highly correlated with the endogenous explanatory variable but not directly correlated with the dependent variable. Availability of CVCs at the funding stage should affect the likelihood of ventures receiving CVC funding but is less likely to influence venture firms' IPO disclosures, making it a good candidate for an instrument. To capture the availability of CVCs (*CVC_AVAIL*), I use the natural log of the total number of existing CVCs over the years that the firm received VC funding. Other explanatory variables for CVC backing in Equation (6) include the number of funding rounds (*FUNDROUND*) and the number of VC investors (*NUMVC*).

Table 5 presents the bivariate probit estimation results. Column (1) reports results on the likelihood of CVC backing. As predicted, the availability of CVCs positively affects the likelihood of CVC backing. Turning to the other explanatory

variables in the selection model, the number of VC investors increases the likelihood of CVC backing, whereas the number of funding rounds decreases the likelihood of CVC backing. Column (2) reports results for the treatment equation. After accounting for the endogenous choice of CVC backing, the influence of CVC backing on IPO firms' information redaction remains positive and significant. Taken together, the PSM and the bivariate probit estimation results suggest that the effect of CVCs on portfolio firms' IPO disclosures is unlikely to be driven exclusively by the selection of CVC investors.

[Insert Table 5]

6.5 Hypotheses 2 through 4: Industry Overlap, Partnerships, and Portfolio Size

Table 6 reports results of estimating Equation (2), which tests the predictions of Hypotheses 2 through 4. As can be seen, the coefficient on *SAMEIND* is positive and statistically significant in all three specifications. For instance, in column (1), the coefficient on *SAMEIND* is 0.295 and significant at the 5% level. This finding suggests that IPO firms in the same industry as the CVC parent are more likely to redact information from their prospectuses than firms that do not operate in the industry as any of their CVC parents. This result is consistent with the prediction in Hypothesis 2 that CVCs having the same industry focus as their ventures are more likely to encourage the ventures to shield proprietary information.

Similarly, the coefficient on *ALLIANCE* is positive and statistically significant in columns (1) and (2). These results are consistent with the prediction in Hypothesis 3 that CVCs that have cooperative partnerships with their ventures have stronger incentives to prevent the disclosure of proprietary information in their portfolio firms' IPO filings.

Turning to the coefficient on *PSIZE*, the estimates are negative and statistically significant in each model, suggesting that ventures backed by CVCs with smaller portfolio size are more likely to redact information in the IPO process. This finding is consistent with the prediction in Hypothesis 4 that CVC parents with more diversified portfolios have lower incentives to influence portfolio firms' disclosures, while CVC parents with smaller portfolios are more concerned about the leakage of proprietary information.

[Insert Table 6]

6.6 Hypothesis 5: The Content of Redacted Information

Table 7 reports results of estimating Equation (3), which tests the prediction of Hypothesis 5. The coefficient estimates on CVC backing are most significant when the redacted information is related to the supplier/customer and research/alliances areas, whereas they are not significant when the information is related to credit/financing or employment.[29] Therefore, consistent with Hypothesis

[29] This pattern also obtains when the dependent variable is defined as a continuous variable (the number of redacted agreements related to a certain category divided by the total number of agreements).

5, the difference in information redaction choices between CVC-backed and non-CVC-backed firms is more pronounced when the information relates to material agreements with partners, suppliers, or customers. Such findings reinforce the view that the effect of CVCs on portfolio firms' IPO disclosures is driven primarily by CVC parents' strategic needs to shield product market- or research-related information from rival firms.

[Insert Table 7]

6.7 Hypothesis 6: Agreements Associated with CVC Parents

Table 8 reports results of estimating Equation (4), which tests the prediction of Hypothesis 6. This test is restricted to the sample of material agreements between CVC-backed IPO firms and corporations or institutions. Of the 2,971 such agreements reported in IPO prospectuses, CVC parents are involved in 259 of these agreements. Table 8 shows that the coefficient on AGMT_CVC is positive and statistically significant, suggesting that IPO firms are more likely to redact information from a material agreement if it is associated with CVC parent. This result is robust to the inclusion of year and industry fixed effects, and provides additional evidence in support of the view that CVCs have strategic incentives to encourage the redaction of sensitive information contained in portfolio firms' public disclosures.

[Insert Table 8]

Chapter 7: Additional Analyses and Robustness Tests

7.1 Spillover of Information Redaction

If a CVC parent has applied for a CT order, such behavior might be expected of its portfolio firms as well. First, CVC parents that have redacted information themselves have demonstrated a concern about the costs of revealing proprietary information and thus are likely to influence their portfolio firms to protect information as well. Second, CVC parents that have previously redacted information can share the benefits of having done so with the IPO firm. To test whether information redaction by the CVC parent predicts similar behavior among the CVC's portfolio firms, I collect the 10-K filings of public CVC parents from the EDGAR database to determine whether the CVC parent has redacted information from any of its material agreements. I then estimate the following regression at the level of public CVC parent - IPO firm pairs:

$$REDACT = f(\beta_0 + \beta_1 CVC\_REDACT + \beta_2 Controls), \quad (7)$$

where CVC_REDACT is either a dummy variable equal to one if the public CVC parent has redacted information from at least one of its 10-K filings in the three years before the date on which the portfolio firm files its prospectus and zero otherwise (CVC_REDACT_DUMMY), or a discrete variable equal to the number of 10-K filings by the CVC parent that contain redacted information (CVC_REDACT_NUMBER). All other variables are as previously defined.

Table 9 reports the results of estimating Equation (7). Due to the time lag between the availability of CVC parents' 10-K filings on EDGAR and portfolio firms' prospectus filing dates, I restrict the sample to IPOs with initial prospectuses filed as of 1999, which leads to a sample of 322 pairs of public CVC parents and portfolio firms. The coefficient estimate on *CVC_REDACT* is positive and statistically significant across specifications. For example, in column (3), the coefficient on *CVC_REDACT_DUMMY* is 0.528 and significant at the 5% level, which suggests that a portfolio firm is more likely to redact information from its IPO prospectus if its CVC parent has previously redacted information from its 10-K filings. This finding is consistent with the view that CVCs concerned about proprietary information themselves are likely to encourage their portfolio firms to protect information through CT orders, and provides additional evidence that CVCs exert influence over ventures' disclosure choices.

[Insert Table 9]

7.2 CVC Backing and Information Content of Other Sections of Prospectuses

Although material agreements constitute an important part of IPO prospectuses, firms also provide large amounts of information in other sections of prospectuses. In an additional test I examine whether CVCs also influence the information content of other sections of their ventures' IPO prospectuses. Following Hanley and Hoberg (2010), I decompose the information contained in a prospectus into standard and informative components. Standard content comprises

information that is already contained in recent or past industry IPOs, while informative content comprises disclosures not explained by these two sources. For a given IPO *k*, its recent IPOs are those filed in the 90-day period prior to *k* and its past industry IPOs are those filed in the same Fama-French industry at least 91 days but not more than one year preceding *k*. Information content is identified by first estimating a model that regresses a normalized word vector for IPO *k* on an averaged vector for *k*'s recent IPOs and an averaged vector for *k*'s past industry IPOs and then calculating the absolute value of the residuals, which reflects the content not explained by the two foregoing sources.[30] I construct the informative content of four sections of prospectuses – Prospectus Summary, Risk Factors, Uses of Proceeds, and Management Discussion and Analysis (MD&A) – as well as the informative content of these four sections combined.

Table 10 reports the results of regressing the informative content of the four separate sections as well as the four sections combined on CVC backing. The sample size is lower in this analysis as a result of limiting attention to prospectuses with machine-readable sections and requiring available recent and past industry IPOs. As can be seen in column (4), the presence of CVC investors is moderately negatively associated with the informative content of the MD&A section of IPO prospectuses. Given that MD&A is intended to reflect management's assessment of the firm's current status as well as future prospects, this finding suggests that

[30] I thank Gerard Hoberg for generously sharing the word roots list that I use to construct the word vectors. For more details, please refer to Section 4 of Hanley and Hoberg (2010).

CVCs discourage informative disclosures in MD&As, which might result in releasing information about the portfolio firm's strategy and outlook to competitors.

[Insert Table 10]

7.3 CVC Backing, Information Redaction, and IPO Underpricing

While information redaction through confidential treatment orders aims to protect proprietary information, such strategy might also impose costs on the issuer and original shareholders. Specifically, the redaction of material information can lead to increased information asymmetries between insiders and potential investors as well as among the set of potential investors (Verrecchia and Weber, 2006; Boone et al., 2016). Therefore, I expect that redacting firms experience greater IPO underpricing. Moreover, CVCs tend to encourage portfolio firms to withhold research- and product market-related information, which is likely more useful for potential investors in assessing VC-backed IPO firms' value than other types of information. Hence, the relation between redaction and underpricing might be stronger when the firm is backed by CVCs.[31] To test this conjecture, I estimate the following equation:

$$UNDERPRICING = f(\delta_0 + \delta_1 REDACT + \delta_2 CVC + \delta_3 REDACT * CVC + \delta_4 Controls), \quad (8)$$

[31] An alternative argument is that the redaction of research- and product market-related information causes greater information asymmetry, while other types of redacted information such as information about credit/leasing and employment might be better inferred from industry norm and thus is associated with lower information asymmetry.

where $UNDERPRICING$ is the percentage price difference between the closing price on the first trading day and the IPO offer price. As defined previously, $REDACT$ and CVC capture whether the firm redacts information from its prospectus and whether it is backed by at least one CVC, respectively. I include controls that are associated with IPO underpricing such as firm size and age, R&D intensity, whether the firm hires an underwriter with high reputation, the number of lead managers, the previous monthly stock returns of firms in the same industry, and the filing amount. I predict that both δ_3 and the sum of $\delta_1$and δ_3 are positive, i.e., information redaction leads to greater IPO underpricing and the effect is stronger with the presence of CVC investors.

As shown in Table 11, the coefficient estimate on the interaction of $REDACT$ and CVC is positive and statistically significant, and so is the sum of the coefficients on $REDACT$ and $REDACT * CVC$. Such findings suggest that IPO redaction leads to increased underpricing and to the extent that CVCs encourage firms to withhold research-related information, the association is more pronounced for CVC-backed firms. Given that IPO underpricing results in money "left on the table", the redaction choice driven by strategic shareholders, although facilitates the protection of proprietary information, creates a capital market tradeoff (from greater information asymmetry) that can be costly to other shareholders.

[Insert Table 11]

7.4 Robustness Tests

In additional analyses (untabulated) I conduct several tests to examine the sensitivity of the main results to alternative sample selection, alternative variable measurement, and additional controls. First, I omit IPOs in the pharmaceutical products and computer software industries, the industries with the greatest concentration of VC-backed IPO firms. Second, I exclude IPOs that went public in 1999 and 2000, the dot-com bubble period when a large number of VC-backed firms went public. Third, I capture the level of CVC participation using two alternative measures: (1) the number of CVCs in an investing VC syndicate and (2) the percentage investment made by the CVCs in a VC syndicate. Fourth, I control for firms' innovation at the IPO stage using the number of patents and patent citations that they have received. Finally, I control for the number of VC investors, the ownership of IVCs at the IPO stage, and the change in VC ownership in the year after the IPO, information that I collect from IPO prospectuses and the first post-IPO proxy statements. In each of these tests, I find that the main results continue to hold.

Chapter 8: Conclusion

Recent research shows that shareholders' financial incentives induce them to exert significant influence over firms' disclosure choices. However, do shareholders' strategic incentives also play a role in firms' disclosure decisions? In this paper I address this question by focusing on a group of shareholders – CVCs – that seek both financial and strategic returns from their investments. Specifically, I investigate whether CVCs affect their portfolio firms' decisions to redact material information from IPO prospectuses.

Using a sample of 453 CVC-backed firms and 711 non-CVC-backed firms from 1996 to 2014, I find that CVC-backed firms are more likely to redact information from IPO prospectuses compared to non-CVC-backed firms – the likelihood of redaction is 16% higher when a CVC investor is present. This effect is more pronounced for CVCs that operate in the same industry as the portfolio firm and for CVCs that have a formal strategic partnership with the portfolio firm. Moreover, CVCs are more likely to influence portfolio firms to redact information in material agreements with collaborative partners, customers, or suppliers as well as information in material agreements related to the CVC's parent. Taken together, the results are consistent with CVCs' strategic motivations playing an important role in their ventures' disclosure decisions. In particular, the results suggest that shareholders with strategic incentives are likely to encourage portfolio firms to adopt a disclosure strategy that shields proprietary information from rival firms. My findings indicate that shareholders' strategic incentives could be as important

as their financial incentives in shaping portfolio firms' disclosure decisions. Moreover, the paper extends the conventional notion of proprietary costs of disclosure to incorporate the proprietary costs specifically to large shareholders.

Table 1. Descriptive Statistics on CVC-backed IPO Firms

This table present descriptive statistics on CVC-backed IPO firms. Panel A reports summary statistics on CVC-backed and non-CVC-backed IPOs by year. Panel B reports the industry distribution of CVC-backed IPO firms. Panel C summarizes the industry composition of CVC parents. Industries are based on the Fama-French 49 industry classification. Panel D shows the change in VC ownership stake in the year after the IPO.

Panel A: VC-backed IPO Activity by Year

Year	VC-backed IPOs	Non-CVC-backed IPOs	CVC-backed IPOs	Percentage of CVC-backed IPOs
1996	90	77	13	14%
1997	96	72	24	25%
1998	55	35	20	36%
1999	202	114	88	43%
2000	171	81	90	53%
2001	27	19	8	30%
2002	19	15	4	21%
2003	20	10	10	50%
2004	70	38	32	46%
2005	35	21	14	40%
2006	48	31	17	35%
2007	69	47	22	32%
2008	5	3	2	40%
2009	10	8	2	20%
2010	37	24	13	35%
2011	38	27	11	29%
2012	44	24	20	45%
2013	56	24	32	57%
2014	72	41	31	43%
Total	1,164	711	453	38%

Panel B: Industry Distribution of CVC-backed IPOs

Industry	Number of CVC-backed IPOs	Percentage of CVC-backed IPOs
Entertainment	2	0.44%
Consumer Goods	1	0.22%
Healthcare	2	0.44%
Medical Equipment	23	5.08%
Pharmaceutical Products	117	25.80%
Chemicals	2	0.44%
Rubber and Plastic Products	1	0.22%
Machinery	2	0.44%
Electrical Equipment	3	0.66%
Petroleum and Natural Gas	1	0.22%
Communication	19	4.19%
Business Services	27	5.96%
Computer Hardware	21	4.64%
Computer Software	154	34.00%
Electronic Equipment	53	11.70%
Measuring and Control Equipment	8	1.77%
Transportation	2	0.44%
Wholesale	1	0.22%
Retail	9	1.99%
Restaurants, Hotels, Motels	1	0.22%
Others	4	0.88%
Total	453	100%

Panel C: CVC Parent Industry Distribution

Industry	Number of CVC Parents	Percentage of CVC Parents
Agriculture	1	0.42%
Recreation	1	0.42%
Printing and Publishing	8	3.33%
Consumer Goods	6	2.50%
Apparel	1	0.42%
Healthcare	3	1.25%
Medical Equipment	4	1.67%
Pharmaceutical Products	32	13.33%
Chemicals	10	4.17%
Construction Materials	1	0.42%
Construction	1	0.42%
Steel Works Etc	2	0.83%
Machinery	4	1.67%
Electrical Equipment	11	4.58%
Automobiles and Trucks	2	0.83%
Petroleum and Natural Gas	3	1.25%
Utilities	5	2.08%
Communication	29	12.08%
Personal Services	6	2.50%
Business Services	20	8.33%
Computer Hardware	12	5.00%
Computer Software	24	10.00%
Electronic Equipment	31	12.92%
Measuring and Control Equipment	1	0.42%
Transportation	2	0.83%
Wholesale	14	5.83%
Retail	3	1.25%
Others	3	1.25%
Total	240	100%

Panel D: Change in VC Ownership

		(1) CVC Investors	(2) IVC Investors	(3) Difference
Pre-IPO Ownership	Mean	13.87%	15.15%	-1.28%***
				(0.026)
	Median	10.05%	12.50%	-2.45%***
				(0.000)
Change in VC Ownership	Mean	-5.83%	-8.05%	2.22%***
				(0.000)
	Median	-5.00%	-6.00%	1.00%***
				(0.000)
Percentage Change in VC Ownership	Mean	-49.80%	-58.63%	8.83%***
				(0.000)
	Median	-33.33%	-44.16%	10.83%***
				(0.000)

Table 2. Descriptive Statistics on the Main Variables

The table contains descriptive statistics and correlations for the main variables used in our analysis. Panel A presents summary statistics for these variables, while Panel B reports Pearson (Spearman) correlations among these variables in the lower (upper) diagonal of the panel. Correlations in bold are significant at the 5% or better. Variable definitions are provided in Appendix A.

Panel A: Summary Statistics

Variable	N	Mean	Std. Dev.	p25	p50	p75
Information Redaction						
REDACT	1,164	0.450	0.498	0.000	0.000	1.000
CVC Backing						
CVC	1,164	0.389	0.488	0.000	0.000	1.000
Control Variables						
SIZE	1,164	3.346	1.214	2.577	3.329	4.105
ROA	1,164	-0.514	0.774	-0.736	-0.339	-0.014
LEVERAGE	1,164	0.254	0.381	0.007	0.116	0.334
R&D	1,164	0.343	0.427	0.072	0.240	0.433
PP&E	1,164	0.171	0.175	0.058	0.112	0.214
CAPEX	1,164	0.084	0.097	0.025	0.055	0.104
AGE	1,164	2.014	0.594	1.609	1.946	2.398
HHI	1,164	0.084	0.064	0.051	0.067	0.093
MKTSIZE	1,164	12.142	1.450	11.253	12.775	13.089
PRODSUB	1,164	1.154	0.086	1.090	1.121	1.227
IPOWAVE	1,164	0.891	0.312	1.000	1.000	1.000
MKTSHARE	1,164	0.253	0.360	0.011	0.056	0.338
NUMAGMT	1,164	2.904	0.506	2.565	2.944	3.219
LENGTH	1,164	11.739	0.497	11.417	11.678	12.089

Table 2 continued

Panel B: Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) *REDACT*	1	**0.195**	-0.055	**-0.167**	**-0.066**	**0.234**	**-0.092**	**-0.104**	**-0.077**	**-0.152**	**0.064**	**0.152**	**0.117**	**-0.143**	**0.176**	**0.175**
(2) *CVC*	**0.195**	1	0.015	**-0.176**	-0.015	**0.176**	-0.054	-0.032	**-0.091**	**-0.081**	**0.139**	0.052	**0.065**	**-0.133**	0.047	**0.078**
(3) *SIZE*	**-0.062**	0.009	1	**0.487**	**-0.078**	**-0.432**	-0.045	**-0.059**	**0.204**	-0.047	**0.135**	**0.063**	**-0.204**	**0.413**	**0.143**	**-0.154**
(4) *ROA*	**-0.107**	**-0.118**	**0.526**	1	**-0.176**	**-0.557**	-0.037	-0.019	**0.332**	**0.113**	**-0.134**	**-0.169**	**-0.146**	**0.481**	0.013	**-0.120**
(5) *LEVERAGE*	**-0.061**	-0.029	**-0.144**	**-0.372**	1	-0.041	**0.390**	**0.146**	0.041	**0.123**	**-0.163**	-0.047	**-0.107**	**0.101**	**0.139**	**0.098**
(6) *R&D*	**0.170**	**0.119**	**-0.448**	**-0.759**	**0.223**	1	**-0.137**	**-0.152**	0.010	**-0.279**	**0.268**	**0.362**	**0.173**	**-0.425**	-0.002	0.050
(7) *PP&E*	**-0.098**	**-0.080**	0.037	**-0.070**	**0.259**	**-0.060**	1	**0.768**	0.006	**0.158**	**-0.280**	**-0.192**	**-0.143**	**0.220**	0.057	**0.104**
(8) *CAPEX*	**-0.067**	-0.031	-0.047	**-0.087**	**0.116**	**-0.076**	**0.709**	1	**-0.130**	**0.163**	**-0.220**	**-0.253**	**-0.083**	**0.137**	-0.034	**0.120**
(9) *AGE*	**-0.076**	**-0.085**	**0.210**	**0.216**	0.040	-0.025	-0.007	**-0.172**	1	**-0.072**	**0.078**	**0.157**	**-0.094**	**0.208**	**0.058**	**-0.187**
(10) *HHI*	**-0.128**	**-0.080**	0.057	**0.086**	**0.070**	**-0.158**	**0.128**	**0.090**	0.051	1	**-0.485**	**-0.594**	**-0.299**	**0.328**	**-0.076**	**0.096**
(11) *MKTSIZE*	**0.083**	**0.159**	0.026	**-0.126**	**-0.088**	**0.221**	**-0.239**	**-0.140**	0.011	**-0.570**	1	**0.526**	**0.276**	**-0.525**	0.054	-0.056
(12) *PRODSUB*	**0.177**	**0.067**	0.043	**-0.203**	**0.086**	**0.376**	**-0.141**	**-0.167**	**0.133**	**-0.361**	**0.452**	1	**0.106**	**-0.298**	**0.172**	**-0.122**
(13) *IPOWAVE*	**0.117**	**0.065**	**-0.206**	**-0.123**	-0.050	**0.128**	**-0.187**	**-0.067**	**-0.104**	**-0.332**	**0.262**	**0.128**	1	-0.413	-0.055	**0.093**
(14) *MKTSHARE*	**-0.172**	**-0.167**	**0.340**	**0.281**	**0.088**	**-0.293**	**0.284**	**0.126**	**0.162**	**0.538**	**-0.613**	**-0.299**	**-0.534**	1	**0.080**	**-0.059**
(15) *NUMAGMT*	**0.172**	0.037	**0.148**	0.034	**0.062**	0.034	**0.092**	0.013	0.034	**-0.058**	-0.010	**0.175**	-0.043	**0.063**	1	**0.217**
(16) *LENGTH*	**0.180**	**0.076**	**-0.112**	**-0.069**	0.023	0.016	**0.096**	**0.124**	**-0.189**	0.006	-0.012	**-0.128**	**0.090**	-0.037	**0.264**	1

Table 3. CVC Backing and IPO Information Redaction

This table reports results on the effect of CVC backing on portfolio firms' IPO information redaction choices. Panels A and B report univariate results. In Panel A results are based on the full sample, while in Panel B results are based on a sample matched by industry, IPO year, and firm size. Panel C reports multivariate regression results on the effect of CVC backing on portfolio firms' IPO information redaction choices (Equation (1)). The full sample contains 1,164 IPO observations spanning the 1996 to 2014 period. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by industry and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Univariate Analysis: Full Sample

	CVC-backed IPO	Non-CVC-backed IPO	Difference	P-value
REDACT (Mean)	0.572	0.373	0.199***	0.000
REDACT (Median)	1.000	0.000		

Panel B: Univariate Analysis: Matched by Industry, IPO Year, and Size

	CVC-backed IPO	Non-CVC-backed IPO	Difference	P-value
REDACT (Mean)	0.584	0.454	0.130***	0.000
REDACT (Median)	1.000	0.000		

Table 3 continued

Panel C: Multivariate Analysis: CVC Backing and IPO Information Redaction

	(1)	(2)	(3)	(4)
		REDACT		
CVC	0.418***	0.400***	0.379***	0.483***
	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.023	0.024	0.065	0.115*
	(0.544)	(0.458)	(0.108)	(0.076)
ROA	0.048	0.040	0.051	0.003
	(0.362)	(0.494)	(0.349)	(0.982)
LEVERAGE	-0.313***	-0.285***	-0.289***	-0.505***
	(0.000)	(0.000)	(0.001)	(0.001)
R&D	0.402**	0.401***	0.227**	0.317
	(0.033)	(0.004)	(0.036)	(0.153)
PP&E	-0.403	-0.444	-0.482*	-1.413***
	(0.211)	(0.133)	(0.081)	(0.001)
CAPEX	-0.140	-0.002	0.388	1.495*
	(0.811)	(0.998)	(0.568)	(0.051)
AGE	-0.099	-0.118	-0.092	-0.174
	(0.297)	(0.193)	(0.311)	(0.130)
HHI	-0.985	-0.764	0.308	-8.184*
	(0.206)	(0.351)	(0.892)	(0.065)
MKTSIZE	-0.139***	-0.134**	0.668**	0.461
	(0.010)	(0.012)	(0.048)	(0.483)
PRODSUB	2.291**	2.081*	-1.298	1.955
	(0.041)	(0.055)	(0.269)	(0.329)
IPOWAVE	0.101	0.157	0.290**	0.085
	(0.506)	(0.321)	(0.025)	(0.649)
MKTSHARE	-0.438**	-0.444**	-0.338*	-1.034***
	(0.016)	(0.017)	(0.098)	(0.000)
NUMAGMT	0.309***	0.261***	0.260***	0.507***
	(0.000)	(0.000)	(0.001)	(0.000)
LENGTH	0.450***	0.598***	0.700***	0.632***
	(0.000)	(0.000)	(0.000)	(0.002)
Constant	-7.171***	-8.642***	-16.486***	-14.419*
	(0.000)	(0.000)	(0.000)	(0.085)
Year FE	No	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Underwriter FE	No	No	No	Yes
Observations	1,164	1,164	1,068	702
Pseudo R^2	0.114	0.128	0.155	0.222

Table 4. Propensity Score Matching

This table presents results of PSM analyses. Panel A shows the pre-matching differences in the variables on which the matching is performed as well as the probit model used in estimating propensity scores for the treatment and control groups. The dependent variable in the probit model equals one if the IPO firm is CVC backed (treatment firm) and zero if it is not backed by CVCs (control firm). Panel B shows the post-matching differences in the covariates based on the subsample of matched treatment and control observations. Panel C presents the PSM results. The procedure is conducted with a caliper of 0.05 and with replacement. After the matching procedure, Equation (1) is re-estimated using the matched sample. All variables are defined in Appendix A. *p*-values are reported in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Panel A: Pre-matching

	Comparing Sample Characteristics			Probit Regression
	(1)	(2)	(3)	(4)
	CVC-backed	Non-CVC-backed	Difference	*CVC*
SIZE	3.359	3.337	0.021	0.144***
			(0.382)	(0.004)
ROA	-0.628	-0.441	-0.187***	-0.150
			(0.000)	(0.372)
LEVERAGE	0.240	0.263	-0.023	-0.056
			(0.159)	(0.521)
R&D	0.406	0.302	0.104***	0.086
			(0.000)	(0.446)
PP&E	0.153	0.182	-0.029***	-0.388
			(0.003)	(0.225)
CAPEX	0.080	0.086	-0.006	0.386
			(0.146)	(0.418)
AGE	1.950	2.054	-0.104***	-0.117
			(0.002)	(0.287)
HHI	0.078	0.088	-0.010***	1.745*
			(0.003)	(0.093)
MKTSIZE	12.430	11.958	0.472***	0.123
			(0.000)	(0.223)
PRODSUB	1.161	1.149	0.012**	-1.975**
			(0.011)	(0.034)
IPOWAVE	0.916	0.875	0.041**	-0.066
			(0.014)	(0.649)
MKTSHARE	0.178	0.301	-0.123***	-0.610***
			(0.000)	(0.004)
NUMAGMT	2.928	2.889	0.039	0.095
			(0.101)	(0.191)
LENGTH	11.787	11.709	0.078***	0.267**
			(0.005)	(0.038)
Constant				-3.717
				(0.138)
Industry FE				Yes
Year FE				Yes
Observations				1,131
Pseudo R^2				0.089

Table 4 continued

Panel B: Post-matching

	Comparing Sample Characteristics		
	(1) CVC-backed	(2) Non-CVC-backed	(3) Difference
SIZE	3.222	3.144	0.078
			(0.206)
ROA	-0.602	-0.579	-0.022
			(0.360)
LEVERAGE	0.215	0.233	-0.018
			(0.283)
R&D	0.402	0.381	0.021
			(0.271)
PP&E	0.136	0.149	-0.013
			(0.129)
CAPEX	0.072	0.078	-0.006
			(0.203)
AGE	1.978	1.994	-0.016
			(0.363)
HHI	0.065	0.067	-0.002
			(0.315)
MKTSIZE	12.662	12.613	0.049
			(0.290)
PRODSUB	1.171	1.167	0.004
			(0.250)
IPOWAVE	0.987	0.993	-0.007
			(0.196)
MKTSHARE	0.103	0.106	-0.003
			(0.436)
NUMAGMT	2.898	2.871	0.027
			(0.243)
LENGTH	11.728	11.748	-0.020
			(0.294)

Table 4 continued

Panel C: Propensity Score Matching Results

	(1)	(2)	(3)
		REDACT	
CVC	0.236***	0.229***	0.211***
	(0.000)	(0.003)	(0.007)
SIZE	-0.023	0.041	0.089**
	(0.501)	(0.295)	(0.027)
ROA	0.080	0.063	0.063
	(0.300)	(0.352)	(0.293)
LEVERAGE	-0.206**	-0.175**	-0.210***
	(0.013)	(0.035)	(0.004)
R&D	0.348	0.475**	0.350*
	(0.233)	(0.033)	(0.050)
PP&E	-0.021	-0.044	-0.130
	(0.931)	(0.859)	(0.654)
CAPEX	0.320	0.581	1.179*
	(0.583)	(0.346)	(0.067)
AGE	-0.158	-0.187**	-0.123
	(0.112)	(0.022)	(0.220)
HHI	-3.967**	-3.522**	-2.067
	(0.038)	(0.040)	(0.672)
MKTSIZE	-0.274***	-0.260***	-0.141
	(0.000)	(0.000)	(0.788)
PRODSUB	2.837**	2.120	-2.098*
	(0.019)	(0.132)	(0.095)
MKTSHARE	-0.453	-0.626	-0.876**
	(0.265)	(0.122)	(0.012)
NUMAGMT	0.547***	0.528***	0.501***
	(0.000)	(0.000)	(0.000)
LENGTH	0.418**	0.639***	0.739***
	(0.019)	(0.000)	(0.000)
Constant	-5.860**	-7.788***	-5.456
	(0.016)	(0.007)	(0.431)
Year FE	No	Yes	Yes
Industry FE	No	No	Yes
Observations	668	668	659
Pseudo R^2	0.106	0.136	0.165

Table 5. Instrumental Variables Approach

The table reports results of estimating Equations (5) and (6), the bivariate probit model that calculates maximum likelihood estimates of two seemingly unrelated equations using an instrumental variables approach. Column (1) presents results for Equation (5); column (2) presents results for Equation (6). All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by industry and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1) *CVC*	(2) *REDACT*
CVCAVAIL	0.499***	
	(0.000)	
FUNDROUND	-0.614***	
	(0.000)	
NUMVC	0.662***	
	(0.000)	
CVC		0.743*
		(0.082)
SIZE	0.064	0.034
	(0.286)	(0.461)
ROA	0.058	0.044
	(0.648)	(0.509)
LEVERAGE	0.149**	-0.316***
	(0.038)	(0.003)
R&D	0.140	0.194
	(0.198)	(0.106)
PP&E	-0.179	-0.360
	(0.568)	(0.280)
CAPEX	0.403	0.077
	(0.396)	(0.899)
AGE	-0.213*	-0.061
	(0.086)	(0.492)
HHI	1.489	0.711
	(0.641)	(0.747)
MKTSIZE	-0.106	0.522
	(0.784)	(0.134)
PRODSUB	-3.317**	-1.422
	(0.024)	(0.171)
IPOWAVE	-0.082	0.287*
	(0.710)	(0.053)
MKTSHARE	-0.118	-0.265
	(0.693)	(0.337)
NUMAGMT	0.109**	0.260**
	(0.048)	(0.016)
LENGTH	0.117	0.662***
	(0.533)	(0.000)
Constant	-7.670	-17.467***
	(0.117)	(0.000)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	1,089	1,089
Pseudo R^2	0.168	-

Table 6. CVC Strategic Incentives and IPO Disclosure

The table reports results of estimating Equation (2), which tests whether CVC-backed portfolio firms' IPO disclosure is affected by whether the CVC parent operates in the same industry as the IPO firm, whether the CVC parent has formed a strategic alliance or joint venture with the portfolio firm, and the number of IPO firms in the CVC parent's portfolio. The sample comprises 453 CVC-backed IPO observations over the 1996 to 2014 period. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by industry and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
		REDACT	
SAMEIND	0.295**	0.271**	0.328***
	(0.014)	(0.023)	(0.003)
ALLIANCE	0.522**	0.530**	0.393
	(0.010)	(0.030)	(0.171)
PSIZE	-0.012***	-0.012**	-0.011**
	(0.010)	(0.020)	(0.035)
SIZE	0.012	-0.002	0.053
	(0.887)	(0.981)	(0.685)
ROA	0.144	0.118	0.007
	(0.418)	(0.479)	(0.972)
LEVERAGE	-0.280**	-0.251**	-0.152
	(0.012)	(0.039)	(0.205)
R&D	0.186	0.149	-0.157
	(0.278)	(0.362)	(0.489)
PP&E	-0.369	-0.544	-0.818*
	(0.533)	(0.256)	(0.095)
CAPEX	-0.556	-0.285	-0.027
	(0.676)	(0.813)	(0.982)
AGE	-0.170*	-0.203**	-0.141
	(0.089)	(0.035)	(0.150)
HHI	-1.991	-1.333	3.866
	(0.134)	(0.309)	(0.633)
MKTSIZE	-0.232***	-0.233***	0.029
	(0.001)	(0.001)	(0.965)
PRODSUB	1.956**	2.281***	1.930
	(0.037)	(0.008)	(0.429)
IPOWAVE	-0.331	-0.140	0.427
	(0.340)	(0.718)	(0.278)
MKTSHARE	-0.628	-0.537	-0.168
	(0.103)	(0.165)	(0.763)
NUMAGMT	0.399***	0.356***	0.362***
	(0.003)	(0.004)	(0.002)
LENGTH	0.593***	0.693***	0.773***
	(0.004)	(0.001)	(0.000)
Constant	-6.397***	-8.245***	-13.094
	(0.005)	(0.005)	(0.116)
Year FE	No	Yes	Yes
Industry FE	No	No	Yes
Observations	453	453	428
Pseudo R^2	0.137	0.160	0.195

Table 7. Content of Redacted Information

The table reports results of testing Hypothesis 5, on whether the effect of CVC backing on portfolio firms' IPO disclosure varies with the type of information. The dependent variable in Panel A is whether a firm redacts information in a certain category. The dependent variable in Panel B is the number of redacted agreements in a certain category divided by the total number of material agreements. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by firm and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1) Supplier/ Customer	(2) Research/ Alliance	(3) Credit/ Leasing	(4) Employment	(5) Stockholder
			REDACT		
CVC	0.256***	0.363***	0.110	0.110	0.329*
	(0.004)	(0.000)	(0.528)	(0.639)	(0.087)
SIZE	0.004	0.000	0.064	0.094	0.255***
	(0.940)	(0.999)	(0.495)	(0.474)	(0.009)
ROA	-0.083	0.093	-0.263	0.312	0.049
	(0.419)	(0.420)	(0.219)	(0.318)	(0.817)
LEVERAGE	-0.121	-0.411***	0.002	0.319	0.136
	(0.382)	(0.003)	(0.995)	(0.302)	(0.513)
R&D	-0.036	0.315	-0.934**	0.160	0.331
	(0.837)	(0.108)	(0.034)	(0.708)	(0.337)
PP&E	-1.104**	-0.836	0.816	0.958	-0.454
	(0.023)	(0.105)	(0.256)	(0.265)	(0.570)
CAPEX	0.966	0.640	-1.255	-1.375	-0.537
	(0.211)	(0.434)	(0.322)	(0.418)	(0.645)
AGE	-0.081	-0.069	-0.063	-0.236	0.033
	(0.378)	(0.472)	(0.660)	(0.322)	(0.835)
HHI	-1.969	3.886*	5.328	-11.264	-5.647
	(0.392)	(0.098)	(0.308)	(0.127)	(0.354)
MKTSIZE	0.692**	0.839*	1.686**	-0.635	0.019
	(0.048)	(0.051)	(0.015)	(0.567)	(0.976)
PRODSUB	-0.461	-3.586**	-5.597*	-14.608**	0.347
	(0.791)	(0.041)	(0.098)	(0.030)	(0.930)
IPOWAVE	0.430*	0.489**	0.702*	0.205	0.453
	(0.062)	(0.042)	(0.077)	(0.784)	(0.400)
MKTSHARE	-0.025	-0.412	0.133	-0.576	0.568
	(0.920)	(0.113)	(0.745)	(0.294)	(0.175)
NUMAGMT	0.435***	0.398***	0.808***	-0.184	0.351*
	(0.000)	(0.000)	(0.000)	(0.391)	(0.059)
LENGTH	0.503***	0.677***	0.021	1.412***	0.329*
	(0.000)	(0.000)	(0.899)	(0.000)	(0.092)
Constant	-13.862***	-16.786***	-15.557*	6.073	-7.082
	(0.001)	(0.005)	(0.063)	(0.609)	(0.353)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	1,034	1,037	835	653	706
Pseudo R^2	0.099	0.228	0.211	0.249	0.206

Table 8. Material Agreements with CVC Parents and Information Redaction

The table reports results of testing Hypothesis 6, on whether CVC-backed IPO firms are more likely to redact information contained in material agreements with CVC parents. The sample contains 2,971 material agreements with corporations or institutions in the prospectuses of CVC-backed IPO firms over the 1996 to 2014 period. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by firm and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
		REDACT_AGMT	
AGMT_CVC	0.588***	0.613***	0.653***
	(0.000)	(0.000)	(0.000)
SIZE	0.101	0.092	0.138*
	(0.279)	(0.260)	(0.073)
ROA	-0.002	-0.060	-0.065
	(0.986)	(0.577)	(0.498)
LEVERAGE	-0.103	-0.096	0.074
	(0.586)	(0.607)	(0.693)
R&D	0.164	0.061	-0.040
	(0.393)	(0.742)	(0.824)
PP&E	-0.998	-1.502**	-1.808***
	(0.119)	(0.011)	(0.004)
CAPEX	0.118	0.813	1.344
	(0.902)	(0.370)	(0.138)
AGE	0.244**	0.263**	0.239*
	(0.039)	(0.024)	(0.060)
HHI	1.258	1.137	13.369***
	(0.373)	(0.446)	(0.009)
MKTSIZE	-0.029	-0.005	0.856*
	(0.701)	(0.945)	(0.087)
PRODSUB	1.948**	1.755*	-2.927
	(0.035)	(0.065)	(0.264)
IPOWAVE	-0.123	-0.063	0.365
	(0.678)	(0.829)	(0.307)
MKTSHARE	-0.639*	-0.624	-0.072
	(0.087)	(0.104)	(0.864)
NUMAGMT	0.032	0.009	0.109
	(0.852)	(0.952)	(0.470)
LENGTH	0.114	0.197	0.165
	(0.363)	(0.159)	(0.236)
Constant	-4.524**	-5.337***	-14.396*
	(0.022)	(0.009)	(0.060)
Year FE	No	Yes	Yes
Industry FE	No	No	Yes
Observations	2,971	2,971	2,800
Pseudo R^2	0.068	0.096	0.139

Table 9. Spillover of Information Redaction

The table reports results of Equation (7), which tests whether CVC-backed IPO firms are more likely to redact information from their prospectuses when the public CVC parent has previously redacted information from its 10-k filings in the three years before the portfolio firm's prospectus filing date. The sample contains 322 pairs of public CVC parents and IPO firms. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by firm and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
				REDACT		
CVC_REDACT_DUMMY	0.347*	0.358*	0.528**			
	(0.097)	(0.094)	(0.014)			
CVC_REDACT_NUMBER				0.204**	0.234**	0.292***
				(0.027)	(0.014)	(0.003)
SIZE	-0.128	-0.132	0.010	-0.136	-0.139	-0.002
	(0.309)	(0.344)	(0.951)	(0.284)	(0.321)	(0.989)
ROA	0.403*	0.300	0.333	0.404*	0.296	0.328
	(0.055)	(0.150)	(0.184)	(0.055)	(0.157)	(0.192)
LEVERAGE	-0.052	-0.121	0.064	-0.076	-0.147	0.018
	(0.859)	(0.693)	(0.841)	(0.797)	(0.633)	(0.956)
R&D	0.197	0.119	-0.189	0.189	0.121	-0.183
	(0.594)	(0.755)	(0.683)	(0.607)	(0.751)	(0.692)
PP&E	0.123	-0.229	0.357	0.144	-0.233	0.348
	(0.909)	(0.841)	(0.820)	(0.894)	(0.837)	(0.824)
CAPEX	-0.547	0.376	1.246	-0.558	0.365	1.201
	(0.762)	(0.842)	(0.621)	(0.756)	(0.845)	(0.633)
AGE	-0.195	-0.295	-0.279	-0.201	-0.289	-0.280
	(0.352)	(0.212)	(0.309)	(0.341)	(0.224)	(0.310)
HHI	1.987	2.171	-11.775	2.021	2.138	-11.234
	(0.376)	(0.374)	(0.372)	(0.370)	(0.382)	(0.392)
MKTSIZE	-0.094	-0.149	-0.139	-0.092	-0.142	-0.179
	(0.517)	(0.330)	(0.924)	(0.530)	(0.353)	(0.902)
PRODSUB	3.111**	5.488***	-2.672	2.998*	5.406***	-2.738
	(0.045)	(0.003)	(0.570)	(0.055)	(0.004)	(0.559)
IPOWAVE	0.126	-0.117	0.453	0.131	-0.115	0.454
	(0.767)	(0.792)	(0.511)	(0.759)	(0.796)	(0.516)
MKTSHARE	-0.096	0.174	0.474	-0.102	0.199	0.499
	(0.856)	(0.774)	(0.512)	(0.847)	(0.743)	(0.491)
NUMAGMT	0.559**	0.599**	0.564**	0.567**	0.603**	0.558**
	(0.024)	(0.026)	(0.041)	(0.023)	(0.025)	(0.043)
LENGTH	0.965***	1.084***	1.201***	0.962***	1.084***	1.203***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-14.337***	-17.650***	-8.072	-14.191***	-17.634***	-7.573
	(0.000)	(0.000)	(0.679)	(0.000)	(0.000)	(0.700)
Year FE	No	Yes	Yes	No	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes
Observations	322	321	291	322	321	291
Pseudo R^2	0.170	0.221	0.268	0.174	0.226	0.272

Table 10. CVC Backing and Informative Content of Other Sections of the Prospectus

The table reports results of testing the effect of CVC backing on the informative content of other sections in portfolio firms' IPO prospectuses. *INFORMATIVE_CONTENT* is defined as the disclosure in the prospectus not explained by recent IPOs and past industry IPOs. The sample contains 883 IPO observations over the 1996 to 2014 period. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by industry and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1) Prospectus Summary	(2) Risk Factors	(3) Use of Proceeds	(4) MD&A	(5) Combined
			INFORMATIVE_CONTENT		
CVC	-0.009	0.008	-0.023	-0.021*	-0.010
	(0.720)	(0.589)	(0.245)	(0.069)	(0.370)
SIZE	-0.002	0.001	0.012	0.014	0.009
	(0.862)	(0.917)	(0.257)	(0.260)	(0.185)
ROA	-0.003	-0.003	-0.036*	-0.021	-0.008
	(0.902)	(0.821)	(0.080)	(0.408)	(0.570)
LEVERAGE	-0.040*	-0.025	-0.028	0.007	0.008
	(0.075)	(0.343)	(0.296)	(0.794)	(0.582)
R&D	0.048	0.066*	0.036	0.052	0.039
	(0.401)	(0.084)	(0.629)	(0.342)	(0.208)
PP&E	0.415	0.177*	0.228*	0.207*	0.113**
	(0.173)	(0.081)	(0.063)	(0.060)	(0.048)
CAPEX	-0.393	-0.110	-0.137	-0.217	-0.118
	(0.276)	(0.356)	(0.399)	(0.191)	(0.244)
AGE	-0.016	-0.026**	-0.008	-0.007	-0.009
	(0.452)	(0.019)	(0.645)	(0.626)	(0.370)
HHI	0.087	-0.392*	-0.187	-0.375	-0.221
	(0.866)	(0.096)	(0.591)	(0.222)	(0.212)
MKTSIZE	-0.009	-0.020	-0.014	-0.009	-0.007
	(0.750)	(0.232)	(0.648)	(0.683)	(0.610)
PRODSUB	-0.567**	-0.312	-0.729***	-0.505**	-0.159
	(0.030)	(0.159)	(0.002)	(0.049)	(0.177)
IPOWAVE	0.053	0.007	0.055	0.022	0.004
	(0.434)	(0.887)	(0.457)	(0.558)	(0.903)
MKTSHARE	-0.004	0.099*	0.063	0.046	0.043
	(0.968)	(0.091)	(0.468)	(0.569)	(0.368)
NUMAGMT	0.046	0.064***	0.075**	0.033*	0.027**
	(0.184)	(0.006)	(0.015)	(0.065)	(0.041)
LENGTH	-0.038*	-0.073***	-0.067***	-0.077***	-0.054***
	(0.062)	(0.000)	(0.001)	(0.000)	(0.000)
Constant	1.505***	1.848***	1.982***	2.070***	1.395***
	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	883	883	883	883	883
Adjusted R^2	0.181	0.181	0.022	0.159	0.158

Table 11. CVC Backing, Information Redaction, and IPO Underpricing

The table reports results of Equation (8), which tests whether information redaction leads to increased IPO underpricing and whether the relation is more pronounced for CVC-backed firms. The sample contains 1,012 IPO observations over the 1996 to 2014 period. All variables are defined in Appendix A. *p*-values are calculated using standard errors clustered by industry and are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	(1) *UNDERPRICING*	(2) Sum of δ_1 and δ_3
REDACT (δ_1)	-0.048	0.092*
	(0.323)	(0.074)
CVC (δ_2)	-0.003	
	(0.946)	
*REDACT * CVC* (δ_3)	0.140*	
	(0.087)	
SIZE	-0.025	
	(0.501)	
AGE	-0.019	
	(0.417)	
R&D	-0.017	
	(0.762)	
PP&E	-0.369**	
	(0.036)	
PRICEREVISE	-0.000	
	(0.812)	
NASDAQ	0.067	
	(0.148)	
NLEAD	-0.190*	
	(0.063)	
HIGHREP	0.032	
	(0.482)	
FILEAMOUNT	0.317***	
	(0.000)	
TIMEOFFER	-0.061**	
	(0.042)	
NUMAGMT	-0.111**	
	(0.027)	
LENGTH	0.015	
	(0.768)	
AVGRET	1.252***	
	(0.000)	
IPOWAVE	0.087	
	(0.376)	
Constant	-0.737	
	(0.183)	
Year FE	Yes	
Industry FE	Yes	
Observations	1,012	
Adjusted R^2	0.301	

Appendices

Appendix A. Variable Definitions[32]

Variable	Definition
IPO Information Redaction	
REDACT	A dummy variable equal to one if an IPO firm redacted information from its prospectus, and zero otherwise.
CVC Backing	
CVC	A dummy variable equal to one if an IPO firms is backed by at least one CVC investor, and zero otherwise.
Control Variables	
SIZE	The natural logarithm of total assets.
ROA	Net income divided by total assets.
LEVERAGE	Total debt divided by total assets.
R&D	Research and development expense divided by total assets.
PP&E	Plant, property and equipment divided by total assets
CAPEX	Capital expenditures divided by total assets
AGE	The number of years since the firm's founding year.
HHI	The Herfindahl–Hirschman Index, calculated as the sum of the squares of the market shares of the firms within the industry
MKTSIZE	The natural logarithm of the sum of sales within an industry, where industry is defined as 3-digit SIC code.
PRODSUB	Industry sales divided by operating costs, with operating costs defined as the sum of costs of goods sold, selling, general and administrative expenses, and depreciation, depletion, and amortization.
IPOWAVE	A dummy variable equal to one where the total number of offerings in a Fama-French industry is equal to five or more, and zero otherwise.
NUMAGMT	The natural logarithm of the number of material agreements contained in the IPO firm's prospectus.
LENGTH	The length of the IPO firm's prospectus, calculated as the natural logarithm of the number of words contained in the prospectus.
Other Variables	
AGMT_CVC	A dummy variable equal to one if an agreement in IPO prospectus is specifically associated with the CVC parent, and zero otherwise.
ALLIANCE	A dummy variable that equals one if an IPO firm is backed by at least one CVC that has formed formal cooperative partnership (strategic alliance or joint venture) with the IPO firm, and zero otherwise.
AVGRET	The average one-month cumulative abnormal returns for all firms within the same three-digit SIC code prior to the IPO issue date.

[32] All continuous variables are winsorized at the 1% and 99% level.

CVCAVAIL	The natural logarithm of the number of all CVC investors for the years that a portfolio firm received VC funding.
CVC_REDACT_DUMMY	A dummy variable that equals one if the public CVC parent has redacted information from at least one of its 10-k filings in the five years before the filing date of the portfolio firm's prospectus and zero otherwise.
CVC_REDACT_NUMBER	The number of CVC's 10-k filings that contain redacted information in the five years before the filing date of the portfolio firm's prospectus.
FILEAMOUNT	The natural logarithm of IPO filing amount
FUNDROUND	The natural logarithm of the number of funding rounds that a firm received VC investment.
HIGHREP	A dummy variable that equals one when the underwriter reputation ranking value exceeds 8.0 and zero otherwise. Underwriter reputation rankings are from Jay R. Ritter's website.
INDSIZE	The natural logarithm of the averaged industry sales when a portfolio firm received VC funding.
INFORMATIVE_CONTENT	The absolute value of residuals from estimating a model that regresses a normalized word vector for IPO *k* on an averaged vector for *k*'s recent IPOs and an averaged vector for *k*'s past industry IPOs. The variable is calculated separately for four sections: Prospectus Summary, The Risk Factors, Uses of Proceeds, and Management Discussion and Analysis (MD&A) as well as a combined document including all the four sections. Please refer to Hanley and Hoberg (2011) for constructing details.
NASDAQ	A dummy variable that equals one if the securities trade on the Nasdaq and zero otherwise.
NLEAD	The natural logarithm of the number of leading underwriters for the issue.
NUMVC	The natural logarithm of the number of VC investors investing the portfolio firm.
PRICEREVISE	The percentage price difference between the IPO offer price and the midpoint of filing date price range.
PSIZE	The average portfolio size of CVC corporate parents backing the IPO firm. Specifically, after counting the number of IPO firms in each CVC corporate parents' portfolio for each year, the variable is calculated by aggregating the portfolio size of CVC parents at IPO events' level by taking the average of the portfolio size of all CVC corporate parents.
REDACT_AGMT	A dummy variable equal to one if a material agreement in IPO prospectus contains redacted information, and zero otherwise.
REDACT_CONTENT	After classifying the redacted information into five categories, this variable is defined as a dummy variable indicating whether an IPO firm has redacted any information belonging to each of the five categories or a continuous variable that captures the proportion of material agreements in each category that a firm redacted.
SAMEIND	A dummy variable that equals one if an IPO firm is backed by at least one CVC that operates in the same industry as the IPO firm, and zero otherwise.
TIMEOFFER	The natural logarithm of the calendar day difference between the IPO filing date and the offering date.
UNDERPRICING	The percentage price difference between the closing price on the first trading day and the IPO offer price.

Appendix B. Example of Redacted Information in IPO Prospectus

The document is from a material agreement in Gevo, Inc.'s S-1 filing with redacted information that is filed separately with the SEC under confidential treatment request.

EX-10.4 17 dex104.htm LICENSE AGREEMENT, BY AND BETWEEN THE COMPANY AND CARGILL INCORPORATED

Exhibit 10.4

***** Text Omitted and Filed Separately**
Confidential Treatment Requested
Under 17 C.F.R. §§ 200.80(b)(4)
and 203.406

LICENSE AGREEMENT

This Agreement, effective the 19th day of February, 2009 ("Effective Date"), by and between Cargill, Inc., a corporation of the state of Delaware, having its principal place of business at 15407 McGinty Road West, Wayzata, MN 55391 (hereinafter "Cargill"), and Gevo, Inc., a corporation of the state of Delaware, having its principal place of business at 345 Inverness Drive South, Building C, Suite 310, Englewood, CO 80112 (hereinafter "Gevo"). Cargill and Gevo are collectively referred to herein as "Parties", in singular or plural usage, as required by context.

WHEREAS, Cargill has developed a yeast biocatalyst […***…], covered by certain Cargill Patents;

WHEREAS, Gevo desires to use and further develop Cargill's yeast biocatalyst with the goal of […***…];

WHEREAS, the Parties desire to grant each other certain rights to use the yeast biocatalyst as well as other technology that is developed in the course of this work, as set forth in this Agreement;

NOW, THEREFORE, in consideration of the mutual covenants set forth herein, the Parties agree as follows:

1. DEFINITIONS

1.1 "Cargill Field" shall mean all other fields outside of the Gevo Field.

1.2 "Cargill Biological Materials" shall include yeast strains and tools for modifying such yeast strains for the Product […***…] as identified in Appendix C and those elected and paid for in Appendix D. Appendix C shall be updated from time to time by Cargill to include future improvements and new tools.

1.3 "Confidential Information" shall mean all information related to the Agreement in any form disclosed in any manner by or on behalf of one Party to the other Party during the term of this Agreement. Without limitation, Confidential Information shall include information about products, raw materials, samples, packaging, manufacturing processes, financial information, research information, tools, business plans, customer lists and supplier lists and the terms and conditions of this Agreement. Notwithstanding the foregoing, the Parties agree that the term "Confidential Information" shall not include any information …

*** Confidential Treatment Requested**

Bibliography

Ahuja, G., and Katila, R., 2001. Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal* 22(3): 197-220.

Ajinkya, B., Bhojraj, S., and Sengupta, P., 2005. The association between outside directors, institutional investors and the properties of management earnings forecasts. *Journal of Accounting Research* 43(3): 343-376.

Atanassov, J., Nanda, V., and Seru, A., 2007. Finance and innovation: The case of publicly traded firms. Working paper, University of Oregon.

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

Beatty, R., 1989. Auditor Reputation and the Pricing of Initial Public Offerings. *The Accounting Review* 64: 693-709.

Benson, D., and Ziedonis, R.H., 2010. Corporate venture capital and the returns to acquiring portfolio companies. *Journal of Financial Economics* 98: 478-499.

Berlin, M., 1998. That thing venture capitalists do. *Business Review* 1:15-26.

Bhattacharya, S., and Ritter, J., 1983. Innovation and communication: Signaling with partial disclosure. *Review of Economic Studies* 50: 331–346.

Boone, A.L., Floros, I.V., and Johnson, S.A., 2016. Redacting proprietary information at the initial public offering. *Journal of Financial Economics* 120(1): 102-123.

Botosan, C.A., 1997. Disclosure level and the cost of equity capital. *The Accounting Review* 72(3): 323-349.

Brav, A., Jiang, W., Partnoy, F., and Thomas, R., 2008. Hedge fund activism, corporate governance, and firm performance. *Journal of Finance* 63(4): 1729-1775.

Cadman, B., and Sunder, J., 2014. Investor horizon and CEO horizon incentives. *The Accounting Review* 89(4): 1299-1328.

Chemmanur, T.J., Krishnan, K., and Nandy, D.K., 2011. How does venture capital financing improve efficiency in private firms? A look beneath the surface. *Review of Financial Studies* 24(12): 4037-4090.

Chemmanur, T.J., Loutskina, E., and Tian, X., 2014. Corporate venture capital, value creation, and innovation. *Review of Financial Studies* 27(8): 2434-2473.

Chesbrough, H.W., 2002. Making sense of corporate venture capital. *Harvard Business Review* 80(3): 90-99.

Cumming, D.J., Hass, L.H., and Tarsalewska, M., 2015. Venture Capital and the Disclosure of Material Weaknesses in Internal Control. *Available at SSRN 2640873*.

Darrough, M.N., 1993. Disclosure policy and competition: Cournot vs. Bertrand. *The Accounting Review* 68(3): 534-561.

Diamond, D.W., and Verrecchia, R.E., 1991. Disclosure, liquidity, and the cost of capital. *Journal of Finance*, 46(4): 1325-1359.

Dushnitsky, G., and Lenox, M.J., 2005. When do incumbents learn from entrepreneurial ventures?: Corporate venture capital and investing firm innovation rates. *Research Policy* 34(5): 615-639.

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

Dushnitsky, G., and Shaver, J.M., 2009. Limitations to interorganizational knowledge acquisition: The paradox of corporate venture capital. *Strategic Management Journal* 30(10): 1045-1064.

Easley, D., and O'Hara, M., 2004. Information and the cost of capital. *Journal of Finance* 59: 1553-1583.

Ehrlich, S. B., Denoble, A. F., Moore, T., and Weaver, R. R., 1994. After the cash arrives—a comparative study of venture capital and private investor involvement in entrepreneurial firms. *Journal of Business Venturing* 9(1): 67-82.

Ellis, J.A., Fee, C.E., and Thomas, S.E., 2012. Proprietary costs and the disclosure of information about customers. *Journal of Accounting Research* 50(3): 685-727.

Ertimur, Y., Sletten, E., and Sunder, J., 2014. Large shareholders and disclosure strategies: Evidence from IPO lockup expirations. *Journal of Accounting and Economics* 58(1): 79-95.

Foster, N., and Davison, Tim., 2017. Latest trends in corporate venture capital. *Financier Worldwide Magazine* January 2017 Issue.

Gage, D., 2016. What corporate venture investors are talking about. *The Wall Street Journal* Jan 29, 2016

Ginsberg, A., Hasan, I., and Tucci, C.L., 2003. Unpacking the endorsement effects of corporate venture capital investing: Do equity markets value information or discipline? No. CSI-REPORT-2005-015.

Gompers, P., and Lerner, J., 2000a. Money chasing deals? The impact of fund inflows on private equity valuation. *Journal of Financial Economics* 55(2): 281-325.

Gompers, P., and Lerner, J., 2000b. The determinants of corporate venture capital success: Organizational structure, incentives, and complementarities. Concentrated Corporate Ownership. *University of Chicago Press* 2000: 17-54.

Gompers, P., and Lerner, J., 2001. The venture capital revolution. *Journal of Economic Perspectives* 15(2): 145-168.

Gompers, P., and Lerner, J., 2004. The Venture Capital Cycle. MIT Press.

Gorman, M., and Sahlman, W. A., 1989. What do venture capitalists do? *Journal of Business Venturing* 4(4): 231-248.

Graham, J.R., Harvey, C.R., and Rajgopal, S., 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40(1): 3-73.

Greene, W.H., 2003. Econometric Analysis. Prentice Hall: Upper Saddle River, NJ.

Guo, R.J., Lev, B., and Zhou, N., 2004. Competitive costs of disclosure by biotech IPOs. *Journal of Accounting Research* 42(2): 319-355.

Hanley, K., and Hoberg, G., 2010. The information content of IPO prospectuses. *Review of Financial Studies* 23: 2821–2864.

Hellmann, T., and Puri, M., 2000. The interaction between product market and financing strategy: The role of venture capital. *Review of Financial Studies* 13(4): 959-984.

Hellmann, T., and Puri, M., 2002. Venture capital and the professionalization of start-up firms: Empirical evidence. *Journal of Finance* 57(1): 169-197.

Hoberg, G., Phillips, G., and Prabhala, N., 2014. Product market threats, payouts, and financial flexibility. *Journal of Finance* 69(1): 293-324.

Ivanov, V.I., and Xie, F., 2010. Do corporate venture capitalists add value to start-up firms? Evidence from IPOs and acquisitions of VC-backed companies. *Financial Management* 39(1): 129-152.

Klein, A., and Zur, E., 2009. Entrepreneurial shareholder activism: Hedge funds and other private investors. *Journal of Finance* 64(1): 187-229

Kogan, L., Papanikolaou, D., Seru, A., and Stoffman, N., 2015. Technological innovation, resource allocation, and growth. *Quarterly Journal of Economics*, forthcoming.

Lambert, R., Leuz, C., and Verrecchia, R., 2007, Accounting information, disclosure, and the cost of capital, *Journal of Accounting Research* 45: 385-420.

Lane, P.J., and Lubatkin, M., 1998. Relative absorptive capacity and interorganizational learning. *Strategic Management Journal* 19(5): 461-477.

Lantz, J.S., Sahut, J.M., and Teulon, F., 2011. What is the real role of corporate venture capital? *International Journal of Business* 16(4): 367.

Lee, K., 2016. Nondisclosure—a good signal? Working paper.

Lee, P.M., and Wahal, S., 2004. Grandstanding, certification and the underpricing of venture capital backed IPOs. *Journal of Financial Economics* 73(2): 375-407.

Leone, A.J., Rock, S., and Willenborg, M., 2007. Disclosure of intended use of proceeds and underpricing in initial public offerings. *Journal of Accounting Research* 45: 111-153.

Lerner, J., 1995. Venture capitalists and the oversight of private firms. *Journal of Finance* 50(1): 301-318.

Li, X., 2010. The impacts of product market competition on the quantity and quality of voluntary disclosures. *Review of Accounting Studies* 15(3): 663-711.

Ma, S., 2015. The life cycle of corporate venture capital. Working paper.

Macmillan, I.C., Kulow, D.M., and Khoylian, R., 1989. Venture capitalists' involvement in their investments—extent and performance, *Journal of Business Venturing* 4(1): 27-47.

Maksimovic, M., and Pichler, P., 2001. Technological innovation and initial public offerings. *Review of Financial Studies* 14: 459–494.

Maula, M., and Murray, G., 2001. Complementary value-adding roles of corporate venture capital and independent venture capital investors. Unpublished manuscript.

Maula, M., Autio, E., and Murray, G., 2005. Corporate venture capitalists and independent venture capitalists: What do they know, who do they know and should entrepreneurs care? *Venture Capital: An International Journal of Entrepreneurial Finance 7*(1): 3-21.

Masulis, R.W., and Nahata, R., 2009. Financial contracting with strategic investors: Evidence from corporate venture capital backed IPOs. *Journal of Financial Intermediation* 18(4): 599-631.

McNally, K., 1997, Corporate Venture Capital: Bridging the Equity Gap in the Small Business Sector. London: Routledge.

Megginson, W.L., and Weiss, K.A., 1991. Venture capitalist certification in initial public offerings. *Journal of Finance* 46(3): 879-903.

Morsfield, S.G., and Tan, C.E., 2006. Do venture capitalists influence the decision to manage earnings in initial public offerings? *The Accounting Review* 81(5): 1119-1150.

Nahata, R., 2008. Venture capital reputation and investment performance. *Journal of Financial Economics* 90(2): 127-151.

Park, H.D., and Steensma, H.K., 2012. When does corporate venture capital add value for new ventures? *Strategic Management Journal* 33(1): 1-22.

Sapienza, H.J., 1992 When do venture capitalists add value? *Journal of Business Venturing* 7(1): 9 –27.

Schrand, C., and Verrecchia, R., 2005. Information disclosure and adverse selection explanations for IPO underpricing. Working paper, University of Pennsylvania.

Seru, A., 2014. Firm boundaries matter: Evidence from conglomerates and R&D activity. *Journal of Financial Economics* 111(2): 381-405.

Steier, L., and Greenwood, R. 1995 Venture capitalist relationships in the deal structuring and post-investment stages of new firm creation, *Journal of Management Studies* 32(3): 337-357.

Tang, M., 2012. What guides the guidance? An empirical examination of the dynamic disclosure theory. Working paper, NYU Stern.

Tian, X., and Wang, T., 2014. Tolerance for failure and corporate innovation. *Review of Financial Studies* 27:211-55.

Verrecchia, R., and Weber, J., 2006. Redacted disclosure. *Journal of Accounting Research* 44: 791-814.

Wang, X.A., and Wan, W.P., 2013. Explaining the variance in underpricing among venture capital backed IPOs: A comparison between private and corporate VC firms. *Strategic Entrepreneurship Journal* 7(4): 331-342.

Wongsunwai, W., 2013. The effect of external monitoring on accrual-based and real earnings management: Evidence from venture-backed initial public offerings. *Contemporary Accounting Research* 30(1): 296-324.

Wooldridge, J.M., 2002. Econometric Analysis of Cross Section and Panel Data. MIT Press: Cambridge, MA.