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Common Venture Capital Investors and Startup Growth

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We exploit the staggered introduction of liability waivers when investors hold stakes in conflicting business opportunities as a shock to venture capital (VC) investment and director networks. After the law changes, we find increases in within-industry VC investment and common directors serving on startup boards. Despite the potential for rent extraction, same-industry startups inside VC portfolios benefit by raising more capital, failing less, and exiting more successfully. VC directors serving on other startup boards are the primary mechanism associated with positive outcomes, consistent with common VC investment facilitating informational exchanges in VC portfolios. (*JEL* G32, G24, G28)

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Venture capital (VC) investors play an important role in advising, monitoring, and providing expertise to entrepreneurial startups (Lerner 1995; Kaplan and Stromberg 2001; Hellmann and Puri 2002; Gompers and Lerner 2004; Bernstein, Giroud, and Townsend 2016). VC investors typically have substantial control rights (Kaplan and Stromberg 2001; Gompers et al. 2020), and actively seek to constrain managerial discretion over

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key decisions through the appointment of board representatives (Amornsiripanitch, Gompers, and Xuan 2019). A key, yet often overlooked, feature of VC investments is that VC portfolios tend to include many startups in the same industry. In fact, the rate of startups in the same industry with a common VC investor has risen dramatically in recent years (Eldar and Grennan 2021). Most startups nowadays share a VC investor with at least one other startup in the same industry. Even startups that operate in the same line of business, such as Uber and Lyft, often raise capital from the same VC investors.[1]

What is the relation between common VC investment and startups' trajectory for growth and success? On one hand, VC investors could play favorites by diverting valuable competitive information from one startup to another (Fried and Ganor 2006; Fulghieri and Sevilir 2009; Pollman 2019).[2] Startups in the same VC portfolio may be vulnerable not only when they compete in the same product category but if they operate in complementary spaces within the same industry (such as software and media). Such startups are likely to seek similar business opportunities, whether developing a new service or pursuing an attractive contract,[3] and there is a risk that VCs will favor some startups at the expense of others.

On the other hand, VC investors can act as incubators for valuable information and expertise. The expertise acquired through common investments at the industry level could benefit all portfolio companies and maximize VC investors' returns. Rather than divert business opportunities from one startup to favor another, VCs can allocate different business opportunities efficiently to the startups that, based on the common VC's information, are best positioned to pursue them. Consistent with this hypothesis, evidence indicates that common VC investors facilitate strategic alliances (Lindsey 2008) and innovation spillovers among startups (Gonzalez-Uribe 2020).

This study explores the connection between common VC investment and startup performance. Our work builds on existing studies by making three key contributions: First, we use a novel empirical strategy based on plausibly exogenous legal changes to states' corporate laws. These changes facilitated common VC investment by reducing the liability risk associated with VCs holding stakes in multiple startups in the same industry. Second, we uncover a direct mechanism for informational exchanges prompted by VC

[1] VC investors, such as All Blue Capital, Atop Capital, G Squared, and Next Equity, invested in both Uber and Lyft before either made their initial public offerings.

[2] For example, in *Alarm.Com Holdings Inc. v. ABS Capital Partners Inc.*, C.A. 2017-0583-JTL (June 15, 2018), a common investor used confidential information acquired through a board representative to benefit another company in its portfolio.

[3] For example, the following companies received VC investments from Benchmark and Greylock: Vudu, a box that allows users to rent or buy content through the internet; ManiaTV, an internet television network; Newport Media, a content developer for TV-enabled phones; SnappyTV, an inexpensive tool to provide TV content to digital audiences; and Metacafe, a provider of short-form video entertainment across various media.

investment – the appointment of directors on startup boards, an overlap we believe our study is the first to spotlight. Third, we examine how common VC investment relates to pivotal startup outcomes, such as follow-on funding rounds, initial public offerings (IPOs), sales, and failures. These metrics are essential to discern if startups with common VC investments fare better or worse than their counterparts without such investments.

We begin our analysis by evaluating the incidence of common VC investors among VC-backed startups using a quasi-natural experiment: the staggered adoption of laws across eight states from 2000 to 2016 that enable corporations incorporated in these states to adopt corporate opportunity waivers (COWs). These waivers exempt investors and directors from litigation risk if they usurp a business opportunity in a way that conflicts with the firm's best interest (Talley 1998; Rauterberg and Talley 2017; Licht 2018; Velasco 2018). VC investments are typically accompanied by a board seat for a VC investor (Kaplan and Stromberg 2003; Fried and Ganor 2006; Bengtsson and Sensoy 2015). These VC board members are privy to information that may bolster their expertise and effectiveness in managing the startups in their portfolios but could also expose them to liability if it enables them to divert business opportunities from one startup to another. These risks are particularly acute in the context of VC investment in startups in the same industry because these startups compete for similar business opportunities. COWs are necessary to relieve VC investors and their director appointees from such potential liability.

To understand the extent to which legal changes might influence common VC investment, we utilize a difference-in-differences estimator, with the staggered implementation of state laws allowing COWs as our treatment variable. Since corporate laws operate based on the state where a firm is incorporated and not where it physically operates or has its headquarters, we've gathered data on startup incorporation states. Our data, sourced from Lexis Advance filings for VC-funded startups as per the Preqin Venture Deals data set, comprises nearly 143,000 observations and 15,000 startups from 1995-2018.

Using this data set, we find that, on average, startups incorporated in treated states are 11.8-percentage-points more likely to have a within-industry common VC investor after the law change. This result holds across various specifications, including ones with startup, VC, and headquarter-state-by-industry-by-year fixed effects, as well as many control variables that help account for growth potential and VC reputation, among other factors. The results are also robust to (a) excluding startups initially incorporated in Delaware, where a majority of startups are incorporated, (b) excluding industries where the "spray and pray" VC investment strategy is common (Ewens, Nanda, and Rhodes-Kropf 2018) and thus could indirectly result in more common investment, and (c) alternative sample constructions, such as those involving different startup life-cycle phases. Across the board, the evidence suggests that COW legislation is associated with a significant increase in common VC investment in startups in the same industry.

Next, we explore the relationship between common VC investment and various startup outcomes using the passage of the laws permitting COWs as an instrumental variable (IV) for common VC investment. First, we examine whether there is an association between common VC investment and VC director networks. While previous research has shown evidence of informational exchanges within VC portfolios (Lindsey 2008; Gonzalez-Uribe 2020), to the best of our knowledge, no study has identified the channel through which startups benefit from positive spillovers in the portfolios of the same VCs. We hypothesize that directors are the key mechanism for facilitating such spillovers. Consistent with this hypothesis, our evidence suggests that startups with a common VC owner have 1.8 more VC directors on their boards, on average. Further, we find that VC directors who sit on the boards of commonly held startups have thicker networks, meaning that they sit on the boards of multiple startups, especially same-industry startups.

We then explore whether common VC investment is associated with startup outcomes. Our evidence suggests that common VC investment is associated with a greater likelihood of receiving an additional round of VC funding. Having a common VC investor is associated with raising 1.14 additional rounds of financing. This estimate represents a meaningful increase given that the median startup in our sample raises only two rounds of financing.[4]

In addition, our evidence suggests that common VC investors are linked to real benefits for startups. Specifically, we find that common VC investment is associated with (1) a higher probability of an exit through an IPO, (2) higher valuations when startups undergo IPOs, (3) a higher probability of sale, and (4) a lower probability of failure. This is consistent with common VC investors creating value for startups through efficient allocations of opportunities among startups in their portfolios rather than advantaging one startup at the expense of another.

Importantly, we link the results on startup growth and successful exits to informational spillovers (see Section 6.2). We first observe that common VC investors are associated with a higher likelihood of a sale to another firm in the common VC investor's portfolio. We then link startup outcomes to the cross-appointment of directors. We rerun the startup growth and exit tests for different subsamples of startups: those without a VC director, those with a VC director, and those with a connected VC director that sits on the board of at least one additional startup. We find little to no effect on startup growth and exits for startups without a VC director but stronger effects for those with VC directors and well-connected ones. Thus, our analysis suggests that information

[4] The point estimate in the IV regression is about 2.5 times that of the endogenous OLS estimate. This is plausible as common VC investment likely involves expert VCs investing in more risky startups (Nanda and Rhodes-Kropf 2013), and therefore the endogenous OLS estimates are likely negatively biased.

flows through VC directors drive the positive outcomes for startups that are associated with common VC investors.

A concern with the IV empirical approach is that various unobserved factors may correlate with the COW laws that drive both common VC investment and startup outcomes. We undertake several qualitative and quantitative steps to mitigate the concern that there is a violation of the exclusion restriction for the IV. Thus, we argue that these laws are a plausibly exogenous source of variation.

First, we explore the history of the laws and find that the impetus for the state law changes was to eliminate uncertainty arising from case law. There was no apparent evidence of lobbying prior to the passage of these laws (see Section A of the Internet Appendix).

Second, our legal analysis suggests that the law changes had a narrow application that specifically addressed the liability arising from owning and managing multiple similar startups (see Section 2.1 and Section A of the Internet Appendix). Thus, unlike other laws that may affect the scope of managerial discretion in various ways[5], these laws are more likely to be linked with startup outcomes via their direct impact on common VC investments, rather than by affecting outcomes through other channels.

Third, to address the concern that firms' choices of their states of incorporation are endogenous, we conduct a survey of lawyers that work on VC deals and advise startups on governance issues and financing terms (see Section 2.2 and Section B of the Internet Appendix). The main concern here is that high-growth startups are more likely to incorporate in Delaware, which is the most popular state of incorporation, and the first adopter of the COW legislation. Our survey suggests that the most important reason startups choose to incorporate in Delaware is the familiarity of lawyers with Delaware law. Based on the survey, the chief reason for firms not to incorporate in Delaware is the personal preference of the founder or lawyers. Moreover, substantive laws, especially the COW laws, do not meaningfully affect incorporation choices, and the state of incorporation is rarely negotiated in VC deals.

Fourth, we extend the difference-in-difference analysis to startup outcomes (see Section G of the Internet Appendix), which is the reduced form for any regression that uses the law changes as an IV. This allows us to scrutinize the parallel trends assumption by mapping the dynamic patterns around the adoption of laws that facilitate common VC investment (Figure 1) and within-industry VC directorships (Figure 2). These figures reveal a substantial rise in common VC investment and within-industry VC directorships following the adoption of COW laws. Despite a possible upward trajectory in shared VC investment preceding the law changes, no preexisting trend in within-industry VC directorships is apparent, which is the key mechanism linking startup

[5] For example, constituency statutes may both reduce the risk of managers' liability for violating their fiduciary duties to shareholders and increase managers' attentiveness to stakeholders' interests.

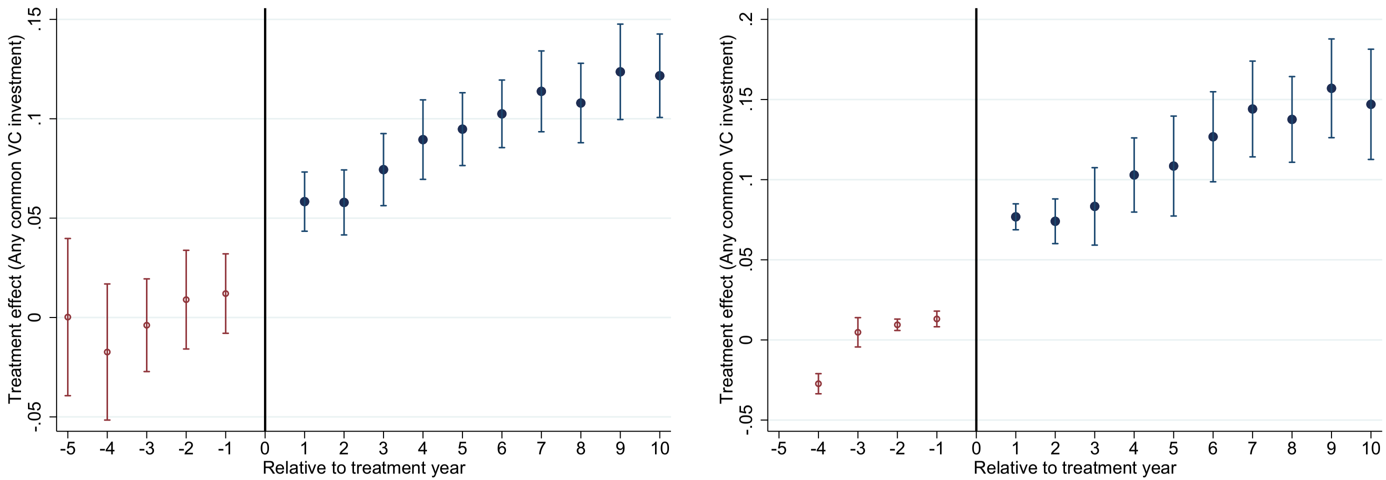

Figure 1
Dynamic effects of corporate opportunity waiver legislation
The figures plot the impact of corporate opportunity waiver (COW) legislation on common VC investments by year relative to the year the law was adopted. The figures show a window spanning from 5 years before the law was adopted to 10 years after the law was adopted. Coefficient estimates are normalized relative to the treatment years and inclusive of partially treated years. The straight lines represent 90% confidence intervals, adjusted for incorporation state-level clustering. The coefficients estimated are based on a difference-in-differences specification that includes startup and year fixed effects and controls for total capital previously raised, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, same headquarter state, and same primary industry. A full set of dummy variables for relative years is included in the regression, but only those in the window are plotted. The figure on the left plots the coefficients for the full sample, and the figure on the right plots the coefficients for the sample limited to startups incorporated in Delaware, California, Massachusetts, and New York.

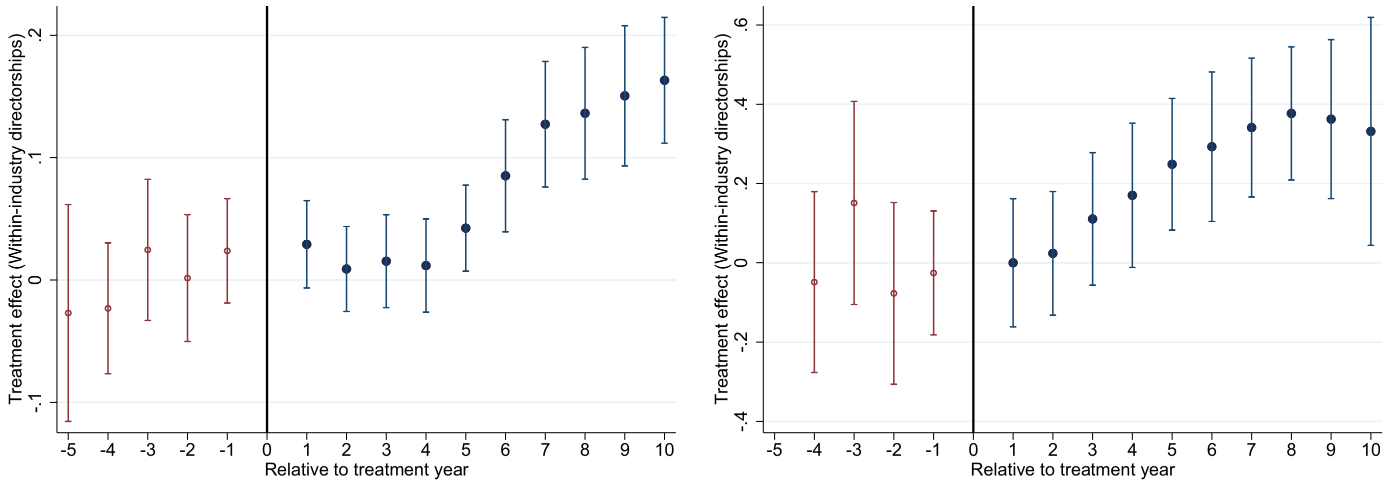

Figure 2
Dynamic effects of corporate opportunity waiver legislation on within-industry VC directorships
The figures plot the impact of corporate opportunity waiver (COW) legislation on same-industry VC directorships by year relative to the year the law was adopted. The figures show a window spanning from 5 years before the law was adopted to 10 years after the law was adopted. Coefficient estimates are normalized relative to the treatment years and inclusive of partially treated years. The straight lines represent 90% confidence intervals, adjusted for incorporation state-level clustering. The coefficients estimated are based on a difference-in-differences specification that includes startup and year fixed effects and includes controls for total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, same headquarter state, and same primary industry. A full set of dummy variables for relative years is included in the regression, but only those in the window are plotted. The figure on the left plots the coefficients for the full sample, and the figure on the right plots the coefficients for the sample limited to startups incorporated in Delaware, California, Massachusetts, and New York.

outcomes with common VC investments.[6] At any rate, to alleviate concerns regarding the parallel trend assumptions, we also consider specifications with matched treated and control units that produce similar results to our main outcomes of interest (see Section H of the Internet Appendix).

Fifth, we address potential indirect associations between the IV and startup growth. Following Angrist, Lavy, and Schlosser (2010) and Conley, Hansen, and Rossi (2012), we conduct a placebo test to show that in a subsample in which the IV does not affect common VC investment, common VC investment is not associated with startup outcomes (see Section F of the Internet Appendix). This zero first-stage test helps mitigate endogeneity concerns.

Sixth, we address the potential concern that the legal changes as a shock may reflect an intent to treat rather than treatment on the treated. The reason is that the laws only permitted firms to adopt COWs rather than automatically exempting investors and directors from liability. We provide qualitative evidence that adoptions of COWs have been standard practice in the VC industry given the potential harmful impact of litigation on VCs' reputations (Atanasov, Ivanov, and Litvak 2012). In particular, we rely on our survey of lawyers because the organizational documents of private startups are not publicly available. The survey reveals that COWs are standard provisions in the charter or bylaws of startups, and if the COW provision is not included in the charter or bylaws, it is usually included in another legal document, such as a privately negotiated contract.

Despite all these steps, we acknowledge that we cannot rule out the possibility that the laws correlate with unobserved factors that may affect startup outcomes. However, our extensive analyses generally support the validity of the exclusion restriction and suggest that the laws that permitted firms to adopt COWs are plausibly exogenous with respect to the outcomes we analyze.

1. Related Literature

Our research is primarily related to other research that examines the impact of common VC investors. Lindsey (2008) shows that alliances are more frequent among startups sharing a common VC. Gonzalez-Uribe (2020) finds evidence of exchanges of innovation resources inside venture capital portfolios. Startups are more likely to cite the patents of other startups in the same VC portfolio. More recently, Li, Liu, and Taylor (2023) find that in the pharmaceutical industry, a common VC investor reduces duplication of R&D across projects of its portfolio companies and improves innovative efficiency. As stated above, we add to these studies by using a novel identification strategy based on

[6] Likewise, there is no discernible trend in other startup outcomes (see Figures G1-G9 in the Internet Appendix).

COWs, highlighting directors as the channel for informal exchanges within VC portfolio, and examining a broader set of startup outcomes.

Our study contributes more broadly to several other important kinds of literature. We contribute to entrepreneurship research in several ways. We identify institutional features that enable VCs to achieve higher returns (Moskowitz and Vissing-Jørgensen 2002; Cochrane 2005), startup growth, and innovation (Hellman and Puri 2000; Lindsey 2008; Furman and Stern 2011). We add to a large body of research that explores how VCs make investment decisions (Gompers 1995; Kaplan and Stromberg 2004; Kaplan and Schoar 2005; Gompers et al. 2008; Puri and Zarutskie 2012; Ewens, Nanda, and Rhodes-Kropf 2018; Gompers et al. 2020), especially studies emphasizing networks and economic ties (Hochberg, Ljungqvist, and Lu 2007; Hochberg, Ljungqvist, and Lu 2010; Hochberg, Lindsey, and Westerfield 2015). Moreover, our survey of lawyers that work on VC deals adds to the literature on VC deal terms (Gompers et al. 2020) by revealing evidence on startups' widespread use of liability waivers and patterns of startups' incorporation decisions.

We contribute to the study of the role of overlapping directors. Our findings are related to studies that document information flows among directors. Bouwman (2011) finds that governance practices are partly the outcome of network effects among public firms with common directors. Our study suggests that in the VC context, common directors are highly consequential and have an effect on real outcomes. This is consistent with studies that document the role of VC directors in advising founders, negotiating deals, and mediating conflicts (Hellmann and Puri 2002; Kaplan and Stromberg 2004; Broughman 2013; Amornsiripanitch, Gompers, and Xuan 2019; Ewens and Malenko 2022). Our study thus complements a rich literature that shows that directors add value to firms (Adams 2017) through their expertise (Güner, Malmendier, and Tate 2008; Dass et al. 2014), social connections (Fracassi and Tate 2012), and reputations (Fich and Shivdasani 2006; Fahlenbrach, Low, and Stulz 2010).

Next, we contribute to the emerging study of common ownership by extending it to the VC industry. Theoretical research on common ownership predicts that it can be anticompetitive (Bresnahan and Salop 1986; Gilo, Moshe, and Spiegel 2006), and recent empirical studies support anticompetitive effects (He and Huang 2017; Azar, Schmalz, and Tecu 2018; Azar, Raina, and Schmalz 2022).[7] Our study does not address competition in the product market, though Eldar and Grennan (2021) suggest that common VC ownership may mitigate the anticompetitive effects of common ownership of public firms through improved product quality. One challenge with the common ownership literature is that it lacks a clear channel through which common owners could influence firm policy. Although our focus

[7] Subsequent research has questioned these findings (Backus, Conlon, and Sinkinson 2021; Dennis, Gerardi, and Schenone 2022; Gilje, Gormley, and Levit 2020; Lewellen and Lowry 2021).

is on informational spillovers, our study is the first to link common ownership to the cross-appointment of directors, thus providing evidence of an active channel through which common owners can influence firm policy (Antón, Ederer, Giné, and Schmalz 2023; Hemphill and Kahan 2020).

Finally, we contribute to the law and finance literature on what constitutes sound practice in corporate governance (Shleifer and Vishny 1997). Our results are consistent with a view that governance is not one-size-fits-all (Giroud and Mueller 2010; Giroud and Mueller 2011), and in some cases what might be considered lax governance – diluting the duty of loyalty with COWs – can be beneficial (Cremers, Litov, and Sepe 2017; Eldar 2018; Grennan 2018; Eldar and Magnolfi 2020).

2. Institutional Background

2.1 Legal and corporate practice

In this section, we provide brief institutional background explaining the legal changes that we exploit in our analysis, and why they mattered for common VC investments. We include a more detailed discussion in Section A of the Internet Appendix.

We rely on the staggered adoption of laws across nine states from 2000 to 2016 that enable corporations to adopt waivers from the corporate opportunity doctrine, or COWs (Rauterberg and Talley 2017). Table 1 reports the states and the dates when firms were first permitted to adopt the COWs. These waivers exempt directors, officers and shareholders from litigation risk if they usurp a business opportunity in a way that conflicts with the firm's best interest (Talley 1998; Rauterberg and Talley 2017; Licht 2018; Velasco 2018). The waivers are an element of the duty of loyalty, which more broadly regulates conflicts of interest and requires fiduciaries to act in the best interest of the corporation. The main motivation for the legal change was to eliminate legal uncertainty regarding firms' ability to adopt COWs. In reviewing the legislative session notes, we find virtually no evidence of lobbying prior to the adoption of the COW laws.

Table 1
Summary of corporate opportunity waiver legislation

State of inc.	Effective Date	By charter	By bylaws	By Board action	Covers directors	Covers Shareholders
DE	July 1, 2000	Yes	Possible	Yes	Yes	Yes
OK	November 1, 2001	Yes	Possible	Yes	Yes	Yes
MO	October 1, 2003	Yes	Possible	Yes	Yes	Yes
KS	January 1, 2005	Yes	Possible	Yes	Yes	Yes
TX	January 1, 2006	Yes	Possible	Yes	Yes	Yes
NV	October 1, 2007	Yes	Possible	Yes	Yes	Yes
NJ	March 11, 2011	Yes	Possible	Yes	Yes	Yes
MD	October 1, 2014	Yes	Possible	Yes	Yes	No
WA	January 1, 2016	Yes	No	No	Yes	Yes

This table offers an overview of the states that amended their corporate laws explicitly to allow COWs (Rauterberg and Talley 2017). These waivers dilute aspects of the fiduciary duty of loyalty.

To better understand the importance of these legal changes, consider the following example. GoDaddy Inc., a firm that provides domain name registration services worldwide, adopted a COW in its certificate of incorporation.[8] As of 2019, GoDaddy had five VC partners sitting on its board. Those five directors sat on 31 other boards, including another web domain company. Prior to the law change, these board seats would have subjected the directors to substantial liability risk. As Little and Orien (2014) detail, general partners serving on multiple company boards had to strategically manage liability landmines, which occur because VC investors are often approached with many investment opportunities once they signal their interest in a space. Without the law change, they faced potential conflicts of interest if they invested in two different but closely related businesses. As stated by one legal expert, if investors "...will need to worry that all their subsequent private investments in other possibly related firms will be attacked as usurped opportunities of the first company they bought into, they will justifiably think twice before committing their capital; hence the need for a waiver of the doctrine" (Grossman 2009).

We do not observe whether or not the startups in our sample actually adopt COWs because private startups are not required to disclose information about the adoption of COWs. Thus, in theory, using the legal changes as a shock may reflect an intent to treat rather than treatment on the treated. Although the duty of loyalty (including the corporate opportunity doctrine) may seem immutable, a majority of public corporations are electing to dilute it by adopting COWs (Rauterberg and Talley 2017). Given the hurdles that the corporate opportunity doctrine poses for VC investment, and the negative impact of litigation on VC firms' reputations (Atanasov, Ivanov, and Litvak 2012), it is likely that the rates of COW adoption in startups are very high. Consistent with this view, the standard form certificate of incorporation provided as a model legal document by the National Venture Capital Association includes a COW provision. Further, in all states (but Washington) COWs do not require amendments to the certificate of incorporation (which entails shareholder approval); rather, they can be easily adopted ad hoc through a bylaw provision or a contract provision. In the next section, we provide survey evidence from lawyers who work on VC deals that confirm that startups almost invariably adopt COWs when permitted to do so.

2.2 Survey Evidence

To evaluate whether we can plausibly rely on laws that permit COWs as quasi-exogenous shocks, we conducted a survey of lawyers to gain their insight into the factors that affect startups' incorporation decisions and propensity to adopt COWs. Before running our survey, we began by interviewing lawyers at leading U.S. law firms that either represented venture capitalists (VCs) or

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[8] See www.sec.gov/Archives/edgar/data/1609711/000119312515120133/d903539dex31.htm

entrepreneurs. We incorporated their input into the design of our survey. We sent the survey to a list of email addresses maintained by the Duke University Law School (74 alums) and the Fuqua School of Business (46 alums) that indicate their primary work experience is in the VC industry. From this list, we received 25 responses, representing a 21% response rate, which is similar to existing financial field studies (Graham and Harvey 2001; Graham et al. 2022; Gompers et al. 2020). We describe here the main results of the survey, but further details are available in Section B of the Internet Appendix.

Table B.1 summarizes the first series of questions which explores the entrepreneur's choice of state of incorporation. Q1 asks "How often do VC firms and startups negotiate state of incorporation in a VC deal?" The modal response is "rarely" (40%) and the remaining responses ranged from never (12%) to always (16%) suggesting some disagreement among practitioners or idiosyncratic views. Q2 asks "Please rank the two most common reasons for startups to incorporate in Delaware." The vast majority of respondents (84%) said "familiarity with the law and the body of precedents." No other choice received even half as much support. Tied for second, the next most commonly selected responses were the "expertise of Delaware's judiciary on business law issues" and "investors will withhold investment if the startup does not incorporate in Delaware." We also sought to understand if firms may self-select into Delaware for other legal reasons, but there were few instances where Delaware was selected for a specific law and the reasons listed were the *Trados* decision, which held that directors' duty is to maximize exclusively the interests of equity holders (Cable 2019), and business combination laws. The final question asks, "Some high-growth startups that seek VC investments choose not to incorporate in Delaware. Please rank the two most common reasons to not incorporate in Delaware." Here the most common reason, with 68% of respondents, was "personal preference of a founder and/or lawyer." The second most common reason at 36% was "loyalty toward the headquarter state."

Table B.2 summarizes the second series of questions in the survey which explore COW adoption patterns. Q4 asks, "The National Venture Capital Association's sample certificate of incorporation includes a waiver from the corporate opportunity doctrine, which is permitted under section 122(7) of the Delaware Corporate Law Code. Is this a standard provision in the charter or bylaws of startups that you observe in practice?" Three-quarters of respondents said "yes." Q5 asks "If this provision is not included in the charter or bylaws, do you typically include it in another legal document (such as the investment agreement with a VC firm or an employment contract with a director)?" Sixty-two percent of respondents say always or most of the time. This suggests that the treatment which is based on firms' states of incorporation does not merely reflect an intent to treat. Finally, Q6 explores the rationale for waiving the corporate opportunity doctrine. Here, 85% of respondents answered that "VC investors frequently engage with founders and other investors, and they want to avoid the risk of unexpected litigation from holding board seats at these potentially related startups." Only one respondent said that startups seeking financing from VC investors have no choice but to let VC investors pursue business opportunities that may belong to the startups. Similarly, only two respondents suggested that the founders agree to the waiver to get a higher valuation from the VC investor. These responses suggest the mechanism through which the COW facilitates common VC investment is by reducing the legal risk of common investment, and not through other possible channels.

Finally, a common critique of surveys is that the respondents may bias their responses by overweighting outcomes they think the researchers want to hear and underweighting less favorable outcomes. To ascertain whether there is an appreciable bias in the survey responses, we included a question from the survey conducted by Gompers et al. (2020) and compared our survey responses with their findings. The benchmark study evaluates how VCs structure investments in practice by asking VCs which contract terms are most important and how flexible they are in negotiating them. We ask about three common terms from Gompers et al. (2020),[9] COW, and state of incorporation. Our survey replicates the ranking of term negotiability in Gompers et al. (2020), and situates COWs and incorporation choices in this ranking.

In conclusion, our survey of VC lawyers suggests that the laws that permit COWs are an important shock to investors' and directors' liability risk, and that startups almost invariably adopt COWs. This is consistent with the institutional analysis in Section 2.1.

3. Data and Sample

Our goal is to study the effects of common VC investors on startups by exploiting variation that occurs at the state of incorporation level over time. To achieve this goal, we build a data set in which the primary unit of analysis is a VC-funded startup j in industry n, headquartered in state h and incorporated in state i during year t. The primary source for data on VC-funded startups, their industry, and their headquarter state is Preqin and the primary source for data on state of incorporation is Lexis Advance. We supplement these sources with data from VentureXpert, Crunchbase, and Compustat.

3.1 VC-funded startups

The data on startups and VC funds are sourced from Preqin, and the sample period extends from 1995 through 2018. To determine the startup founding year, we use the earliest of the following three variables: year of first incorporation (from Lexis Advance), year of first deal (from Preqin), and founding year (from Preqin or VentureXpert when missing). To determine

[9] The three terms are (1) board control, (2) pro rata clause and (3) redemption rights.

the startup exit year, we supplement the Preqin data on exits with data from VentureXpert and manual searches in Crunchbase, because Preqin does not have a variable to indicate whether a portfolio company goes out of business or fails. We label a startup as having failed if it is listed as defunct, out of business, or in bankruptcy. Finally, we conservatively code as failed any startup that has not raised capital in 5 years.

We exclude startups not located in the United States. We also exclude nonprofit startups and those that are not incorporated (such as limited liability companies [LLCs]), as they would not be subject to state legislation changes. For the state of headquarters, we use the state of location. Given that determining the state of incorporation is a complicated and time-consuming process, we limit the total number of startups in the sample. To select this sample, we include all startups that reach at least a Series A round or receive at least $10 million in VC funding. This cutoff raises the concern that our sample is biased toward more successful startups. To mitigate this concern, we added to the data: (1) all Massachusetts startups that raised $1 million to $10 million, and (2) startups that belong to two high-fixed-cost industries (semiconductors and pharmaceuticals) and two low-fixed-cost industries (internet retail and internet business) that raised $1 million to $10 million. These startups either are either located in an entrepreneurial hub (i.e., Massachusetts) or belong to industries that are the focus of VC investments but have not raised substantial capital from VCs. The results of our study are not sensitive to these additions, though we acknowledge that we cannot rule out the possibility that sample selection may affect our results.

3.2 State of incorporation

A major challenge in identifying the state of incorporation is that Preqin does not provide this information. We use Lexis Advance Public Records to manually identify this variable. The nationwide business locator tool on Lexis allows for searches by name and location. The source records include all corporate filings collected from secretaries of state, Uniform Commercial Code filings, and Experian business records. Of the initial set of VC-funded startups, we are able to identify about 92% of the startups using the nationwide business locator. We then download all corporate records from the secretary of state of the state in which the startup is headquartered. We examine the filings and determine whether the state of incorporation is categorized as "Foreign" or "Domestic." If listed as "Foreign," we identify the "Foreign State of Incorporation," which is typically Delaware, as the state of incorporation. If listed as "Domestic," we identify the "Place Incorporated" as the state of incorporation. We further code startups for which no filings are available on Lexis using publicly available data from the websites of the Delaware and California secretaries of state. Our final sample of startups with state of incorporation data comprises 14,991 unique startups. While this sample represents only approximately 58% of the unique startups in Preqin's database, it represents 99% of the deal value in Preqin. Although a few studies collect data on the incorporation of private firms (Dammann and Schundeln 2011; Broughman, Fried, and Ibrahim 2014), to the best of our knowledge, this is the most comprehensive data set to date.

3.3 Industry classification

For each VC-funded startup, Preqin provides two descriptions of the industry: primary industry and subindustries. The subindustries are listed in order of relevance, so we focus on the first subindustry. For instance, Zocdoc's primary industry is Healthcare IT and its subindustry is web applications. Lending Club's primary industry is financial services and its subindustry is e-financial. The narrowest definition of industry uses both primary industry and subindustry and includes 130 unique industries. Using only the primary industry produces 78 unique industries, and the coarsest definition includes 10 unique industries. Tables D.1-D.4 provide additional details on these definitions.

3.4 Common VC investment

We create two measures of common VC investment at the startup-year level. The measures are (1) an indicator for whether any VC investor is an investor in another startup in the same industry and (2) a count of the total number of VC investors that invested in other startups in the same industry. We use the Preqin variable corresponding to a VC investor, such as Benchmark Capital or Sequoia Capital, to define the investor level. We use the Preqin variable of primary and first subindustry to define the industry.

We also create three measures of within-industry VC investments at the startup-year level, using the Preqin primary industry classification. The three measures are indicator variables for (1) whether any VC investor made a within-industry investment in that startup, (2) whether such investment is on the extensive margin, and (3) whether such investment is on the intensive margin. The indicator variable for extensive margin investment is equal to one when the VC investor invests in a new startup in a given year that is in the same industry as a portfolio company that it currently holds in its portfolio. The indicator variable for intensive margin investment is equal to one when the VC investor invests more money in a startup than it has previously invested in.

3.5 Within-industry directorships

We gather data on directors and the VC lead partners who serve as directors from Preqin to construct three measures related to board members. The first measure is simply the total number of VC directors per startup-year. The second is the average number of additional board appointments that the VC directors hold per startup-year. The third is the average number of other board appointments per startup-year that are within the same industry as the startup. The second and third measures capture the thickness of director networks.

These networks may serve as the basis for informational exchanges within VC portfolios.

3.6 VC investor reputation

We use two measures of VC reputation. The first is the average ranking of VCs based on the Lee-Pollock-Jin's VC reputation index (Lee, Pollock, and Jin 2011) over 1995-2010 (the years that overlap with our sample period). We further follow the prior literature which shows that age, size, industry expertise, and successful IPOs lead to an elite reputation (Hsu 2004, Robinson and Sensoy 2013, Kahle and Stulz 2017, Guzman and Stern 2020). Specifically, for each startup year in our sample, we construct averages across prior VC investors for the following variables: VC age (VC founding year less current year), size (assets under management), the number of funds, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. These latter two variables help control for the fact that VCs can add value passively to startups simply by attaching their names to startups, especially in innovation hubs (Bernstein et al. 2022).

3.7 Startup deal outcomes and exits

We source the VC funding raised by startups from Preqin. For deal count, we add the number of rounds of financing a startup raises each year. Late-stage rounds are defined as those that are at the Series B-J stage of financing or are described as "Pre-IPO." We define deal amount as the logarithm of U.S. dollar deal size reported by Preqin, adjusted for inflation. We define the time between deal rounds on an annual basis. We gather exit data from Preqin, which includes IPOs, trade sales and mergers. We define "sale" as any trade sale or a merger where the acquirer is a practicing entity.

When the startup is sold, Preqin provides the name of the acquirer. We further define common acquisition as any merger where the acquirer and the target have a common VC investor and create an indicator variable for whether a startup is acquired by a firm that is in the portfolio of a common VC investor.

3.8 VC fund performance

We gather VC fund performance data from Preqin's Cash Flow data set. The Cash Flow data set provides periodic snapshots of fund performance relative to a benchmark. It only covers a limited number of VC funds, so coverage is incomplete. However, to approximate complete coverage, Preqin benchmarks the performance to established indexes (e.g., early stage, general venture) and ranks each funds' performance relative to the benchmark. We use the annual benchmarked quartiles as a proxy for portfolio returns.

3.9 IPO valuations

For startups that undergo an IPO, we supplement the Preqin data with IPO valuation data and publicly available incorporation data from SEC Edgar. We follow a similar approach to that introduced by Purnanandam and Swaminathan (2004) to determine the IPO value. This procedure involves computing three multiples for each IPO firm based on Sales, EBITDA and Earnings divided by the equivalent multiple for a matched public firm. We describe each of the three measures: $\left(\frac{P}{V}\right)_{Sales}$, $\left(\frac{P}{V}\right)_{EBITDA}$, and $\left(\frac{P}{V}\right)_{Earnings}$ in Section C of the Internet Appendix.

4. Descriptive Statistics

Our main startup-year sample includes 142,174 startup-years belonging to 14,991 Preqin startups with data on their states of incorporation. Table 2 displays summary statistics for common VC investments, VC directors, VC deals, and startup exits. Separate statistics are provided for the full sample as well as the treated and control samples. Startup-years are only included in the treated sample if a startup is incorporated in a state that passed a COW law for years after the law was adopted. Control startup-years consist of startup-year observations for the never-treated group as well as startup-year observations for years prior to the treatment for the treated group. About 71% of all startup-years are in the treated sample. This is because about 66% of the startup-year observations are startups incorporated in Delaware (see Table D.5).[10] As discussed below, we use several robustness tests to address concerns regarding selection into incorporation states, including specifications that exclude Delaware startups.

Panel A of Table 2 depicts the measures of common VC investment. The statistics reveal a meaningful increase in common VC investors after the law changes. Among the treated startups, 60% have a common VC investor while only 32% of control startups have a common VC investor. Both the total number of common VC investments and within-industry investment follow a similar pattern. The doubling of within-industry investment holds for both the intensive and extensive margin.

Panel B of Table 2 summarizes our three measures of director cross-appointments. The average number of VC directors is 1.72 per firm-year. On average, each VC director holds 2.53 board positions at other VC firms in a given firm-year and 0.61 board positions are at same-industry startups in a given startup-year. Across all measures of director thickness, we observe higher values for the treated sample.

Panel C of Table 2 summarizes the VC reputation variables. The startups headquartered in treated states receive investments from VC investors who are

[10] This is consistent with Broughman, Fried, and Ibrahim (2014) who rely on similar sources for identifying the state of incorporation, and find that 68% of startups that have received VC financing are incorporated in Delaware.

Table 2
Summary statistics

	All			Treated			Control		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
A: Common VC investments									
Any common VC investment	142,174	0.51	0.50	100,970	0.60	0.49	41,204	0.32	0.46
Total common VC investment	142,174	0.99	1.20	100,970	1.18	1.24	41,204	0.54	0.95
Within-industry investment	142,174	0.18	0.38	100,970	0.20	0.40	41,204	0.11	0.31
Intensive margin investment	142,174	0.13	0.33	100,970	0.15	0.36	41,204	0.07	0.26
Extensive margin investment	142,174	0.05	0.22	100,970	0.06	0.23	41,204	0.03	0.18
B: VC directors									
VC directorships	100,894	1.72	2.05	73,889	1.99	2.14	27,005	1.00	1.58
Additional directorships	100,894	2.53	3.57	73,889	2.96	3.74	27,005	1.36	2.71
Additional within-industry directorships	100,894	0.61	1.22	73,889	0.73	1.33	27,005	0.29	0.80
C: VC reputation									
VC reputation (100=best)	142,174	9.78	18.22	100,970	11.11	19.17	41,204	6.52	15.17
VC age	142,174	6.41	7.71	100,970	7.39	7.94	41,204	3.99	6.51
VC size (AUM)	142,174	747.04	1,441.03	100,970	882.47	1,563.74	41,204	415.17	1,008.93
VC fund number	142,174	2.63	3.24	100,970	3.04	3.36	41,204	1.62	2.68
VC total rounds of startup investment	142,174	71.08	128.53	100,970	86.44	139.94	41,204	33.46	83.79
VC total IPOs of startups invested in	142,174	3.71	8.64	100,970	4.47	9.48	41,204	1.85	5.66
VC same headquarter state as startup	142,174	0.29	0.38	100,970	0.33	0.39	41,204	0.21	0.35
VC same primary industry as startup	142,174	0.14	0.27	100,970	0.17	0.28	41,204	0.09	0.22
D: VC deals									
Count	142,174	0.28	0.51	100,970	0.31	0.53	41,204	0.19	0.44
Late Stage	142,174	0.10	0.32	100,970	0.11	0.34	41,204	0.07	0.27
Deal value (log(1+))	142,174	0.52	1.08	100,970	0.58	1.13	41,204	0.37	0.94
Time between deals (year)	28,047	0.56	1.13	22,734	0.56	1.12	5,313	0.55	1.18
E: Exits									
IPO	142,174	0.01	0.08	100,970	0.01	0.08	41,204	0.00	0.06
Sale	142,174	0.03	0.17	100,970	0.03	0.18	41,204	0.02	0.14
Acquired by a common VC investment	142,174	0.01	0.07	100,970	0.01	0.08	41,204	0.00	0.05
Failure	142,174	0.04	0.20	100,970	0.05	0.21	41,204	0.03	0.17

This table provides summary statistics for observations at the startup-year level. Separate statistics are provided for the full sample of startups, for the treated sample of startups, and for the control sample of startups. Treatment is defined as being incorporated in a state that allows for COWs. Deal amounts are in millions of dollars and are inflation-adjusted. All variables are described in Section 3.

more reputable and established in terms of age, fund number and assets under management. To account for this heterogeneity across VC investors, we control for VC characteristics and VC fixed effects.

Panel D of Table 2 considers deal variables. We observe 0.28 deals per startup-year. Late-stage deals occur less frequently and constitute only 0.10 deals per startup-year. The average inflation-adjusted dollar deal volume per year is \$4.7 million, although this amount is averaged across years that do and do not include deals. The treated sample has a higher average deal count, including late-stage deals, and higher deal amounts than the untreated sample.

Panel E of Table 2 depicts the statistics about exits. Treated startups undergo IPOs and sales at higher rates than control startups. Treated startups are also more frequently acquired by a firm with a common VC investor. However, they fail at higher rates too, suggesting that the treatment may result in real benefits for startups.

We use this startup-year data to describe the sample correlation between common VC investors and startup growth. Table D.6 reports the associations based on the endogenous ordinary least square (OLS) regressions controlling for startup, VC, headquarter-state-by-year, and industry-by-year fixed effects as well as controls for startup growth potential and average VC characteristics. The table shows that having a common VC investor is associated with raising 0.45 additional rounds of financing in a given year. Next, the table includes the partial correlations associated with the total number of common VC investors. It reveals a correlation of 0.22 for raising additional rounds of financing. Similarly, we observe positive correlations between treatment and late-stage financing and deal value. Finally, the table illustrates that the number of common VC investors is correlated with a higher probability of IPO and sale, and negative correlations with failure.

5. Empirical Design

Identifying the effects of common VC investors on startup outcomes is challenging due to inherent selection issues that arise from VC investment decisions. For example, endogeneity may arise if VC investors choose to invest in startups with higher risk or at times when the price of risk is higher. Likewise, changes in a startup's growth trajectory may cause VC investors to invest in other startups in the same industry.

To get closer to the ideal of a random shock that generates exogenous variation in VCs' within-industry investments, we use the set of quasi-natural experiments stemming from the law changes that permit COWs. Specifically, we exploit the state of incorporation level shocks as quasi-natural experiments to establish a link between a startup's ability to adopt COWs and common VC investment. Because variation is at the state of incorporation level, we can compare startups in the same industry that are headquartered in the same state but are subject to different legislation. This empirical design significantly mitigates the confounding effects resulting from regional economic shocks or conglomeration effects in entrepreneurial hubs.

To understand whether these laws led to a significant shift in the extent to which VCs hold stakes in startups in the same industry, we estimate six regressions. Specification (1) is a standard difference-in-differences specification with year fixed effects. Specification (2) also includes startup fixed effects. Specification (3) includes startup, year, and VC fixed effects as well as a control for late treatment. Specification (4) includes startup, VC, and headquarter-state-by-year fixed effects, and specification (5) augments that specification with industry-by-year fixed effects. Finally, specification (6), which is the most demanding one, includes startup, VC, and HQ-state-by-industry-by-year fixed effects. As an example, the equation for specification (5) is:

$$Y_{jnhit} = \alpha + \beta (Treat \times Post)_{jnhit} + \zeta (Treat \times Post5)_{jnhit} + \mu X_{jnhit} + \omega VC_{jnhit} + f_j + \gamma_{ht} + \rho_{it} + \varepsilon_{jnhit} \quad (1)$$

In the above equation, Y represents the outcome variable, such as an indicator for having a VC investor in common with another startup within industry n. The observation unit is startup j that operates in industry n and is headquartered in state h and incorporated in state i in year t. $Treat$ is an indicator for startups that are incorporated in treated states. $Treat \times Post$ is an indicator for startups that are incorporated in states after the passage of the COW laws. β is the main coefficient of interest that isolates the change attributable to the law. $Post5$ is an indicator for any startup that has been treated for 5 years. Estimating ζ accounts for potential reversals that may occur outside the standard 5-year window. f_j denotes the startup fixed effects that capture all of the startup-level time-invariant effects, γ_{ht} represents a headquarter-state-by-year fixed effect that attempts to control for local economic conditions (e.g., state funding initiatives for innovation), and ρ_{it} represents an industry-by-year fixed effect that accounts for industry level trends.

X_{jnhit} represents a vector of controls for (a) startup characteristics, specifically age, capital raised to date, and rounds raised to date, and (b) the average of VC investor characteristics described in Section 3.6, such as age, size (assets under management), number of funds, total rounds of startup investment, the average number of investment rounds per year, and total IPOs of startups invested in. VC_{jnhit} represents a vector with indicator variables for each VC investor ranked in the top 250 for reputation based on the VC's average ranking in 2010-2015 under the Lee-Pollock-Jin's VC reputation index (Lee, Pollock, and Jin 2011).[11]

Next, we evaluate the potential consequences of common VC investors. Because the difference-in-differences approach provides indirect evidence of a relationship between common VC investors and startup outcomes, we focus on an IV strategy for examining the direct effect of common VC investors on startup outcomes. We also run the difference-in-differences specifications (see Internet Appendix G), as they represent the reduced form regression that, combined with the first stage results on changes in common VC investors, generate the coefficient of interest in the IV specification (Angrist and Pischke 2008).

[11] We focus on the top-250 VCs in part because including more fixed effects is computationally challenging and because it is unlikely that VCs ranked below the top 250 have a meaningful role in monitoring and certifying the governance choice of startups.

For the exclusion restriction to hold, it must be that conditional on controls, the law changes are uncorrelated with other unobservable drivers of startup growth. While we cannot overrule the presence of such unobservable factors, we have several reasons to believe that these factors are immaterial to our setup. First, as mentioned above, these laws directly target the use of valuable business information in another venture and do not affect other legal risks, as directors remain subject to all other fiduciary duties.[12] Second, we have multiple legal changes, so any selection concern must be about unobservable time-varying selection that occurs at the exact time of the law change in nine different states. This is unlikely given our survey results that show that COW laws do not affect incorporation decisions (see Section 2.2). Finally, our specifications also control for startup fixed effects and startup growth potential to account for the fixed and time-varying differences across startups as well as VC fixed effects and VC reputational characteristics, thereby mitigating concerns that the IV captures founders' or VC investors' private information about the startup growth potential.

Accordingly, the resultant IV estimates can plausibly be interpreted as measuring the effects of common VC investors on startup performance. The first-stage equation for the IV analysis is

$$\begin{aligned} CommonVC_{jnhit} = {} & \alpha + \beta(Treat \times Post)_{jnhit} + \mu X_{jnhit} \\ & + \omega VC_{jnhit} + f_j + \gamma_{ht} + \rho_{it} + \nu_{jnhit}, \end{aligned} \tag{2}$$

where *CommonVC* is one of the measures of common VC investors, primarily an indicator for whether the startup has any common VC investor and the log of the total number of common VC investors. The observation unit is startup j that operates in industry n and is headquartered in state h but incorporated in state i in year t. $Treat \times Post$ is an indicator for startups that are incorporated in states with COW laws after the law change. X_{jnhit} is a vector of startup and VC controls. VC_{jnhit} represents the vector of VC fixed effects for the top-250 VC investors, and f_j denotes the startup fixed effects. γ_{ht} represents a headquarter-state-by-year fixed effect that controls for local economic conditions (e.g., state funding initiatives for innovation), ρ_{it} represents an industry-by-year fixed effect that accounts for industry level trends, and ν_{jnhit} is the unobservable error component.

12 Rauterberg and Talley (2017) find a positive stock market reaction to adoption of waivers by 83 public firms. While this result may suggest that COWs benefit firms other than through facilitating common VC investment, all of the key examples of COWs adopted by public firms, such as Prosper and NetSuite, are focused on facilitating investments by VC investors. Thus, the adoption of COWs by public firms is fundamentally different than the adoption by startups given that public firm adoption is always bundled with a transaction or other board decisions, and thus the positive stock price effect for public firms may be the result of these concurrent events.

The IV approach uses the fitted values from the first stage to predict the outcome of interest as follows:

$$Y_{jnhit} = \alpha + \beta \widehat{CommonVC}_{jnhit} + \mu X_{jnhit} + \omega VC_{jnhit} + f_j + \gamma_{ht} + \rho_{it} + \varepsilon_{jnhit}, \tag{3}$$

In the above equation, Y again represents the outcome variable, such as raising a new round of VC financing. $\widehat{CommonVC}$ is our first stage fitted value and X_{jnhit}, f_j, γ_{ht}, and ρ_{it} represent the same controls and fixed effects as in the first stage. For the specifications where the dependent variable is an exit by the startup (such as an IPO or failure), we do not include the startup fixed effects (f_j), because the dependent variable is equal to one at most one time in the life of the startup. We cluster the standard errors by startup j and adjust for small clusters.

6. Results

In this section, we present evidence documenting an increase in common VC investors following the law changes. Next, we show that this increase in common VC investors is associated with an increase in VC directorships at other startups. Then, we assess whether common VC investment is associated with value creation by examining startups' ability to raise additional capital and their exits.

6.1 Common VC investors

Panel A of Table 3 shows that the likelihood of a common VC investor increases for treated startups. As shown in column 2, on average, startups incorporated in treated states are 11.8-percentage-points more likely to have a within-industry common VC investor after the law changes. The economic magnitude is large in comparison to the baseline; for example, prior to the first law passage, only 10% of startups incorporated in Delaware had a common VC investor. This result holds across a variety of specifications including ones with startup, VC, industry-by-year, headquarter-state-by-year, and headquarter-state-by-industry-by-year fixed effects, as well as controls for startup growth potential and VC characteristics, such as reputation, age, size, and total number of startups invested in that IPO. In each specification, the result is significant at the 1% level.

As shown in columns 3–6, the positive coefficient on $Treat \times Post$ suggests that the initial increase in the likelihood of a common VC investor is long-lived, and there is no evidence of reversal. Columns 4 and 5 include headquarter-state-by-year fixed effects to ensure that the treatment is not confounded by local economic conditions, such as the startup culture in Silicon Valley. Including these controls does not materially change the point estimates, suggesting that local economic conditions are largely orthogonal to the legal shocks. Column 6

Table 3
Total common venture capital investments and corporate opportunity waivers

A: Any common VC investments	(1)	(2)	(3)	(4)	(5)	(6)
Treat	0.039** (0.019)					
Treat × Post	0.070*** (0.018)	0.118*** (0.015)	0.078*** (0.010)	0.078*** (0.008)	0.075*** (0.007)	0.080*** (0.008)
Treat × Post after 5 years			0.045*** (0.007)	0.050*** (0.007)	0.047*** (0.007)	0.047*** (0.007)
Adjusted R^2 (%)	34.7	66.0	69.3	69.4	69.8	70.0
Panel B: Total common VC investments						
Treat	0.069 (0.056)					
Treat × Post	0.190*** (0.057)	0.203*** (0.037)	0.094*** (0.018)	0.087*** (0.012)	0.096*** (0.015)	0.103*** (0.015)
Treat × Post after five years			0.116*** (0.020)	0.141*** (0.011)	0.105*** (0.010)	0.104*** (0.010)
Adjusted R^2 (%)	35.3	76.6	81.4	81.5	82.9	82.9
Additional startup and VC controls	Yes	Yes	Yes	Yes	Yes	Yes
Startup fixed effects	No	Yes	Yes	Yes	Yes	Yes
VC fixed effects	No	No	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	No	No	No
HQ-state-by-year fixed effects	No	No	No	Yes	Yes	No
Industry-by-year fixed effects	No	No	No	No	Yes	No
HQ-state-by-industry-by-year fixed effects	No	No	No	No	No	Yes
Observations	142,174	142,174	142,174	141,296	141,296	139,559
Number of unique startups	14,991	14,991	14,991	14,896	14,896	14,794

This table presents the results from difference-in-differences regressions that exploit the staggered adoption of state legislation permitting corporate opportunity waivers (COWs). In panel A, the dependent variable is an indicator variable for whether a startup has a VC investor that commonly owns another startup within the same industry. In panel B, the dependent variable is the natural log of the total number of common VC owners that startup has. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. For the dependent variables, industry is defined based on Preqin's primary and subindustry classification. For the industry fixed effects, the adjusted primary industry classification, which is coarser than the primary industry classification, is used. Robust standard errors are clustered by state of incorporation. $*p<.1$; $**p<.05$; $***p<.01$

includes headquarter-state-by-industry-by-year fixed effects to control for shifts in the distribution of industries across states over time (e.g., more biotech) that could be correlated with the presence of particular VC investors. Even in this specification, startups incorporated in treated states are 8.0 percentage points more likely to have a within-industry common VC investor after the adoptions of COW laws.

Panel B of Table 3 evaluates the total number of common VC investors as the dependent variable. The coefficient estimate suggests that startups located in treated states experienced a significant increase in the total number of common VC investors. Focusing on the specifications with the most conservative fixed effects, the point estimate suggests a 10% increase in common VC investment following the law changes.

As an alternative approach, we explore within-industry investments on an extensive margin. As shown in Table G.1, for both extensive and intensive margins, VC investors are significantly more likely to make a within-industry investment after the passage of the COW laws. Again, these results hold across all specifications. A comparison of the point estimates in column 2 shows that 24% of same-industry investment is on the extensive margin.

We have focused on the full sample of VC-funded startups so far, but this may ignore important heterogeneity across states of incorporation in terms of the availability of VC funding. A potential concern is that about 66% of the observations in our sample comes from startups incorporated in Delaware (see Table D.5). As a first step to address this concern, Figure D.1 plots the rates of startups with common VC investors in the years before and after the law change for different subgroups of startups: (a) Delaware, the first treated state, (b) Texas, Washington and New Jersey, states that adopted the COW legislation in later years, (c) California, Massachusetts, and New York, entrepreneurial states that did not adopt the legislation, and (d) other control states. The treated states, not only Delaware, clearly experienced a greater growth in common VC investment.

More formally, Table 4 examines two alternative samples for the regressions. First, we limit the sample to Delaware, California, Massachusetts, and New York, the states where most entrepreneurial startups are incorporated. Second, we exclude startups that were originally incorporated in Delaware from the analysis. After excluding these startups, 26% of the remaining observations are from control states and 8% are from the other treated states. In both cases, the results are similar, suggesting that the increase in common VC investors is not driven exclusively by one legal change or only part of the sample.[13]

To further test the validity of the difference-in-differences approach, we run two placebo tests. First, we compare changes in the likelihood of a common VC investor using the same treated states but placebo treatment dates. First, we randomly assign a treatment date that is more than 5 years before or after its actual treatment. Second, we compare changes in the likelihood of a common VC investor using a placebo group of states that do not allow for COWs as treated states. For this exercise, we exclude treated startups. Then, among the remaining nontreated startups, we select a new set of eight states to serve as our placebo treatment group. The placebo treatment states include California, New York, Connecticut, Colorado, Indiana, Illinois, Arizona, Georgia, and Oregon. The placebo treatment group is deliberately similar to the actual treated states in terms of size and entrepreneurial activity. As shown in Table D.8, for both of these tests, we find statistically and economically insignificant changes in the likelihood of a common VC investor and total common VC investors.

[13] In Table D.7, we also rerun the empirical tests but include only the startups that are not headquartered in their state of incorporation and are not headquartered in Delaware. Our findings remain largely the same, even with our small sample size of 4,571 observations.

Table 4
Common venture capital investments (alternative samples)

	Any common VC investments		Total common VC investments	
A: DE, CA, MA, and NY	(1)	(2)	(3)	(4)
Treat × Post	0.122***	0.091***	0.193**	0.128**
	(0.014)	(0.005)	(0.035)	(0.026)
Treat × Post after 5 years		0.053**		0.107***
		(0.013)		(0.010)
Adjusted R^2 (%)	69.0	69.5	81.6	83.0
Number of observations	123,327	122,435	123,327	122,435
Number of unique firms	13,512	13,421	13,512	13,421
B: Not first incorporated in DE	(1)	(2)	(3)	(4)
Treat × Post	0.121***	0.071***	0.199***	0.096**
	(0.020)	(0.024)	(0.051)	(0.041)
Treat × Post after 5 years		0.088***		0.179***
		(0.024)		(0.029)
Adjusted R^2 (%)	70.5	71.4	78.7	80.8
Additional controls	Yes	Yes	Yes	Yes
Startup fixed effects	Yes	Yes	Yes	Yes
VC investor fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
HQ-state-by-industry-by-year fixed effects	No	Yes	No	Yes
Industry-by-year fixed effects	No	Yes	No	Yes
Number of observations	47,739	47,350	47,739	47,350
Number of unique startups	4,109	4,083	4,109	4,083

This table presents the results from difference-in-differences regressions that exploit the staggered adoption of state legislation permitting corporate opportunity waivers (COWs). In panel A, the sample is limited to startups incorporated in Delaware, California, Massachusetts, and New York. In panel B, the sample is limited to startups that do not first incorporate in Delaware. In columns 1 and 2, the dependent variable is an indicator variable for whether a startup has a VC investor that commonly invests in another startup within the same industry. In columns 3 and 4, the dependent variable is the natural log of the total number of common VC investments that startup has. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. For the dependent variables, industry is defined based on Preqin's primary and subindustry classification. For the industry fixed effects, the adjusted primary industry classification, which is coarser than the primary industry classification, is used. Robust standard errors clustered by state of incorporation. $*p<.1$; $**p<.05$; $***p<.01$

Next, we present visual evidence to assess whether the results are driven by preexisting differential trends or are biased due to effects that may be developing slowly over time. In Figure 1, we show the dynamic coefficient estimates equivalent to specification (2) with the startup and year fixed effects. The figures show a window spanning from 5 years before the law changes to 10 years after the law changes. The straight lines represent 90% confidence intervals. The figures plot the coefficients when any common VC investor is the dependent variable. The figure on the left represents the full sample and the figure on the right focuses on the high entrepreneurship states. We acknowledge that there seems to be a trend upwards in common VC investment in the years leading up to the adoption of COW laws. On the other hand, in all 5 years prior to treatment, including 2 and 1 years prior to the law change, the coefficient estimates are relatively flat and close to zero, while in the 5 years after treatment the coefficient estimates are positive and substantially higher.

In the Internet Appendix, we show additional visual evidence of increases in the rates of startups with a common VC investor for treated states. Figure D.2 shows the raw trends in rates of startups with a common VC investor over time for entrepreneurial states, namely, Delaware, California, Massachusetts, and New York. Among these states, only Delaware adopted the COW law. While both Delaware and the other states trend upward, there is a meaningful jump for Delaware relative to the other states following the law change. Accordingly, while there seems to be a slight pre-trend in common VC investment, the jump in common VC investment is substantially larger for treated startups.

Finally, in Table D.9, we show robustness results that (a) exclude software startups after 2006 that may have attracted more VC capital due to the "spray and pray" investment that proliferated after the introduction of Cloud computing (Ewens, Nanda, and Rhodes-Kropf 2018), (b) exclude the years of the bursting of the dot-com bubble, and (c) exclude the years of the 2007-2009 financial crisis. In each case, the statistical inferences are similar to those based in our main specifications.

6.2 Directors as a mechanism for information coordination

Having shown evidence consistent with the law changes having a positive association with common VC investment, we next explore accompanying board seats, a key mechanism for facilitating information sharing among startups. In 2, we examine the dynamic patterns associated with the COW laws and within-industry VC directorships. The coefficient estimates are relatively flat and close to zero before the law changes. After the adoption of the COW laws, within-industry director appointments are more likely. The reaction is relatively slow when examining the entire sample (the figure on the left), yet it is relatively faster and still gradually increasing when focusing on the highly entrepreneurial states (the figure on the right). Because director appointments take time, it is not surprising that the effect of the laws is not immediate. Overall, the figures suggest that the within-industry directorships increased after the law changes and that startups in both treated and control states followed parallel trends prior to the law changes.[14]

In the main test, we examine the relationship between common ownership and directorships using the IV regressions. We instrument for common ownership using an indicator that equals one if the startup is incorporated in a treated state after the law change. As expected, the t-statistic on the instrument is highly significant and the F-statistic from the first stage of the IV regression exceeds the required threshold for making valid inferences (Lee et al. 2022).

Panel A of Table 5 shows that startups with a common VC investor have 1.8 more VC directors on the board. In panels B and C of Table 5, we turn to

[14] In Figures G.4 and G.5, we should similar dynamic effects for all directorships and all VC directorships.

Table 5
Common venture capital investments and the board of directors

A: VC director	(1)	(2)	(3)	(4)	(5)	(6)
Any common VC investment	1.792***	1.763***	1.645***			
	(0.363)	(0.392)	(0.384)			
Total common VC investments				1.258***	1.249***	1.160***
				(0.279)	(0.298)	(0.287)
B: VC director with additional directorships						
Any common VC investment	1.850***	1.915***	1.730***			
	(0.592)	(0.629)	(0.615)			
Total common VC investments				1.299***	1.357***	1.220***
				(0.422)	(0.448)	(0.433)
C: VC director with additional within-industry directorships						
Any common VC investment	0.702***	0.475**	0.416*			
	(0.240)	(0.236)	(0.232)			
Total common VC investments				0.493***	0.337**	0.293*
				(0.168)	(0.163)	(0.159)
First-stage F-statistic	130.4	127.7	136.0	48.7	49.2	52.1
t-statistic on instrument	11.42	11.30	11.66	6.98	7.01	7.22
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Startup fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC investor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	No	Yes	No	No
HQ-state-by-year fixed effects	No	Yes	No	No	Yes	No
Industry-by-year fixed effects	No	Yes	No	No	Yes	No
HQ-state-by-industry-by-year fixed effects	No	No	Yes	No	No	Yes
Observations	100,893	100,310	98,639	100,893	100,310	98,639
Number of unique startups	10,264	10,206	10,119	10,264	10,206	10,119

This table presents results from instrumental variable (IV) regressions examining the type of directorships held at startups with common owners. The key explanatory variable is common venture capital (VC) investment and the instrument is an indicator variable for if a startup is incorporated in a state that permits corporate opportunity waivers (COWs). In columns 1 and 2, any common VC investment is an indicator variable for whether a startup has a VC investor that commonly invests in another startup within the same industry, and in columns 3 and 4 total common VC investments is defined as the natural logarithm of the total number of common VC investors. In panel A, the dependent variable is VC directorships, defined as the total number of directorships held by VC lead partners or VC board representatives in the startup board. In panel B, the dependent variable is the average number of other directorships that are held by VC fund leaders. In panel C, the dependent variable is the average number of within-industry directorships held by VC fund leaders. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. Industry for common ownership is defined based on Preqin's primary and subindustry classification. Robust standard errors are clustered by startup and adjusted for small clusters. The first-stage F-statistic is the Kleibergen-Paap Wald statistic. $*p<.1$; $**p<.05$; $***p<.01$

other measures of director thickness. These results suggest that common VC investment is associated with having VC directors serve on another startup's board. For example, column 1 of panel B shows that the startups with a common VC investor have VC directors that sit on the board of 1.9 additional startups, on average, and 0.7 additional startups within the same industry. These results are statistically significant and robust to the inclusion of different fixed effects as shown in columns 2 and 3. Columns 4 through 6 examine the total number of common VC investors to help understand incremental changes in common VC investment. These results suggest that a 50% increase in common VC investment is associated with 0.58-0.63 more VC directors, with a network that includes 0.65 more directorships and 0.15-0.25 more directorships at startups within the same industry.

In conclusion, our analyses of VC directorships suggests that startups with greater common VC investors are associated with a rise in the number of well-connected VC board representatives. These findings uncover a mechanism through which VC investors acquire information on startups' aptitudes and may allocate business opportunities among their portfolio companies.

6.3 Startup growth

We explore the relationship between common VC investment and startup growth using the IV strategy. As shown in Panel A of Table 6, greater common VC investment is associated with about one additional round of financing. The increase in financing rounds is statistically significant at the 1% level and represents an economically meaningful magnitude given that the median number of financing rounds is two. In columns 4 through 6, the independent variable is the log of the total number of common VC investors. For these tests, the point estimate suggests that a 10% increase in common VC investment is associated with between a 7.6% and 8.8% increase in deal volume. In each regression, the t-statistic on the instrument is highly significant, and the F-statistic from the first stage of the IV regression is about 70 or above. Taken together, these initial results are consistent with positive economic outcomes associated with common VC investment.

The next set of tests evaluates how common VC investment may influence the types of deals made. In particular, we explore the heterogeneity underlying our previous result by looking at whether early or later rounds of financing are associated with common VC investment. Given that later-stage capital investments tend to be larger and have more investors in order to meet the higher capital needs of more mature entrepreneurial firms, we would expect to see more deals in later rounds and larger deals if there are real economic benefits for startups. It is possible, however, that after early investments, the directors divert opportunities to other startups that they work with, thereby reducing the overall likelihood of a startup receiving late-stage financing and resulting in startups receiving smaller deals.

Panel B of Table 6 reports the results of the financing round tests. We find a positive relationship between common VC investment and receiving later-stage financing from VC firms. As shown in column 1, common VC investment is associated with 0.24 additional rounds of late-stage financing, on average. In this case, a 10% increase in common VC investment is associated with a 1.6% to 1.9% increase in late-round financing as shown in columns 4 through 6. All results are significant at the 1 percent level.

Table 6
Common venture capital investments and Deals

A: VC deal count	(1)	(2)	(3)	(4)	(5)	(6)
Any common VC investment	1.143***	1.307***	1.327***			
	(0.102)	(0.115)	(0.114)			
Total common VC investments				0.762***	0.866***	0.884***
				(0.093)	(0.103)	(0.104)
B: Late-stage deal count						
Any common VC investment	0.241***	0.270***	0.291***			
	(0.046)	(0.050)	(0.050)			
Total common VC investments				0.161***	0.179***	0.194***
				(0.033)	(0.036)	(0.036)
C: Deal value						
Any common VC investment	1.987***	2.222***	2.268***			
	(0.201)	(0.220)	(0.220)			
Total common VC investments				1.325***	1.472***	1.512***
				(0.173)	(0.188)	(0.190)
First-stage F-statistic	154.8	147.7	155.1	69.5	71.4	72.3
t-statistic on instrument	12.44	12.15	12.45	8.33	8.45	8.50
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Startup fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC investor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	No	Yes	No	No
HQ-state-by-year fixed effects	No	Yes	No	No	Yes	No
Industry-by-year fixed effects	No	Yes	No	No	Yes	No
HQ-state-by-industry-by-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	142,174	141,296	139,559	142,174	141,296	139,559
Number of unique startups	14,991	14,896	14,794	14,991	14,896	14,794

This table presents results from instrumental variable (IV) regressions examining VC financing outcomes for startups with common VC investments. The key explanatory variable is common VC investment and the instrument is an indicator for if a startup is incorporated in a state that permits corporate opportunity waivers (COWs). In columns 1 through 3, any common VC investment is an indicator variable for whether a startup has a VC investor that commonly owns another startup within the same industry, and in columns 4 through 6 total common VC investment is defined as the natural log of the total number of common VC investments. In Panel A, the dependent variable is deal volume, which is defined as any VC equity financing deal a firm receives in a given year. In panel B, the dependent variable is late-round VC deal volume, which is defined as a round of equity VC financing that is later than the seed or first round. In Panel C, the dependent variable is deal value, defined as the natural log of one plus the deal value in millions of 2010 dollars. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. Industry for common ownership is defined based on Preqin's primary and subindustry classification. Robust standard errors are clustered by startup and adjusted for small clusters. The first-stage F-statistic is the Kleibergen-Paap Wald statistic. $*p<.1$; $**p<.05$; $***p<.01$

In panel C of Table 6, we consider deal size. The dependent variable is the log of one plus the deal value in millions of 2010 dollars. The coefficient estimates suggest that, on average, common VC investment is associated with a larger deal volume. The elasticity estimated in column 4 suggests that a 10% increase in common VC investment would yield a 13.3% increase in deal size.

Given that the increase in deal size could stem from these startups being forced to wait longer between rounds as part of a holdup by some VC investors, we evaluate the time between financing rounds. Because the sample size is limited since few startups receive multiple rounds of financing, we perform this

Table 7
Venture capital funds' return distributions

Dependent variable = return quartile, where 4 indicates best returns	(1)	(2)	(3)
Percent of portfolio startups that are treated	0.464***		
	(0.093)		
Percent of portfolio startups that have common VC investment		0.417***	
		(0.075)	
Average number of common VC investments across portfolio startups			0.116***
			(0.025)
Additional controls	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Adjusted R^2 (%)	1.9	2.1	1.8
Number of observations	3,452	3,452	3,452
Number of unique VCs	381	381	381

This table tests whether VC funds' portfolios of startups achieve higher returns when common ownership is greater. The dependent variable is the return quartile, where four indicates best returns. All returns are benchmarked against an appropriate index (e.g., early-stage, general venture). Common VC investment is proxied for using the percentage of portfolio companies that are treated. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. Robust standard errors are reported. $*p<.1$; $**p<.05$; $***p<.01$

test using the difference-in-differences framework. As reported in Table G.4, we find no evidence of delays in financing.

Thus, overall, the results on deal size and timing are consistent with the notion that common VC investment has positive economic benefits.

6.4 VC funds' returns and startups' exits

Although the startup growth results suggest that common VC investment could help create value for startups, they are also potentially consistent with VC investors with greater common ownership maximizing their overall portfolio return by providing advantages to few startups at the expense of other startups in their portfolios. To disentangle these two alternatives, we evaluate real effects by examining the performance of VC funds with greater common VC investment. Following this, we proceed to evaluate startup exits and IPO valuations for portfolio companies.

Table 7 examines the performance of VC portfolios as a whole. For these regressions, the dependent variable is the quartile of the VCs' returns in a given year, and the focal explanatory variables are either the percentage of startups that are in treated states or the percentage of startups in the portfolio that are held by the same VC investor. In each case, we find a significant and positive relationship between attributes associated with common VC investment and greater VC portfolio returns. Note, however, that because most VC investors do not disclose the returns they achieve, the sample size is relatively small, with only 381 unique VC investors and 3,452 VC-year observations. At any rate, the results are significant and suggest that common VC investment benefits VC investors.

Table 8
Common venture capital investments and startup exits

A: Initial public offering (IPO)	(1)	(2)	(3)	(4)	(5)	(6)
Any common VC investment	0.037***	0.039***	0.042***			
	(0.005)	(0.006)	(0.007)			
Total common VC investments				0.018***	0.021***	0.023***
				(0.003)	(0.004)	(0.004)
B: Sale						
Any common VC investment	0.021*	0.029**	0.027*			
	(0.012)	(0.014)	(0.014)			
Total common VC investments				0.010*	0.016**	0.015*
				(0.006)	(0.008)	(0.008)
C: Failure						
Any common VC investment	−0.125***	−0.158***	−0.165***			
	(0.018)	(0.023)	(0.024)			
Total common VC investments				−0.061***	−0.087***	−0.090***
				(0.009)	(0.013)	(0.013)
First-stage F-statistic	185.1	144.7	140.4	153.4	101.6	99.5
t-statistic on instrument	13.60	12.03	11.85	12.38	10.08	9.97
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
VC investor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	No	Yes	No	No
Industry-by-year fixed effects	No	Yes	No	No	Yes	No
HQ-state-by-year fixed effects	No	Yes	No	No	Yes	No
HQ-state-by-industry-by-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	142,174	141,296	139,565	42,174	141,296	139,565
Number of unique startups	14,991	14,896	14,799	14,991	14,896	14,799

This table presents results from instrumental variable (IV) regressions examining startup exits and common ownership. The key explanatory variable is common VC investment and the instrument is an indicator for if a startup is incorporated in a state that permits corporate opportunity waivers (COWs). In columns 1 and 2, any common VC investment is an indicator variable for whether a startup has a VC investor that commonly owns another startup within the same industry, and in columns 3 and 4 total common VC investment is defined as the natural log of the total number of common VC investments. The dependent variable in panel A is an indicator for whether a firm undergoes an IPO, in panel B the dependent variable is an indicator for a sale, in panel C the dependent variable is an indicator for whether the startup fails. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. Industry for common ownership is defined based on Preqin's primary and subindustry classification. Robust standard errors are clustered by startup and adjusted for small clusters. The first-stage F-statistic is the Kleibergen-Paap Wald statistic. $*p<.1$; $**p<.05$; $***p<.01$

We now turn to examine startup exits. Table 8 evaluates startup exits. Our results in panel A of Table 8 suggest that common VC investment is associated with about 3.7-percentage-points higher probability of IPOs, which is significant at the 1% level. The economic magnitude is large given that about 6% of the startups in the sample undergo an IPO. Next, we evaluate sales in panel B of Table 8. We show that common VC investment is associated with a 2.1-percentage-point higher probability of sale, which is significant at 10% level. Finally, in panel C of Table 8, we show a lower probability of failure for commonly held startups, which suggests that common VC investment even helps those firms at the bottom of the distribution. Having a common VC

Table 9
Initial public offering valuation

A: $\left(\frac{P}{V}\right)_{Sales}$	(1)
Treat	−0.024
	(0.026)
Treat × Post	0.044*
	(0.024)
R^2 (%)	7.84
Number of observations	570
B: $\left(\frac{P}{V}\right)_{EBITDA}$	
Treat	−0.008**
	(0.004)
Treat × Post	0.019**
	(0.008)
R^2 (%)	3.04
Number of observations	577
C: $\left(\frac{P}{V}\right)_{Earnings}$	
Treat	−0.006
	(0.007)
Treat × Post	0.064**
	(0.022)
R^2 (%)	2.13
Year fixed effects	Yes
Industry fixed effects	Yes
Number of observations	618

This table presents the results from difference-in-differences regressions that exploit the staggered adoption of state legislation permitting corporate opportunity waivers (COWs). In each panel, the dependent variable is the standardized ratio of the IPO offer price relative to the intrinsic value of the firm. The ratios are calculated using the method outlined in Section 3.9 that adjusts each ratio using an annual set of matched public firms. In panel A, the multiple is the price-to-sales ratio, in panel B the multiple is the price-to-earnings-before-interest-tax-depreciation-and-amortization ratio, and in panel C the multiple is the price-to-earnings ratio. All specifications include year and two-digit SIC industry fixed effects. Robust standard errors are clustered by state of incorporation. $*p<.1$; $**p<.05$; $***p<.01$

investor is associated with a 12.5-percentage-point decrease in the probability of failure and is significant at the 1% level.

We further investigate IPOs by examining IPO valuations. Given that a single IPO produces outsized returns for a fund, we examine the extent to which a treated startup receives a favorable valuation at its IPO in Table 9. While we do not have a large enough sample to pass weak instrument tests, we can still implement the difference-in-differences design. Using the standard difference-in-differences design, we examine three different valuation methods based on the IPO proceeds divided by three different accounting measures (sales, EBITDA, and earnings) as compared to matched non-IPO firms. We find that the treated firms, on average, receive more favorable valuations. For example, as reported in panel C, treated startups have a price-to-earnings ratio that is 6% higher than that of control firms.

In summary, while we find that VC funds that invest more in treated startups significantly outperform their benchmark index, startups benefit too. The rate of IPO exit for startups with higher rates of common VC investment is greater, and we have some suggestive evidence that their valuations are more favorable when they undergo an IPO. Similarly, we find that the VC investors with more common VC investments are able to shift some startups from failure and low-return multiples to higher multiples, likely via sales to would-be acquirers. Taken together, this evidence suggests that the accumulated information and expertise of VC investors who invest in startups within the same industry enables them to better allocate resources and opportunities among startups, and there is no evidence that they advantage one startup over another.

6.5 Informational spillovers and directors networks

We document a pattern consistent with common VC investment facilitating startup growth, but it is also essential to establish the mechanism through which common VC investment affects startup outcomes. As discussed above, prior studies of common VC investment do not provide evidence of a mechanism or a channel for information sharing (Lindsey 2008, Gonzalez-Uribe 2020). Incidentally, there is a debate as to whether common ownership of public firms is consequential for firm outcomes, in large part because there is skepticism about institutional investors' ability to affect firms' management (Lewellen and Lowry 2021, Eldar and Grennan 2021). In the context of startups, however, given the central role of VCs and their director representatives in managing startups, it is reasonable to hypothesize that common VC investment facilitates informational spillovers through director networks.

In Table 10, we consider a potential direct channel through which common VC investment generates informational exchanges, namely through sales to startups that have a common VC investor. As shown in column 1, there is a 0.8-percentage-point higher likelihood of a sale to a startup with a common VC investor. This result is significant at the 10% level and is conditional on the many controls for startup characteristics and VC reputation. The finding of a higher likelihood of a sale is significant in three out of four specifications but is not statistically significant when we add VC fixed effects. This is not surprising given the variation in the data. To the extent that there are few such acquisitions (e.g., one such acquisition per VC), or if all of these are done by a small set of big VCs, one would expect the VC fixed effects to absorb the variation. Thus, we believe that the results suggest that common VC investment facilitates sales to commonly held startups.

Next, we inquire whether the benefits associated with common VC investment are driven by director networks. In panels A and B of Table 11, we compare the characteristics of VC directors for startup growth and exits relative to those that do not raise additional financing or exit. We observe that having more VC directors, especially those with additional directorships, is associated with more growth and successful exits. Consistent with directors facilitating information flows, startups acquired by startups with a VC investor in common also have the most well-connected directors. While they do not

Table 10
Common venture capital investments and common acquisitions

	Dep. var. = Acquired by a common VC investment			
A. Any common VC investment	(1)	(2)	(3)	(4)
Any common VC investment	0.008*	0.010*	0.009*	0.000
	(0.004)	(0.005)	(0.005)	(0.005)
First-stage F-statistic	272.6	213.2	202.1	185.1
t-statistic on instrument	16.51	14.60	14.22	13.60
B. Total common VC investments				
Total common VC investments	0.003*	0.005*	0.004*	0.000
	(0.002)	(0.002)	(0.003)	(0.003)
First-stage F-statistic	262.3	176.8	165.8	153.4
t-statistic on instrument	16.20	13.30	12.87	12.38
Additional controls	Yes	Yes	Yes	Yes
VC investor fixed effects	No	No	No	Yes
Year fixed effects	Yes	No	No	Yes
Industry-by-year fixed effects	No	Yes	No	No
HQ-state-by-year fixed effects	No	Yes	No	No
HQ-state-by-industry-by-year fixed effects	No	No	Yes	No
Number of observations	142,174	141,296	139,565	142,174
Number of unique startups	14,991	14,896	14,799	14,991

This table presents results from instrumental variable (IV) regressions examining acquisitions by a firm with a common VC investor. The key explanatory variable is common VC investment and the instrument is an indicator for if a startup is incorporated in a state that permits corporate opportunity waivers (COWs). In panel A the explanatory variable of interest is any common VC investment, an indicator variable for whether a startup has a VC investor that commonly owns another startup within the same industry. In panel B, the explanatory variable of interest is total common VC investment, defined as the natural log of the total number of common VC investments. The dependent variable is an indicator for a sale to a firm with a common VC investment. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. Industry for common ownership is defined based on Preqin's primary and subindustry classification. Robust standard errors are clustered by startup and adjusted for small clusters. The first-stage F-statistic is the Kleibergen-Paap Wald statistic. $*p<.1$; $**p<.05$; $***p<.01$

have the largest number of VC directors, their VC directors have 5.7 additional directorships on average. The summary statistics are similarly higher for IPOs and sales.

In panels C and D of Table 11, we run subsample tests based on director characteristics. Specifically, we restrict the sample to the startups without a VC director, with a VC director, and with a common VC director, which we define as having at least one additional VC directorship, and compare the startup exits. In panel C, we find that common ownership facilitates more late-stage investment and greater deal amounts when the startup has a VC director (columns 2 and 5) than startups with no VC directors (columns 1 and 4), and these results are even stronger when the director is a common director (columns 3 and 6).

We find similar patterns when considering IPOs and failures. We find no relationship between common VC investment and an IPO or failure for startups without VC directors. In contrast, for the startups with VC directors, we find higher probabilities of IPOs and lower probabilities of failure. When we restrict the sample even further to common VC directors, the estimated relationships are even larger.

Table 11
Directors and startup exits

A: VC directors by VC deal outcomes	Any round No (1)	Any round Yes (2)	Late stage No (3)	Late stage Yes (4)
VC directors	1.56	2.16	1.57	2.87
Common VC directors	2.34	3.06	2.41	3.46

B: VC directors by startup exit	IPOs No (1)	IPOs Yes (2)	Sale No (3)	Sale Yes (4)	Common Acq. No (5)	Common Acq. Yes (6)	Failures No (7)	Failures Yes (8)
VC directors	1.71	4.16	1.69	2.78	1.72	2.59	1.70	2.49
Common VC directors	2.53	3.41	2.48	4.42	2.52	5.69	2.48	4.00

	Dep. var = Late stage			Dep. var = Deal amount		
C: VC deal outcomes	No VC director (1)	VC director (2)	Common VC director (3)	No VC director (4)	VC director (5)	Common VC director (6)
Any common VC investment	0.106***	0.664***	0.864***	1.328***	3.194***	4.395***
	(0.037)	(0.179)	(0.322)	(0.156)	(0.778)	(1.503)
First-stage F-statistic	117.9	20.3	9.4	117.9	20.3	9.4
Number of observations	35,225	64,860	54,549	35,225	64,860	54,549
Includes additional controls, VC, industry-by-year and headquarter-state-by-year fixed effects						

	Dep var. = IPO			Dep var. = Failure		
D: Startup exits	No VC director (1)	VC director (2)	Common VC director (3)	No VC director (4)	VC director (5)	Common VC director (6)
Any common VC investment	0.013*	0.132***	0.205***	0.000	−0.423***	−0.639***
	(0.007)	(0.036)	(0.074)	(0.000)	(0.106)	(0.222)
First-stage F-statistic	144.0	27.1	13.5	144.0	27.1	13.5
Number of observations	76,280	64,860	54,549	76,280	64,860	54,549
Includes additional controls, VC, industry-by-year and headquarter-state-by-year fixed effects						

This table examines the relationship between VC directorships and startup growth. Panels A and B show summary statistics for characteristics of VC directors by VC deal rounds and startup exit type, respectively. Panels C and D presents IV regression evidence on the relationship between common ownership and startup growth for subsamples of startups categorized by VC director characteristics. In columns 1 and 4, the sample is limited to startups with no VC directors, in columns 2 and 5 the sample is limited to startups with VC directors, and in columns 3 and 6 the sample is limited to startups with common VC directors, defined as directors that have at least one additional directorship. The explanatory variable is any common VC investment defined as an indicator variable for whether a startup has a VC investor that commonly owns another startup within the same industry. Additional control variables include total capital previously raised by the startup, the total number of rounds of capital previously raised, and averages for VC investors' reputation, age, size, fund number, total rounds of startup investment, total IPOs of startups invested in, percent of startups invested in with the same headquarter state as the VC, and percent of startups invested in with the same primary industry as any of the industries listed for a specific fund in Preqin. Robust standard errors are clustered by startup and adjusted for small clusters. $*p<.1$; $**p<.05$; $***p<.01$

Overall, these findings support the hypothesis that directors are a mechanism through which common ownership generates positive outcomes for startups.

6.6 Robustness tests and extensions

In Section A of the Internet Appendix, as part of the legal analysis, we run robustness tests that account for states' laws that permit firms to exempt directors from monetary liability for violating the duty of loyalty, which includes the corporate opportunity doctrine. Thus, it is possible that more states, such as Nevada and Virginia, should be included in our treatment group.

In these tests, the treatment is defined as the earlier of two types of legislation: the passage of COW legislation or statutes that permit broader exemption from liability for violating the duty of loyalty. We also account for differences in states' COW legislation. For example, the COW legislation in Nevada does not cover shareholders, and the legislation in Washington requires shareholder approval before adopting COWs (as opposed to merely board action as in other states). Thus, we examine regressions in which the treatment variable excludes Nevada and regressions in which the treatment variable excludes Washington. Across these tests, our estimates generate similar inferences to our main specifications.

In Section E of the Internet Appendix, we present several variations of our IV estimates analyses for VC directorships, deals, and startup exits. We include robustness checks that limit the sample to high entrepreneurial states and specifications that exclude firms initially incorporated in Delaware. Further, we present evidence for the subsamples that exclude the "spray and pray" investment strategy documented in Ewens, Nanda, and Rhodes-Kropf (2018), the bursting of the dot-com bubble, and the financial crisis. We also create a subsample where VCs have stronger bargaining power and are arguably less likely to benefit startups.[15] In each of these subsamples, the statistical inferences are similar to those based on our main specifications.

In Section F of the Internet Appendix, we use two recent advances in the literature on IV estimation to test and relax the exclusion restriction. First, following the approach in Angrist, Lavy, and Schlosser (2010), we find candidate subgroups of startups unlikely to comply with the instrument, and thus, for these subgroups, the first stage is very likely to be zero. Then, we examine whether the IV has a direct effect on startup outcomes for these zero-first-stage groups. We use two candidate subgroups. The first candidate subgroup consists of startups that had not raised financing in over 3 years prior to the law change, and the second candidate subgroup consists of startups from regulated industries and/or industries where the government may influence the ownership structure. Overall, the evidence is consistent with the IV having insignificant effects on startup outcomes for these zero-first-stage groups. This test suggests that the exclusion restriction is satisfied. As a second step, we follow the literature on plausibly exogenous IV estimation (Conley, Hansen, and Rossi 2012, Imbens and Rubin 2015, Kippersluis and Rietveld 2018), and we relax the exclusion restriction assumption associated with the IV. We show that a plausibly exogenous IV still results in statistical inferences consistent with a positive relationship between common VC investment and directorships, deal count, deal value, IPOs, and failures.

15 We exclude startups for which the common VC investor first invests in the startup in a later round, when the startup is more mature and the founder may have more power.

In Section G of the Internet Appendix, we present additional parallel trend figures and the reduced-form difference-in-differences analyses for VC directorships, deals, and startup exits. The figures show no evidence of secular trends prior to treatment. For some of the outcomes, noise in the post-period suggests the need for strategies like the instrument to help isolate the quasi-random variation. The reduced-form evidence consistently shows a strong statistical relationship between the instrument and startup outcomes. In this Internet Appendix, we also include robustness checks of the reduced form results, including those that limit the sample to high entrepreneurial states and that exclude firms originally incorporated in Delaware. Further, we present reduced-form evidence for the subsamples that exclude the "spray and pray" investment strategies (Ewens, Nanda, and Rhodes-Kropf 2018), the bursting of the dot-com bubble, and the financial crisis. In all the specifications, the instrument is statistically significantly related to these outcomes.

In Section H of the Internet Appendix, we more fully address the concern regarding any potential pre-trends by extending our analysis to a matching framework. We present estimates from propensity score and Mahalanobis nearest neighbors matching techniques. We focus on startups incorporated in the highly entrepreneurial states of Delaware, California, Massachusetts, and New York. The rationale is that startups in these states are likely to be a better match for one another. We evaluate the matching results based on a composite index of pre-treatment startup and VC characteristics. The matching exercises help to select the best comparison control group for the sample of treated startups. Using 18 alternative matching approaches, we find no evidence to contradict our main findings. In some cases, the economic magnitude of the point estimates is smaller, but in all cases, the inferences are similar to those in the main results.

In Section I of the Internet Appendix, we consider whether our estimates may change conditional on the lifecycle of the startup. Favoritism may be a more salient concern early in the life of a startup. To address this possibility, we consider three thresholds for including startups in the sample based on the dollar value of VC investments (\$10, \$15, and \$25 million) and three thresholds relating to the age of the startup (8, 10, and 15 years). We do not find any evidence that the dollar value meaningfully changes our inferences. We do see some evidence that only including young startups mutes the magnitude of the positive benefits from common VC investment, but this is likely mechanical as few startups succeed early in their lifecycle.

In Section J of the Internet Appendix, we conduct several industry analyses. First, we address the concern that the main results are driven by VCs' industry specialization. We show that over the sample period, the average number of industries VCs invested in increased, suggesting that VCs actually became less specialized. Second, we evaluate whether there may be more favoritism in industries with strong IP protection because IP may be used to protect market share and discourage innovation by other startups. While we find a stronger likelihood of an IPO in industries that have strong intellectual property (IP) protection (e.g., pharmaceuticals), there are also positive outcomes in industries with low IP protection. Third, we examine the informativeness of the Preqin industry definition by creating randomized placebo industries and recalculating the common VC investment using these placebo industries. We show that the increase in total common investment within industries was significantly larger than the increase in total common investments within the placebo industries following the adoption of COW laws.

Finally, in Section K of the Internet Appendix, we explore the possibility that while common VC investment increases the average deal amounts and the number of deals, it may increase their variance.[16] We test the variance in outcomes for startups by recasting our main indicator variables into an ordinal variable where values range from failure all the way up to IPO. Although our results are suggestive, we find no evidence of an increase in variance. Thus, the observed positive relationship between common VC investment and startup outcomes does not appear to come with greater risk.

7. Conclusion

We show that investment in startups within the same industry is pervasive in VC portfolios, and we investigate the extent to which such common industry investment may add value to startups beyond the funding provided by the VCs. Prior literature shows that startups in the same VC portfolio benefit from greater opportunities to form strategic alliances and innovation spillovers across startups held by the same VC investor (Lindsey 2008, Gonzalez-Uribe 2020).

Nonetheless, there are lingering concerns that VCs may disproportionately favor certain startups over others (Fried and Ganor 2006, Somerville 2015). The key economic tension centers on how opportunities for information sharing brought about by common VC investors are associated with startup performance. VCs can play favorites with their commonly held startups, maximizing the returns of one startup at the expense of another. On the other hand, information sharing creates opportunities for VCs to generate positive spillovers among startups.

Using a novel, quasi-experimental design based on legal changes that facilitate common VC investment, the findings in this study suggest that common VC investment across industries is associated with positive outcomes for startups. Examining a broad set of important outcomes, our evidence suggests that startups with common VC investors raise more capital through more rounds of investment; they are more likely to exit through an IPO at a higher valuation; and they are less likely to fail. These results support the

[16] Note that it is not possible to examine the variance of outcomes variables that are dummy variables, and, therefore, this analysis is limited to continuous outcome variables.

hypothesis that across a broad array of industries, common VC investments help the startups in which they invest.

Importantly, we show that common VC investment is associated with more directorships for VC investors and a thickening of those directors' overall networks, especially at startups in the same industry. Our evidence of a link between VC directorships at other startups and a greater probability of IPOs and a lower probability of failures suggests that directors are a key mechanism through which information spillovers could facilitate the efficient allocation of resources among startups.

In summary, our identification strategy based on narrowly defined legal changes that facilitate common VC investment, coupled with an examination of a comprehensive set of startup outcomes, and evidence of a plausible mechanism for informational exchanges, suggest that common VC investment is beneficial.

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