Tax Incentives and Venture Capital Risk-Taking*

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Abstract

Can tax subsidies prompt investors to fund riskier ventures? We answer this question under a framework in which venture capitalists (VCs) combine outside funding with incentive-based compensation and study a policy change that eliminated capital gains taxes on certain startup investments. Using bunching methods, regression discontinuity designs, and a triple-differences design exploiting industry eligibility, investment year, and holding-period requirements, we analyze data from 158 thousand investor–firm pairings over two decades. We first identify strategic investment timing, with tax subsidies prompting concentration at required holding-period thresholds. We then document strategic capital allocation, with investments just below the eligibility threshold receiving more follow-on funding than those just above. More notably, when and where tax subsidies apply, VCs shift their project selection toward riskier ventures: they increase investments in pre-commercial stage startups and in firms carrying pre-existing debt. They also become more likely to invest across state lines and provide a company's first capital, while becoming less likely to syndicate investments. In turn, their portfolio companies show higher failure rates and greater multi-year funding gaps. The increased risk-taking also yields salient return outcomes: tax-subsidized VC-backed ventures attain higher valuations and are more likely to reach "unicorn status." None of these patterns are observed for comparable non-VC investors receiving the very same tax subsidies. Our study is the first to show that tax policy can shift entrepreneurial financing toward riskier, more experimental, valuable ventures, with outcomes shaped by investor organizational structure and incentives.

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1 Introduction

Young, entrepreneurial firms account for 20% of gross job creation and 26% of productivity growth in the U.S. economy (Haltiwanger et al. (2013); Akcigit and Kerr (2018)). They face severe financing challenges because capital market frictions such as information asymmetries and incomplete contracting impair risk-sharing between entrepreneurs and investors. These frictions lead to underinvestment in startups, particularly those pursuing business models perceived to be risky (Hall and Lerner (2010)).

Capital market frictions also create tensions in the design of tax policies meant to promote entrepreneurship. In the U.S., over 80% of the formal equity investment in startups is channeled through VC firms and angel investors (see NVCA (2025)). These investors overcome financing frictions by combining risky capital with intensive screening and monitoring. If tax incentives encourage investors to fund high-potential ventures—particularly at early stages where frictions are most severe—tax policies may reduce underinvestment. However, providing benefits to investors with high-risk tolerance and sophisticated capabilities may simply increase returns to their existing strategies without improving capital allocation to new ventures. The value of tax policies to entrepreneurial finance depends on whether they help overcome market frictions or merely create opportunities for tax arbitrage.

This paper examines how tax policy affects capital allocation and risk-taking in entrepreneurial markets. It does so by examining how different types of investors respond to tax subsidies. Our analysis addresses several questions. First, how do responses to tax subsidies vary across investors with different organizational structures and incentive schemes? In particular, are there differences between VCs that combine outside capital with incentive-based compensation and angel investors that use their own capital? Second, can tax incentives affect not only the level of investment but also investors' willingness to back riskier ventures? Third, through what mechanisms do these incentives operate? Do they only affect project selection? Or do they also affect how investors keep their portfolio companies?

We tackle these questions using a conceptual framework in which VCs combine outside capital with incentive-based compensation through carried interest. This risk-sharing structure creates convex, option-like payoffs that increase in value with venture return volatility and tax subsidies combined. Our framework generates testable predictions about taxes, investment thresholds, and risk-taking behavior. In contrast to angel investors that invest their own capital and corporate investors that are subject to a different tax regime, VCs significantly lower their investment thresholds when their investments qualify for high tax subsidies. Notably, this threshold effect emerges after explicitly accounting for general partners' (GPs') capital contribution to VC funds and reputation costs associated with their future fundraising capability. Lower investment thresholds then lead VCs to select new, marginal projects that are riskier—ventures with higher variance in potential outcomes that would likely otherwise go unfunded.

We test our model's predictions using the 2009-10 enhancement of the Qualified Small Business Stock (QSBS) program, which created significant discontinuities in tax benefits for certain startup investments. The QSBS is an ongoing subsidy program that provides capital gain tax benefits at both federal and state levels, currently costing over $3 billion in annual foregone tax revenues. As we explain in detail below, the program provides preferential tax treatment for investments in qualifying small businesses, subject to a mandatory five-year holding period requirement. Qualification is restricted to newly issued stock in C-corporations, with total assets below $50 million, and operating in sectors like technology and manufacturing but excluding service-based industries. Policy requirements intentionally concentrate benefits in certain capital-intensive sectors where financing frictions are more severe.

The American Recovery and Reinvestment Act (ARRA) of 2009 marked the first major change in the QSBS program, introducing a wedge in after-tax returns between qualified and non-qualified investments. Before 2009, QSBS-qualifying investments held for five years faced a 14% federal capital gain tax rate—originally designed to be half of the 28% long-term federal capital gain tax rate when introduced in 1993. As regular capital gains tax rates declined over time—falling to 15% in 2003—the net tax benefit of QSBS qualification dropped to just *one* percentage point. The 2009 reform increased the subsidy of QSBS-eligible investments to 75% of the regular rate. The Small Business Jobs Act (SBJA) of 2010 boosted this benefit by *fully eliminating* capital gains taxes on all QSBS-qualifying investments.

Our analysis leverages data from PitchBook, which tracks VC, angel, and corporate investments in startups. Based on QSBS's eligibility criteria, we construct a testing sample by following investor entries between 2004 and 2022, focusing on investments in C-corporations with initial funding rounds below $50 million. Using detailed investment-level data, we identify and track 39 thousand unique investors and 35 thousand unique portfolio companies, observing each investor–firm paring relationship from initial investment through exit. Our data allow for tests contrasting how VCs, angels, and corporate investors respond to tax incentives throughout the full investment lifecycle—from initial selection through valuation milestones, exit strategies (e.g., IPOs), and failures.

We begin by estimating the elasticity of investor responses to tax subsisies using bunching methods. In doing so, we analyze the extent to which investors cluster at the tax-subsidy required minimum investment holding period of five years. We identify significant bunching at this five-year mark for QSBS-eligible investments after the 2009 reform; a unique, salient effect that remains robust under both bootstrapped confidence intervals and partial identification bounds. To separate tax effects from other factors that might lead investors to prefer five-year holding periods, we implement a differences-in-bunching approach that compares eligible *versus* ineligible sectors and pre- *versus* post-reform periods. The results reveal that QSBS benefits generate a 2% increase in the mass of investors exiting *exactly* at the five-year holding threshold for *each* percentage point of tax subsidy *within* sectors QSBS benefits apply *after* 2009.

We next examine capital allocation responses to tax incentives using a regression discontinuity design (RDD) approach that exploits the eligibility cutoff at the QSBS program's $50 million asset threshold. Our analysis compares follow-on funding amounts (five years following the initial investment) for eligible-sector investments just below *versus* just above the asset threshold. Pre-2009 investments show no discontinuity around the threshold. In contrast, post-reform investments just above $50 million receive 31–67% less new funding than those just below. That is, once QSBS benefits were enhanced, investors committed significantly more capital to portfolio companies just meeting tax-subsidy eligibility.

We then examine how tax subsidies affect *new investment selection* using investor–firm level data in a difference-in-differences framework. The approach exploits variation in sector eligibility and investment timing around the 2009 QSBS reform, while controlling for investor, state–industry, and year fixed effects. We show that VCs select businesses with higher fundamental risk *when* and *where* tax benefits become available: as investments qualify for tax subsidies, VC investments in eligible sectors become 74% more likely to take place in pre-commercial stage startups—early development phases with highly uncertain viability. VCs also become 183% more likely to invest in firms carrying pre-existing debt, reflecting a willingness to accept greater financial risk. Additionally, VCs become 16% more likely to invest in states away from their domicile, where monitoring is costlier and information asymmetries are greater, and 6% more likely to enter new industries in which they have no previous track record. VCs also reduce their reliance on external certification and risk-sharing: they become twice as likely to provide a startup's first funding, and 20% less likely to participate in investment syndicates. In contrast, angel and corporate investors show no significant changes in their investment selection criteria along *any* of these dimensions associated with risk-taking in project selection.

Next, we ask whether risk-taking through investment selection translates into different performance outcomes and exit routes. In this analysis, we consider three key features of the QSBS program in a triple-differences research design: (1) industry eligibility criteria that create well-defined comparison groups; (2) the policy change that significantly increased tax subsidies; and (3) the mandatory five-year holding period. In other words, our tests compare changes in investment outcomes across eligible *versus* ineligible sectors, pre- *versus* post-tax-reform, and investments held for less *versus* more than five years. We note that this new set of tests provides for a *dynamic analysis of investor–firm relations* as we follow various outcomes over an entire span of nearly 20 years. In doing so, these new tests exploit several additional data features that help identify the causal effects of tax subsidies. Investor–firm fixed effects address assortative matching confounders, such as higher-quality VCs systematically selecting more promising startups. Year fixed effects control for aggregate changes in entrepreneurial finance markets. Investment holding-period fixed effects absorb any mechanical relationship between investment duration and outcomes. Year and holding-period fixed effects further control for vintage-specific shocks affecting investments initiated in a given year. Standard-error clustering at the investor level accounts for correlation in the residuals across different investments made by the same investor.[1]

These tests yield several new results. First, they show that VCs' shift toward riskier ventures leads to measurable consequences in investment outcomes. When their investments qualify for tax benefits, VC investments in ventures in eligible sectors experience a 71% higher rate of complete business failures relative to the baseline failure rate (failures occur in 2% of investor–firm–year observations, representing 22% of all exit events). These negative effects extend beyond outright failures: tax-advantaged VC investments are 169% more likely to experience extended periods (five or more years) without raising any new funding, a common predictor of distress in VC markets where successful firms typically raise capital every 12 to 18 months (see Gompers (1995)). These patterns are unique to VC-backed investments; angel and corporate investors do not experience increases in failure rates and funding shortages.

On the flip side, tax-advantaged investments return superior valuation outcomes among VC-backed companies. When VC investments qualify for tax subsidies, portfolio companies that achieve an

[1] We show in robustness checks that our results hold under several alternative error-clustering schemes.

exit see 131% higher valuations. The effect on extreme valuations is striking: VC-backed ventures are twice as likely to achieve unicorn status (valuations exceeding $1 billion), rising to four times as likely among those that exit. This valuation premium, combined with our findings on increased failure rates, suggests that tax subsidies prompt VCs to pursue more "high-risk–high-return" investment strategies. It is worth stressing that these outcomes are not observed for non-VC investors (angels and corporates), nor for ventures in which VCs invest for less than five years (even in tax-subsidy eligible sectors).

These risk-taking effects extend to systematic reallocation toward more innovative industries, even *within* QSBS-eligible sectors. Using patent-based innovation measures from Kogan et al. (2017), we document that VCs *increase* their targeting of scientifically and commercially innovative industries within eligible sectors while simultaneously *reducing* innovation-intensive investments in ineligible sectors. This "innovation transfer" effect suggests that tax benefits affect not only risk-taking but also concentrate the most experimental investments where tax subsidies apply.

Notably, most—but not all—state-level taxes conform with the federal QSBS benefits.[2] We take advantage of this heterogeneity to shore up our inferences. We start with a case study of California-based investors to characterize our results. California provided a 50% state-level QSBS exemption (as opposed to the federal 100%) before eliminating it in 2013, when a court ruled the benefit unconstitutional. California-based VCs' QSBS tax-advantaged investments were 160% more likely to fail than other comparable investments when state-level tax benefits were available. After the state eliminated its QSBS benefits, Californian VCs' QSBS-eligible investment failure rates were cut by two-thirds. These patterns extend beyond California. Eligible investments in QSBS-complying high capital gain tax states consistently show stronger risk-taking effects than those in low-tax states.

We further ask whether risk-taking responses to tax subsidies depend on VC firm characteristics and capital supply composition. We find that larger VC firms, which typically command higher carried interest fees (Robinson and Sensoy (2013)), exhibit significantly stronger risk-taking responses to tax subsidies. Additionally, we examine how the composition of VC limited partners (LPs) affects risk-taking responses. Using detailed fund-level LP composition data, we construct measures of "sophisticated" capital supply based on elite private university endowments, which maintain long-term

[2] The non-conforming states are: New Jersey, Pennsylvania, Mississippi, Alabama, California (after 2012), Utah (before 2016), and Massachusetts (before 2022).

horizons and professional investment capabilities (Lerner et al. (2007, 2008)). We find that VCs backed by sophisticated LPs exhibit dramatically stronger risk-taking responses: a 10 percentage point increase in elite private endowment LP share amplifies portfolio company failure rates by two to three times.

Our results contribute to research on the impact of tax policy on entrepreneurial activity. Tax policy is found to affect a range of corporate decisions, including capital structure (Lin and Flannery (2013)), investment behavior (Zwick and Mahon (2017)), plant relocation (Giroud and Rauh (2019)), and worker-skill hiring (Campello et al. (2025)). A significant body of research has examined state and local tax incentives (Chirinko and Wilson (2008); Curtis and Decker (2018); Fajgelbaum et al. (2019); Slattery and Zidar (2020)) and the effects of taxation on innovation (Akcigit et al. (2022)). Relatedly, studies of targeted incentives show that tax credits have positive effects when they directly support firm operations (Hall and Van Reenen (2000); Agrawal et al. (2020); Freedman et al. (2022)), though policies to promote entrepreneurship often face structural challenges (Lerner (2022)).

More recent papers examine policies targeting entrepreneurial investment. Abdulrauf et al. (2025) examine tax return data and find that exclusions of capital gains on QSBS have increased over the past decade. Gocmen et al. (2025) argue that high-net-worth individuals' growing participation in private capital markets has widened the income gap between wealthy individuals and other income earners. Edwards and Todtenhaupt (2020) study the impact of the 2010 SBJA on pre-IPO firms and report larger funding rounds for firms that had already raised funds; the authors look only at VC investments and do not consider whether tax changes affect investor selection or risk-taking behavior. Chen and Farre-Mensa (2023) document that the QSBS increased firm births (counts) and patenting in eligible sectors; their work focuses on aggregate entrepreneurship outcomes rather than investor-level risk-taking behavior and heterogeneity. Dimitrova and Eswar (2023) use staggered state-level capital gains tax changes to show that higher taxes reduce VC-backed firms' patent counts and citations. Denes et al. (2023) examine angel investor tax credits and find that while these programs increase angel investment activity, they fail to generate real economic effects; the authors do not consider whether tax incentives alter investment risk-taking strategies or how investor organizational structure affects responsiveness to tax policy. Among several other dimensions, we advance the literature by showing that tax policy can affect not just the level of entrepreneurial investment, but fundamentally alter how certain types of investors—chiefly VCs—deploy capital. We show that tax subsidies encourage greater risk-taking, leading certain types of investors to fund more experimental, valuable ventures that could otherwise go unfunded.

We also expand the literature by showing how organizational structure shapes responses of specialized entrepreneurial investment to tax subsidies. While prior studies have examined how the VC organizational form creates agency conflicts between GPs and LPs (Axelson et al. (2009, 2013); Chung et al. (2012)) and affects investment performance (Kaplan and Schoar (2005); Hochberg et al. (2007); Ewens and Rhodes-Kropf (2015)), the relationship between investment vehicle structure and tax policy responsiveness remains unexplored. We show that VCs' distinctive organizational structure—combining outside capital with incentive-based compensation—creates unique responses to tax benefits.

Our findings have important policy implications for entrepreneurial finance policy. Tax subsidies like the QSBS expand the frontier of venture investment by encouraging funding of marginally riskier ventures that would otherwise remain unfunded. This generates higher variance outcomes—both more failures and more breakthrough successes—suggesting tax benefits enable experimental, high-risk investments that drive social value. The concentrated effects among VC partnerships indicate that the institutional structure through which tax benefits flow critically shapes their economic impact.

The remainder of the paper is organized as follows. Section 2 presents our conceptual framework, Section 3 details institutional features of the QSBS program, and Section 4 describes our data sampling. Section 5 presents strategic timing and investment allocation analyses. After describing our empirical strategy in Section 6, we examine investment selection in Section 7 and present investment performance and exit channels in Section 8. We analyze industry-level innovation in Section 9 and study data heterogeneity in Section 10. Section 11 concludes.

2 Conceptual Framework

We develop a framework that explains why tax benefits have heterogeneous effects across investor types in entrepreneurial financial markets. Prior VC-related research has focused on dimensions such as LPs' capital supply, entrepreneurs' funding demand, and VCs' monitoring effort (e.g., Poterba 1989; Gompers and Lerner 1998; Keuschnigg and Nielsen 2003). We instead focus on the option-like incentives of GPs—the managers and decision-makers in VC funds—and extend the analysis to other major startup investors. The key insight is that VCs are the most responsive to tax benefits among startup investors. As we explain in detail below, because GPs deploy predominantly outside capital and are compensated through convex carried-interest contracts, capital gains subsidies lower their effective investment threshold far more than they do for angel or corporate investors.

2.1 Setup

Our framework is based on the standard real-options approach to investment under uncertainty (Pindyck (1988)). An investor can choose to invest in a project by providing capital I. Upon investment, the investor earns the cash flow X per unit of time, which evolves according to:

$$dX = \mu X dt + \sigma X dB - X dN, \tag{1}$$

where μ is a constant drift rate, σ is project volatility, B is a standard Brownian motion, and N a Poisson jump process with intensity η. The realization of N indicates that the profits X fall to zero. This formulation explicitly acknowledges that startups are not established firms with stable and predictable cash flows, but rather experimental ventures facing non-negligible probabilities of sudden business failure.[3] The investor is risk-neutral and applies the constant discount rate $r > \mu$.

The value of the underlying project is the present value of receiving X, given by:

$$V(X) = \frac{X}{r - \mu + \eta}. \tag{2}$$

The option value to fund the project is:

$$G(X) = \left(\frac{X^*}{r - \mu + \eta} - I \right) \left(\frac{X}{X^*} \right)^{\beta_+}, \tag{3}$$

where $\beta_+ > 1$ accounts for the risk of the project, and X^* ensures differentiability and is the optimal

[3] Another way to think of η is as a geometric depreciation rate that erodes the profitability of projects. Intuitively, η will raise the discount rate of future cash flows and make projects less viable. Given η, a project will last $\frac{1}{\eta}$ years on average. Empirically, Hall and Woodward (2010) document that the median lifetime of venture-backed startups is four years.

exercise threshold solving the smooth-pasting condition $G'(X^*) = V'(X^*)$, which implies:

$$X^* = \frac{\beta_+}{\beta_+ - 1}(r - \mu + \eta)I. \tag{4}$$

We extend this framework to account for the different payoff structures of VCs, angel investors, and corporate investors, which leads to heterogeneous responses to tax policy aiming to boost entrepreneurial financial markets. For a detailed derivation of these equations, see Appendix IA1.1.

2.2 Investor Types and Incentives

We consider three investor types: VCs, angels, and corporates. They account for over 80% of the funds invested in C-corporations under \$50 million in assets in our data; businesses that qualify for QSBS incentives. These investors differ in their capital sources, incentive structures, and tax treatment. We derive the payoff functions for each investor type and show how they respond to tax subsidies in turn.

2.2.1 Venture Capitalists

VCs make investment decisions based on broad investment theses that guide their capital allocation strategies, with project selection being their primary value-addition mechanism (Metrick and Yasuda (2021); Gompers et al. (2020)).[4] They combine management fees and carried interest in their compensation structure. Upon investment, the GPs of a VC fund earn the cash flow $\alpha I + (1 - \tau_K)\gamma \max\{X - h, 0\}$, where α is the management fee rate on committed capital I, τ_K is the effective tax rate on capital gains, γ is the rate of carried interest, and h is a hurdle rate—the rate below which GPs making decisions about investing do not receive carried interest compensation. The present value of this convex cash flow is:

$$V_{VC}(X) = \frac{\alpha I}{r + \eta} + (1 - \tau_K)\gamma \times \begin{cases} b_1 X^{\beta_+}, & X \leq h, \\ b_2 X^{\beta_-} + \dfrac{X}{r - \mu + \eta} - \dfrac{h}{r + \eta}, & X \geq h, \end{cases} \tag{5}$$

[4] Investment theses typically encompass sector focus, geographic preferences, stage specialization, and risk-return profiles that shape how VCs evaluate and select portfolio companies (Metrick and Yasuda (2021)). Survey evidence from 885 institutional venture capitalists shows that deal selection is rated as the most important of the three main value-creation activities, ahead of deal sourcing and post-investment value-added services (Gompers et al. (2020)).

where $\beta_{-} < 0$, b_1, and b_2 are constants that ensure the function's continuity and differentiability at $X = h$.

The optimal investment policy X^* for VCs uniquely solves the smooth-pasting condition:

$$(1-\tau_K)\gamma\left[b_2\frac{\beta_{+}-\beta_{-}}{\beta_{+}}(X^*)^{\beta_{-}}+\frac{\beta_{+}-1}{\beta_{+}(r-\mu+\eta)}X^*-\frac{h}{r+\eta}\right]+\frac{\alpha I}{r+\eta}-I=0 \tag{6}$$

We next account for GP's personal capital contributions (ωI) and reputation costs (φ). GPs of VC firms typically commit a small fraction of a fund's capital from their personal resources (median of 1%, as Robinson and Sensoy (2013) document), creating direct downside exposure beyond the carried interest incentive structure. GPs also face reputation costs as investment performance directly affects their ability to raise follow-on funds from LPs (Kaplan and Schoar (2005); Barber and Yasuda (2017)). Chung et al. (2012) formalize this mechanism, modeling how fund managers balance current fund risk-taking against expected lifetime earnings across multiple fund generations. For tractability, we model reputation costs as linear in investment size—which is without loss of generality as reputation costs enter the threshold condition additively rather than interacting with tax terms.[5] VCs' investment threshold becomes:

$$(1-\tau_K)\gamma\left[b_2\frac{\beta_{+}-\beta_{-}}{\beta_{+}}(X^*)^{\beta_{-}}+\frac{\beta_{+}-1}{\beta_{+}(r-\mu+\eta)}X^*-\frac{h}{r+\eta}\right]+\frac{\alpha I}{r+\eta}-\omega I-(1-\omega)I\varphi=0. \tag{7}$$

This condition determines the cash flow threshold X^* at which investment becomes optimal, with the tax rate τ_K directly affecting this threshold. VCs' payoff structure is call option-like due to the carried interest mechanism, which provides asymmetric returns with limited downside exposure and significant upside participation. Capital gains tax subsidies amplify this convexity by reducing the tax burden on gains, thereby steepening the non-linear payoff profile of the investment. Simply put, marginal gains increase disproportionately for GPs managing VC funds—making the upside even more attractive. VCs have strong incentives to invest in riskier ventures when receiving tax subsidies.

[5] Chung et al. (2012) documents a implicit to explicit pay-for-performance ratio of 0.18–0.44 for venture capitalists. In other words, for every dollar a GP earns through carried interest, they gain an additional 18–44 cents in career value through enhanced reputation and future fundraising ability. However, these reputation effects are asymmetric. Barber and Yasuda (2017) estimate how interim performance affects the probability of successfully raising follow-on funds. The authors find that escaping poor performance (moving from 4^{th} to 3^{rd} quartile) increases fundraising probability by 1.3 units, while achieving exceptional performance (moving from 2^{nd} to 1^{st} quartile) increases it by only 0.4 units. These results imply that negative reputation effects from underperformance are 3.25 times stronger than positive reputation effects from outperformance.

2.2.2 Angel Investors

Angels invest their own capital (Kerr et al. (2014)). Upon investment, an angel investor earns the cash flow $(1-\tau_K)X$. The present value of this linear payoff is:

$$V_{\text{Angel}}(X) = (1-\tau_K)\frac{X}{r-\mu+\eta}. \tag{8}$$

The optimal investment policy X^* for angel investors is given by:

$$X^* = \frac{\beta_+}{\beta_+ - 1}\frac{r-\mu+\eta}{1-\tau_K}I. \tag{9}$$

Unlike VCs, angels' linear payoff structure implies that any reduction in the effective tax rate yields only a proportional benefit rather than significantly altering their investment thresholds, as they bear the full risk of their capital.

2.2.3 Corporate Investors

Corporate investors, including both strategic corporate acquirers and corporate venture capital (CVC) arms, perpetually earn the cash flow $(1-\tau_c)X+gX$ upon investment, where τ_c is the corporate tax rate and g represents strategic value beyond purely financial returns—such as access to new technologies, market intelligence, or business synergies (Bena and Li 2014; Ma 2020). The present value of their cash flow is:

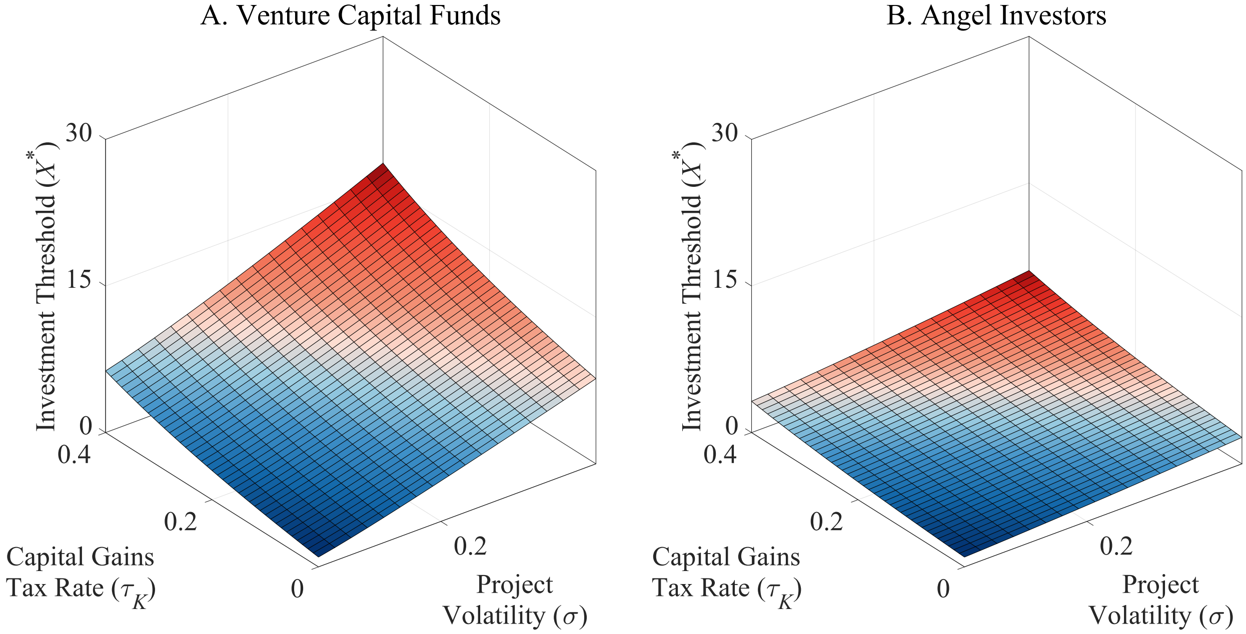
$$V_{Corp}(X) = (1-\tau_c)\frac{X}{r-\mu+\eta} + \frac{gX}{r-\mu+\eta}. \tag{10}$$

The optimal investment policy X^* for corporate investors is given by:

$$X^* = \frac{\beta_+}{\beta_+ - 1}\frac{r-\mu+\eta}{1-\tau_c+g}I. \tag{11}$$

Notably, corporate investors operate under a different tax regime: they pay corporate income taxes on their gains. As such, they exhibit no responsiveness to subsidies given to capital gains taxes.

Figure 1: Minimum Investment Thresholds by Investor Type, Tax Rate, and Risk Level



This figure shows how minimum investment thresholds (X^*) vary with effective tax rates (τ_K) and project volatility (σ). The parameters used are: discount rate $r = 0.07$, drift rate $\mu = 0.03$, management fee $\alpha = 0.02$, carried interest $\gamma = 0.20$, hurdle rate $h = 0.08$, $I = \$10$, and GP personal commitment $\omega = 0.01$ (Cochrane (2005); Metrick and Yasuda (2010); Robinson and Sensoy (2013)). The range of project volatility σ (0.05–0.40) corresponds to annualized measures of idiosyncratic risk in Ewens et al. (2013). Sudden failure $\eta = 1/4$ considers project lifespan of four years (Hall and Woodward (2010)). Career cost φ of 0.54 is based on implicit pay-for-performance of 0.35 (Chung et al. (2012)), expected multiple of invested capital of 2.36 (Harris et al. (2023)), and 3.25x stronger negative reputation effects (the asymmetry is calculated as the fundraising benefit of escaping poor performance relative to achieving exceptional performance based on Barber and Yasuda (2017)).

2.2.4 Comparative Depiction: Model Calibration

We use Figure 1 to illustrate our calibrated model's key predictions borrowing various parameters from the existing literature. To cut clutter, we consider only VCs and angels in our calibration exercise as only those categories of investors receive the tax subsidies we investigate in the data. The figure shows investment thresholds as a function of both tax rates and asset risk. The investment threshold (vertical axis) represents the minimum cash flow required to trigger investment—higher values indicate greater reluctance to invest. As tax rates decline, investors require lower cash flows for new investing. Notably, VCs (Panel A) exhibit a stronger response to tax changes than angels (Panel B). More importantly for our goals, this differential sensitivity is more pronounced for high-risk investments, implying that VCs have a higher tax elasticity of investment for riskier ventures. For alternative parameter specifications (higher GP personal commitment, no hurdle rate, higher reputation cost, and higher project volatility), see Figure IA2.[6]

2.3 Testable Predictions

Our framework yields three predictions about how tax subsidies shape venture investment. We frame them accordingly:

Prediction 1: QSBS tax subsidies increase risk-taking in venture investment selection

QSBS tax subsidies give preferential treatment to capital gains while maintaining deductibility of losses, yielding asymmetric payoffs. When taxes on capital gains decline, investment thresholds decline:

$$\frac{\partial X^*}{\partial \tau_K} > 0 \tag{12}$$

Prediction 2: VCs exhibit the strongest response to QSBS tax subsidies relative to other investor types

Due to their unique ability to share risk through outside capital funding while capturing upside through carried interest, VCs show the most significant reduction in investment thresholds among investors:

$$\left|\frac{\partial X^*_{VC}}{\partial \tau_K}\right| > \left|\frac{\partial X^*_{Angel}}{\partial \tau_K}\right| > \left|\frac{\partial X^*_{Corp}}{\partial \tau_c}\right| = 0 \tag{13}$$

Prediction 3: Project risk and carried interest jointly amplify VCs' responses to QSBS tax subsidies

The differential sensitivity of investment thresholds to taxation becomes more pronounced for high-risk projects. As project risk increases, VCs' investment thresholds become even more responsive to tax changes compared to other investor types:

$$\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \sigma} > \frac{\partial^2 X^*_{Angel}}{\partial \tau_K \partial \sigma} > \frac{\partial^2 X^*_{Corp}}{\partial \tau_c \partial \sigma} = 0 \tag{14}$$

[6] We conduct sensitivity analyses examining how key model parameters affect both investment selectivity and tax responsiveness in Appendix IA2. These analyses reveal a novel finding: while reputation costs (φ), GP capital commitment (ω), and project sudden failure rates (η) increase investment thresholds as one would intuitively expect, they also systematically amplify tax sensitivity. The latter occurs because higher selectivity places investors at steeper regions of their investment threshold functions, where small changes in tax rates generate proportionally larger responses.

It is worth noting that this risk-tax interaction effect strengthens with higher carried interest rates (γ), as GPs' convex payoff structure becomes more pronounced:

$$\frac{\partial}{\partial \gamma}\left(\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \sigma}\right) > 0 \tag{15}$$

We next test the above predictions studying the impact of the QSBS program on entrepreneurial firm investment. We do so focusing on changes in risk-taking across different investor types.

3 Institutional Background

The Qualified Small Business Stock (QSBS) program is a tax policy designed to stimulate investment in capital-intensive small businesses through capital gains tax subsidies. Established in 1993, the program has evolved over the last three decades, with its fiscal impact reaching some \$2 billion in foregone federal tax revenue as of 2023. We discuss the various institutional features of the QSBS in turn.

3.1 Tax Treatment of Startup Investments

3.1.1 Tax Status by Investor Type

The three largest categories of entrepreneurial investors face distinct eligibility for QSBS benefits. Angel investors pay individual capital gains taxes and can qualify for QSBS benefits on eligible investments. As explained in detail below, VCs can also qualify for QSBS benefits. In contrast, corporate investors, including corporate VC arms, are subject to corporate income taxes rather than capital gains taxes, making them ineligible for QSBS benefits regardless of the characteristics of their portfolio companies.[7]

[7] Corporate VCs are usually funded by their corporate parents. In the rare cases where corporate VCs raise external LP capital, if the LP is an individual, the LP may qualify for QSBS benefits. However, the vast majority of corporate VC investments come directly from the corporation's balance sheet rather than from external LPs (Chemmanur et al. (2014)).

3.1.2 VC Organizational Structure and Tax Pass-Through

VC firms are organized as limited partnerships, which are pass-through entities for tax purposes.[8] This structure means the partnership itself pays no taxes; instead, all gains and losses flow directly to both LPs (the VC fund investors) and GPs (the VC fund managers). Upon investment exit, proceeds are distributed pre-tax according to the partnership agreement.

Most private equity funds, including VC funds, operate according to a distribution waterfall that determines the relative economic rights between LPs and GPs. Typically, LPs first receive a return of capital and a preferred return or "hurdle rate" (often 8% annually). GPs typically receive an annual management fee of 2% of committed capital plus 20% of all profits exceeding the hurdle rate (known as "carried interest"). After LPs receive their capital plus hurdle rate, the GP receives a "catch-up" allocation, where the GP receives 100% of distributions until it has received 20% of all profits distributed thus far. Thereafter, remaining profits are distributed 80% to LPs and 20% to the GP.[9]

Each LP's tax treatment depends on their own status. Individual LPs, such as high-net-worth individuals, can qualify for QSBS benefits on eligible investments. Tax-exempt LPs, including pension funds, endowments, and foundations, typically do not pay taxes on their investment gains regardless of the QSBS status of their investments through VC funds. Corporate LPs are ineligible for QSBS benefits.

Similarly, each GP reports their share of the gains on their own tax returns. GPs are typically individuals who receive both management fees (taxed as ordinary income) and carried interest (taxed as capital gains and eligible for QSBS benefits when the underlying investment qualifies). Alternatively, GPs can be structured as legal entities (e.g., LLC, S-Corporation, or management companies), which are typically organized as pass-through entities themselves. In these cases, the tax treatment eventually flows to individual owners or partners of the legal entity, who remain eligible for QSBS benefits.

[8] As of 2024, US-based VC firms manage $1.3 trillion in assets with over $307 billion in dry powder (NVCA (2025)).

[9] Fund waterfalls distribute returns based on pretax performance (Spiro (2019)). The timing of LP and GP distributions can vary based on the fund structure. In an American-style waterfall, capital is returned with respect to each portfolio company—GPs receive carried interest on a deal-by-deal basis. In a European-style waterfall, all LP capital must be returned before GPs begin receiving carried interest. Most fund limited partnership agreements include clawback provisions requiring GPs to return prior distributions at fund termination if they received more than their entitled 20% of aggregate profits.

3.2 Eligibility Requirements

3.2.1 Company Eligibility Requirements

For a company's stock to qualify as QSBS under Section 1202 of the Internal Revenue Code, the issuing corporation must satisfy three criteria (IRS (1993)).[10] First, the entity must be a domestic C-corporation at the time of stock issuance and throughout the holding period—LLCs, LPs, and other firm types are not eligible. Second, the corporation's gross assets—defined as the sum of cash, the adjusted bases of other property, and any property contributed in exchange for stock—cannot exceed \$50 million before the stock issuance. Third, the corporation must maintain at least 80% of its assets in qualified business sectors throughout the shareholder's holding period. Notably, the QSBS program explicitly excludes industries where the principal asset is human capital skill or reputation, such as professional services, financial services, hospitality, farming, and natural resource extraction. These restrictions concentrate QSBS tax benefits into technology, pharmaceutical and biotechnology, and other capital-intensive businesses (see Table IA3 for a mapping of eligible sectors).

3.2.2 Shareholder Eligibility Requirements

Shareholder eligibility for tax benefit considers three dimensions. First, investors must acquire stock at original issuance directly from the corporation in exchange for money, property (excluding stock), or services—ownership via secondary transactions does not qualify. Second, shareholders face a mandatory five-year holding period before qualifying for QSBS tax benefits.[11] Third, the maximum exclusion per issuing corporation is bounded by the greater of \$10 million or ten times the initial investment basis.[12]

[10] Section 1202 was added to the Internal Revenue Code by the Omnibus Budget Reconciliation Act of 1993 to promote long-term investment in capital-intensive sectors. It defines the tax treatment and eligibility requirements for the QSBS.

[11] For options, holding period starts at exercise; for RSAs, at issuance or vesting; for convertible securities, at conversion.

[12] Tax specialists have discovered and exploited a key loophole: the law places no restriction on the number of individuals who can claim QSBS benefits for the same company. When investors give shares to family or friends, or when multiple individuals invest directly, each person qualifies for their own separate exclusion of up to \$10 million or ten times their investment basis, whichever is greater. This practice, called "stacking," allows investors to multiply the tax benefits significantly beyond statutory limits. Consider, for example, a small \$100K investment. Rather than having one person obtaining up to a \$10 million tax exclusion on a successful venture, distributing it among 10 people creates \$100 million in total exclusions. In another tax strategy called "packing," investors artificially increase their tax basis: an investor might place patents from one QSBS-eligible company into another company they also own, then merge the two. This increases the investment basis, thereby raising the maximum tax-free gain through the 10× multiple, without additional capital investment.

3.3 Evolution of QSBS Tax Benefits

The QSBS program was introduced in 1993 as a response to the early 1990s recession and was expanded after the Global Financial Crisis. The program initially offered a special federal capital gain tax rate of 14% on long-term investments—by design, a 50% reduction over the tax rate at the time of program inception of 28%.[13] However, the program's benefits diminished steadily over the following decade. While the QSBS rate remained fixed at 14%, regular capital gains rates declined, eventually dropping to 15% in 2003—making the net benefit under QSBS status drop to just one percentage point.[14]

A series of reforms later revitalized the program. First, the American Recovery and Reinvestment Act (ARRA) of 2009 changed it to a percentage-based model where only 25% of investment gains would be subject to taxes at the 28% capital gains tax rate. The 75% exclusion only applied to qualified stock acquired after February 17, 2009. The Small Business Jobs Act (SBJA) of 2010 later raised the exclusion to 100% for stock acquired after September 27, 2010. While that exemption was initially temporary, the 2015 Protecting Americans from Tax Hikes Act (PATH) made it permanent.

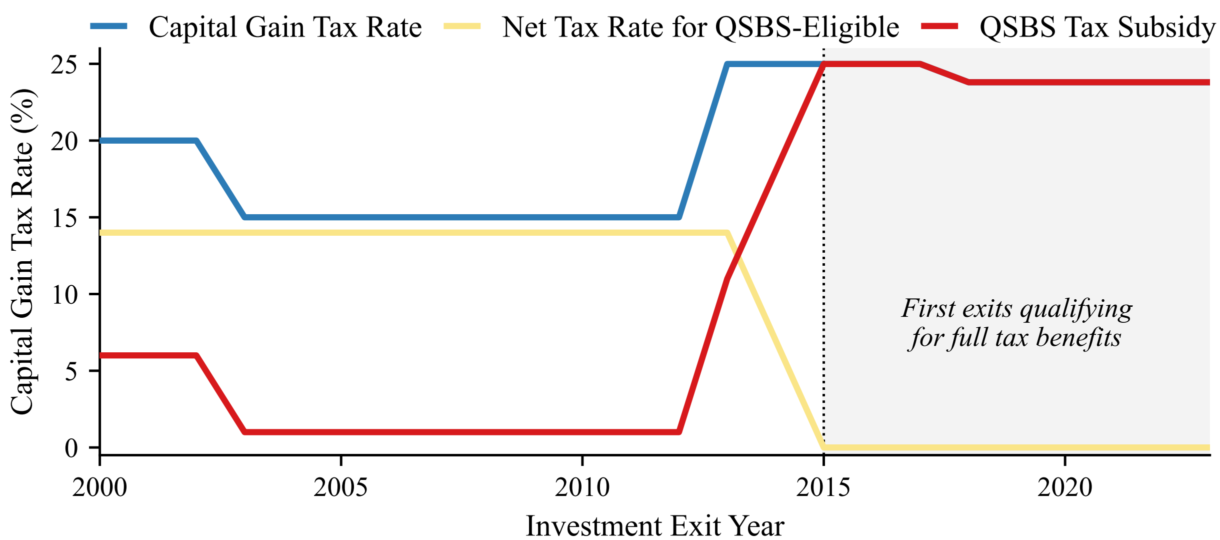
Figure 2 depicts the evolution of QSBS tax benefits since 2000. When the federal capital gains tax rate (blue line) peaked at 25% in 2015, investments that qualified under the post-2010 SBJA provisions and exited in 2015 were completely exempt from federal capital gains taxes (yellow line), thus representing a subsidy of 25 percentage points (red line). As shown in Figure IA6, the program's fiscal impact has scaled directly with these net tax benefits—declining after 2003 when the benefit was reduced to just one percentage point, then expanding dramatically as benefits increased, with federal tax expenditures growing from $68 million in 2010 to $3.4 billion in 2024 (both in 2024 dollars).[15] Looking forward, projected cumulative foregone revenues between 2025 and 2034 are estimated at $40 billion in real terms. For a comprehensive numerical example showing how various QSBS provisions affect investor tax liabilities across different investment periods and jurisdictions, see Appendix IA3.

[13] Losses on QSBS are treated as capital losses, subject to the standard deduction against ordinary income (IRS (1993)).

[14] Capital gain tax rates are sourced from NBER TAXSIM (Feenberg and Coutts (1993)) and the National Tax Foundation.

[15] Using IRS microdata, Abdulrauf et al. (2025) report larger estimates of QSBS's fiscal impact: they document that exclusions removed $51 billion of gains from the tax base in 2021 and reached $140 billion cumulatively over 2012–2022. They also show that, in a typical year, about 33 thousand individual taxpayers and over four thousand trusts claim QSBS exclusions. Moreover, the benefit is concentrated: those excluding more than $1 million account for roughly 90% of total gains excluded, and taxpayers with annual income above $1 million make up 26% of claimants but 75% of excluded gains.

Figure 2: The Evolution of the QSBS Federal Tax Benefits



This figure plots the maximum long-term federal capital gains tax rate (blue line), the QSBS tax subsidy (yellow line), and their difference (red line) between 2000 and 2023. The vertical line marks 2015, when the first exits qualifying for full benefits under the 2010 SBJA became possible. Data are from NBER TAXSIM and the National Tax Foundation.

3.4 State-Level Compliance

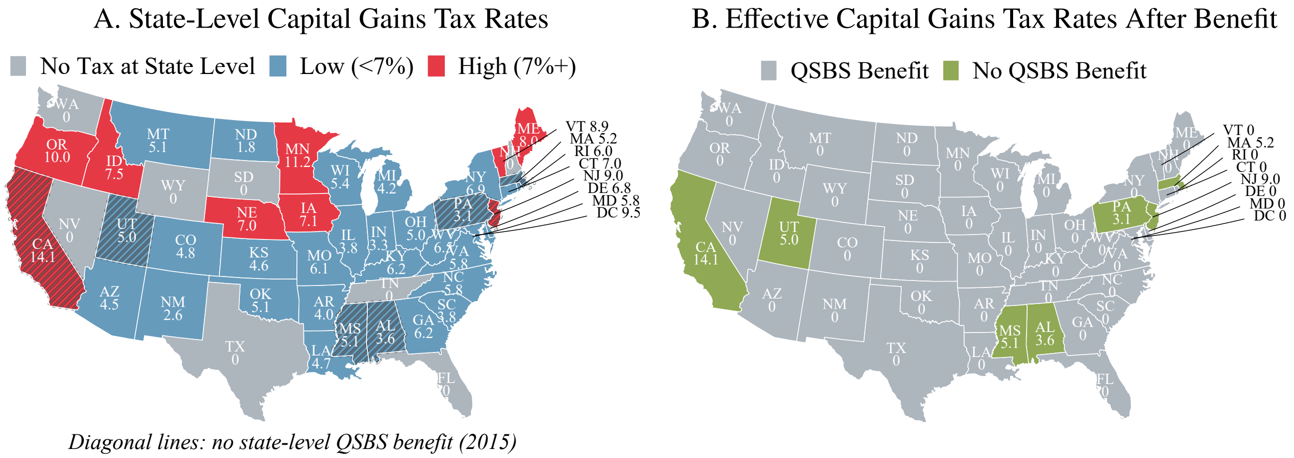
The economic value of the QSBS benefits varies across states through two channels: state-level capital gains tax rates and state conformity with federal QSBS treatment. As shown in Panel A of Figure 3, state capital gains tax rates in 2015—the first year when both the 2009 ARRA and 2010 SBJA exclusions became effective due to the five-year holding requirement—ranged from 0% to 14.1%. Nine states have no state capital gains tax[16], making state-level QSBS provisions irrelevant for their residents, while eleven states have a capital gain tax rate above 7%.

As Panel B of Figure 3 and Table IA2 show, most states conform with federal QSBS tax rules. This means that they provide corresponding state-level capital gains tax exemptions for qualifying investments. For example, when the federal government offers a 100% capital gains tax exclusion for qualified investments, conforming states like North Carolina and Georgia also exempt 100% of those gains from state taxes.[17] Four states have consistently opted out of offering QSBS benefits: New Jersey,

[16]These states are: Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, Wyoming.

[17]Before 2009, conforming states usually applied a 50% exclusion to their current capital gains rates—e.g., Illinois, with a 3% regular long-term capital gain tax rate in 2008, provided a 1.5% benefit for eligible investments exited in 2008.

Figure 3: State-Level Capital Gains Tax Rates in QSBS Eligible Sectors (2015)



This figure displays state-level capital gains tax rates as of 2015. Panel A categorizes states by tax rates: no tax (gray), low 0–5% (blue), and high >5% (red). Diagonal lines indicate states that do not provide state-level QSBS benefits. Panel B shows effective capital gains tax rates after accounting for the QSBS exemption, where states in gray provide the full exemption (effective rate of 0%) and states in green maintain their original tax rates. Data are from NBER TAXSIM.

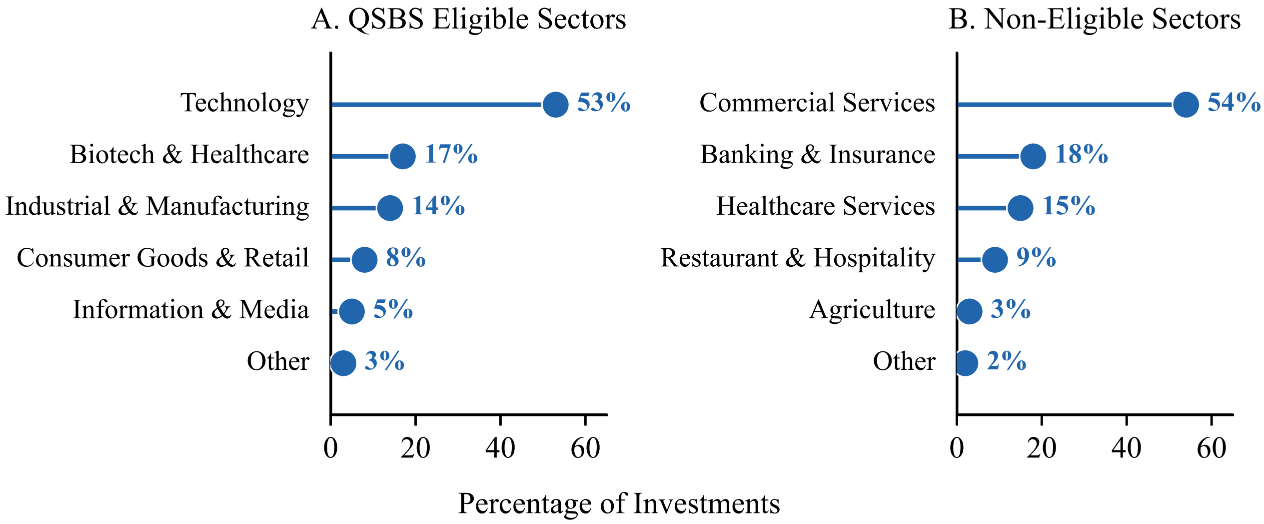
Pennsylvania, Mississippi, and Alabama. California initially provided QSBS benefits but eliminated it in 2013.[18] QSBS-eligible investments in these non-conforming states are subject to full state capital gains taxes. Utah and Massachusetts adopted conformity in 2016 and 2022, respectively.

4 Data and Variable Construction

We use data from PitchBook, which tracks investments on startups by VCs, angel investors, and corporate investors. For the main tests performed, we construct our sample identifying investments eligible for the QSBS tax benefits while maintaining consistency with the program's eligibility requirements. First, we restrict sampling to U.S.-based firms. Second, using legal firm names in PitchBook, we exclude firms designated as Limited Liability Partnerships (LLPs) or Limited Partnerships (LPs), as only C-corporations can issue qualifying stock under the QSBS program. Third, consistent with the program's $50 million gross asset requirement, we exclude investor–firm pairs where the investment

[18] A local court found that providing preferential treatment to California-based businesses was unconstitutional. Before the court ruling, California-based investors could exclude 50% of their QSBS gains from state taxation. Starting 2013, they became subject to the full state tax rate on all QSBS gains.

Figure 4: Investment Distribution by Sector



This figure shows the distribution of investment counts across QSBS-eligible and ineligible sectors from 2004 to 2022. Panel A shows the composition of QSBS-eligible sectors, where sectors are defined based on IRC Section 1202 eligibility criteria. Panel B shows ineligible sectors, which are excluded from the QSBS benefits. Data are from PitchBook.

amount exceeds $50 million in the startup's founding year or the investor's entry year. We then classify firms into eligible and ineligible sectors based on the Internal Revenue Code's Section 1202 criteria.[19]

We track investor–firm pairs from investment entry through exit or up to a 10-year holding period between 2004 and 2022.[20] Focusing on entries through 2017, we track any investment long enough to observe whether it reaches the five-year holding period required for the QSBS qualification. Our final sample yields 1.1 million investor–firm–year observations and over 158 thousand investor–firm pairings.[21]

4.1 Industry and Investor Composition

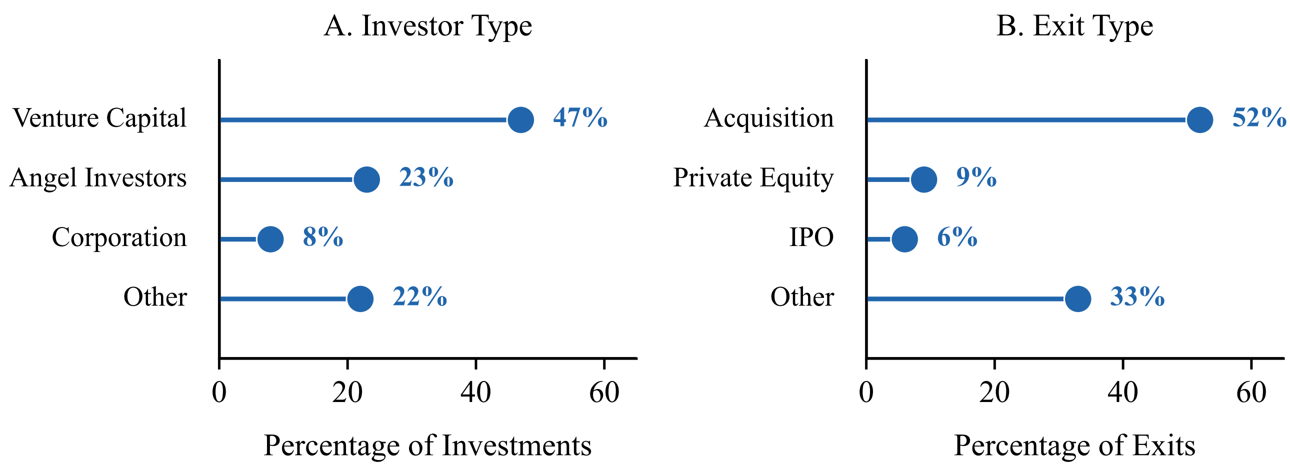
Technology companies dominate our sample of eligible investor–firm pairings, accounting for 53% of investments, as shown in Panel A of Figure 4. Within technology, business and productivity software represents the most prominent component, followed by application software and social platform software. Biotech and healthcare firms represent the second-largest category at 17%, followed by

[19] As we detail below, we perform auxiliary tests using a regression discontinuity design (RDD) approach where we exploit variation around the $50 million investment size, sampling firms of size up to $75 million in QSBS-eligible sectors.

[20] Over 90% of the investments eventually achieving an exit in our data do so within ten years of the initial investment.

[21] Our sample includes 39 thousand unique investors and 35 thousand unique portfolio companies. As a reference, as of 2024, VC firms own stakes in approximately 58 thousand US-based portfolio companies (NVCA (2025)).

Figure 5: Distribution of Investor and Exit Types



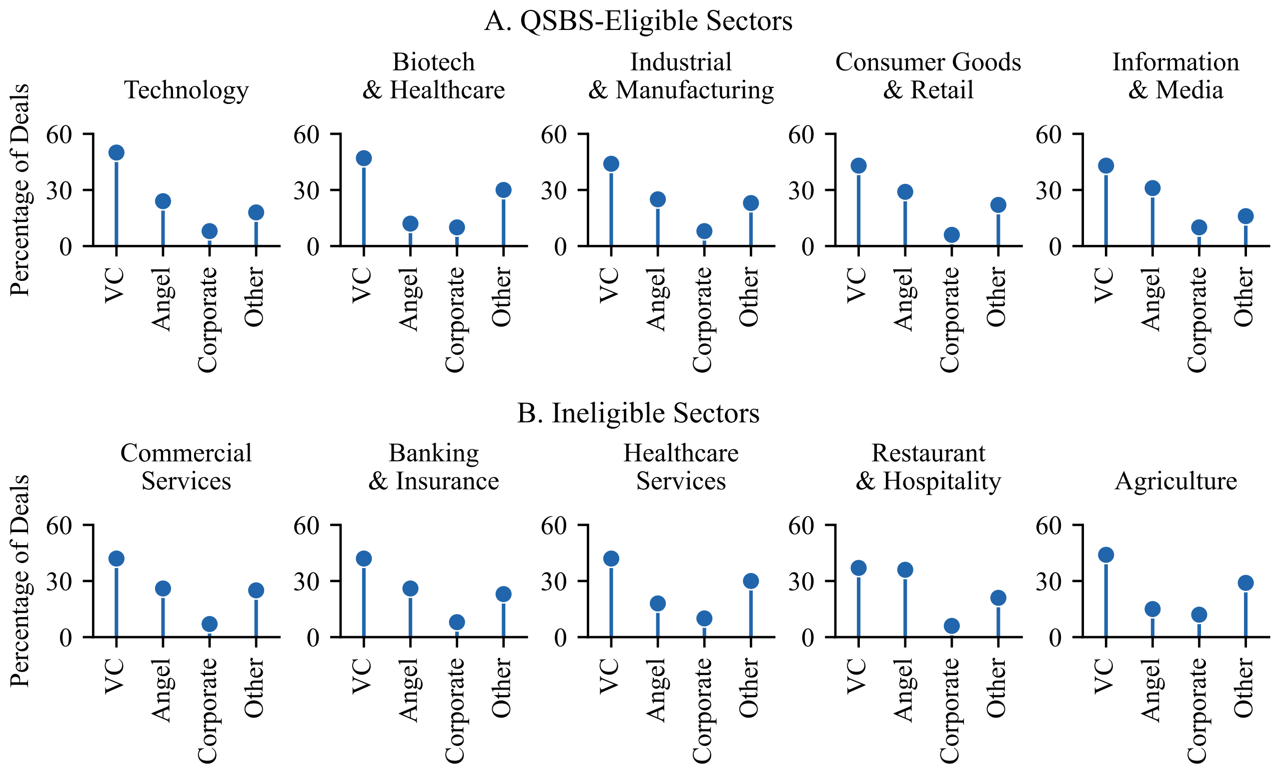
This figure shows the distribution of deal counts by investor type (Panel A) and deal exits by exit type (Panel B) from 2004 to 2022. Venture Capital includes traditional VC firms. Angel Investors includes individual angel investors and angel groups. Corporatation includes corporate VC arms and other corporate investments. Data are from PitchBook.

industrial and manufacturing at 14%. Consumer goods and retail (8%) and information and media (5%) constitute smaller shares, with other qualified sectors accounting for the remaining 3%. Among ineligible sectors shown in Panel B, commercial services—e.g., consulting, education and training, and real estate—represent 54% of investor–firm pairings. Banking and insurance (18%), healthcare services (15%), and restaurant and hospitality (9%) make up most of the remaining ineligible activity, with agriculture (3%) and other sectors (2%) accounting for small shares.

The composition of investors and exit outcomes in our sample, presented in Figure 5, reveals the central role of VC in early-stage finance. Panel A shows that VC firms are the dominant investor type, accounting for 47% of the number of investments. Angel investors represent 23%, while corporations participate in 8%. Combined, other investors—including accelerators, growth equity funds, family offices, and the U.S. Government—account for the remaining 22%. Panel B shows that acquisitions represent the most common exit path at 52% of outcomes. PE buyouts represent 9% of exits, while IPOs account for 6%. Other exit types—comprising mostly business closures—account for the remaining 33%.

Our identification strategy implies that investor composition is not systematically different between QSBS-eligible and ineligible sectors, which could otherwise confound the effects of tax policy changes. Supporting our assumption, Figure 6 shows that investor type distributions are comparable

Figure 6: Distribution of Investor Types by Industry



This figure shows the percentage distribution of investor types across different industries from 2004 to 2022. Panel A displays QSBS-eligible sectors, while Panel B shows ineligible sectors. Data are from PitchBook.

across different industries regardless of QSBS eligibility. In all sectors, VC consistently represents the largest share of investments. Angel investors are the second largest investor category across sectors, with corporate investors and other entities comprising smaller proportions.

4.2 Key Variables and Summary Statistics

We analyze the effect of tax policy on investment behavior at two different types of analysis. First, we discuss initial investment decisions, using data at the investor–firm level. Second, we analyze financing and performance outcomes at the investor–firm–year level.

4.2.1 Investment Selection

We examine six investment selection variables at the investor–firm level constructed using PitchBook data. First, we track "pre-commercial stage" investments, which include firms in stealth mode, product beta stage, clinical/pre-clinical trials, and recent grant recipients (where the last financing round was a grant). These investments are characterized by high information asymmetry, long exit timelines, innovative nature, and high uncertainty on commercial viability. For example, startups in stealth mode often develop technology in secrecy for years before becoming visible to potential buyers.[22]

Second, we analyze capital structure via a "debt" indicator for whether the portfolio company has outstanding debt at the time of investment. Pre-existing debt introduces payment obligations and potential conflicts between investors and creditors. It critically heightens a firm's sensitivity to market conditions, particularly for early-stage ventures with limited cash flow (Graham and Leary 2011).

Third, we capture the geographical dispersion between investors and portfolio companies through a "different state" indicator, equal to one if the investor and firm are headquartered in different states. Geographic distance increases information asymmetries between investors and entrepreneurs while reducing the level of investor oversight (Lerner 1995), thereby amplifying investment risk.

Fourth, we assess industry familiarity with a "new industry" indicator, equal to one if the investor has no prior investment in the firm's industry during the 1998–2003 pre-sample window. Entering unfamiliar industries typically involves greater risk since investors lack the industry-specific human capital, networks of contacts to identify promising opportunities, and specialized know-how needed to effectively manage investments in these sectors (Gompers et al. (2008))

Fifth, we examine external certification through a "first funding" indicator, equal to one if the portfolio company has not received prior backing from VCs, angel investors, corporate investors, accelerators, or private debt funds at the time of the initial investment. Companies with previous financial backing represent lower-risk investments, as they have already passed through screening processes and received validation in capital markets, and receive ongoing monitoring from financiers.[23]

[22] Siri remained in stealth mode until acquired by Apple (Arora et al. (2021)). Clinical trial investments are also risky: less than one-third of pre-clinical trial candidates advance to the trial stage (Takebe et al. (2018)), and of those advancing to clinical trials, only 14% receive FDA approval (Wong et al. (2019)). Grant recipients typically receive funding from government programs or foundations. These grants primarily enable technology prototyping and proof-of-concept (see Howell (2017)).

[23] Angel groups undertake "costly due diligence" and include "sophisticated and active" investors (Kerr et al. (2014)). VCs screen an average of 200 companies to make only four investments annually (Gompers et al. (2020)), while private

Finally, we examine whether investors manage risk through syndication. We construct a "multi-investor" indicator, equal to one if the initial investment involves five or more investors (representing above-median number of investors in the initial round in our sample). Syndication reduces investor risk through multiple mechanisms: risk sharing across parties, improved screening through information pooling, social validation from other sophisticated investors, access to diverse expertise, and greater assurance of follow-on funding (Lerner (1994), Hochberg et al. (2007)).[24]

4.2.2 Financing and Performance Outcomes

Understanding how tax benefits affect financing and performance outcomes requires tracking investor–firm relationships over time. Using data from PitchBook, we construct three sets of outcome variables that capture the evolution of investments from funding through exit: (1) investment failures; (2) valuation performance; and (3) investment exit channels of portfolio companies by investors.

Our inital set identifies investment distress through two measures. First, we track complete business failure through an indicator variable "out of business" based on PitchBook's designation for firms that cease operations. Second, we capture severe funding droughts through "five years without funding", an indicator that equals one when firms go five or more years without raising new capital.[25]

Our second set tracks investment performance through firm valuation. "Valuation" is a continuous measure of post-money valuation in billion dollars, reflecting firm value immediately after each financing round. We also identify "unicorn" status—an indicator for firms reaching valuation above $1 billion—capturing firms that achieve outstanding valuation outcomes.[26]

Finally, we examine exit patterns through mutually exclusive indicators for three types of exits.

debt investors dedicate 100 hours per deal to due diligence (Block et al. (2024)). Accelerators provide quality signals through "rigorous selection procedures" (Mayya and Huang (2025)). Post-investment, these investors provide intensive oversight: VCs spend 18 hours per week working with portfolio companies and 80% interact more than monthly (Gompers et al. (2020)), while angels adopt "very hands-on" roles providing advice and contacts (Kerr et al. (2014)). Private debt funds monitor portfolio companies monthly through financial statements, covenant checks, and periodic meetings—more frequently than traditional banks (Block et al. (2024)). This validation and ongoing oversight facilitates access to follow-on funding, with angel-funded companies showing 70% higher likelihood of obtaining additional financing (Kerr et al. (2014)).

[24] Relatedly, Paul Graham (founder of Y Combinator) observes that "By far the biggest influence on investors' opinions of a startup is the opinion of other investors. There are very, very few who simply decide for themselves." (Graham (2010)).

[25] Among firms that ultimately fail, the average duration without new funding is 2.1 years before closure, while firms achieving unicorn status typically go only 0.3 years between funding rounds.

[26] Venture capitalist Aileen Lee introduced the term "unicorn" in a 2013 article: "We like the term because to us, it means something extremely rare, and magical" (Lee (2013))

First, we track "private equity buyout" (acquisitions by PE firms). Second, we identify "acquisition" (portfolio company sales to operating companies). Third, we capture "IPO" (public listings). This categorization follows the lifecycle of venture-backed firms—PE buyouts typically occur when companies are more mature, while IPOs and strategic acquisitions often happen earlier when firms still need growth capital (Gompers (1996); Puri and Zarutskie (2012)).

4.3 Summary Statistics

Table 1 shows summary statistics for our 1.1 million investor–firm–year observations. Most investments in the sample are in QSBS-eligible sectors and occurred after the 2009 reform. The average investment is held for 3.4 years, with about one-third reaching the five-year holding requirement for tax benefits.

PLACE TABLE 1 ABOUT HERE

Investment outcome statistics reflect high returns and high risks of venture funding. Complete business failures occur in 1.9% of investor–firm–year observations, and 6.4% go five or more years without raising new capital. Unicorn status appears in 4.8% of investor–firm–years where valuation is available.[27] Besides portfolio company closures, the most investment exits come through strategic acquisitions (4.4% of investor–firm–years), with PE buyouts (0.7%) and IPOs (0.5%) being less common.

Table IA4 compares raw, unconditional means of QSBS-eligible and ineligible sectors before and after 2009. In the pre-QSBS reform period, the two groups show largely similar characteristics—e.g., investment holding periods differ by only 0.04 years, business failure rates are identical at 0.6%, and mean valuations differ by an insignificant \$48 million ($t = -0.9$). In the post-reform period, eligible sectors show significantly higher holding periods and failure rates, and lower valuations compared to ineligible sectors, suggesting a shift in investment patterns.

[27] 6,292 (17.8%) portfolio companies in our sample go out of business while just 876 (2.5% of the total) achieve unicorn status while. Unicorns appear in a larger fraction of the investor–firm–year sample because (1) they attract more investors (unicorns average 9.1 investors *versus* 3.1 for firms that go out of business); and (2) they may hold unicorn status for multiple years.

5 Timing and Investment Allocation Responses to Tax Incentives

Our first step in characterizing the impact of changes to the QSBS tax benefits under ARRA and SBJA is to identify how investors strategically adjust their behavior in response to these tax incentives. We employ two complementary empirical approaches in this section. First, we analyze bunching behavior at the five-year holding threshold required for QSBS tax subsidy qualification, employing bunching and difference-in-bunching techniques. Second, we leverage regression discontinuity design (RDD) and difference-in-discontinuities analyses at the $50 million asset threshold to examine how tax incentives affect capital allocation decisions around this cutoff. We discuss these approaches in turn.

5.1 Bunching Approach

The mandatory five-year holding period for QSBS qualification creates a "notch" in the capital gains tax schedule—investors who hold investments for at least five years qualify for substantial tax subsidies, while those exiting just before five years receive no benefits. As such, we expect strategic timing of exits at the five-year threshold. Panel A in Figure 7 suggests that the pre-reform distribution of holding periods has no distinct clustering at five years. Panel B, in contrast, shows that post-reform investments exhibit a salient spike in exits precisely at the five-year mark.[28] We measure the magnitude of this bunching behavior employing techniques that quantify behavioral responses to tax incentives.[29]

5.1.1 Baseline Bunching Estimates

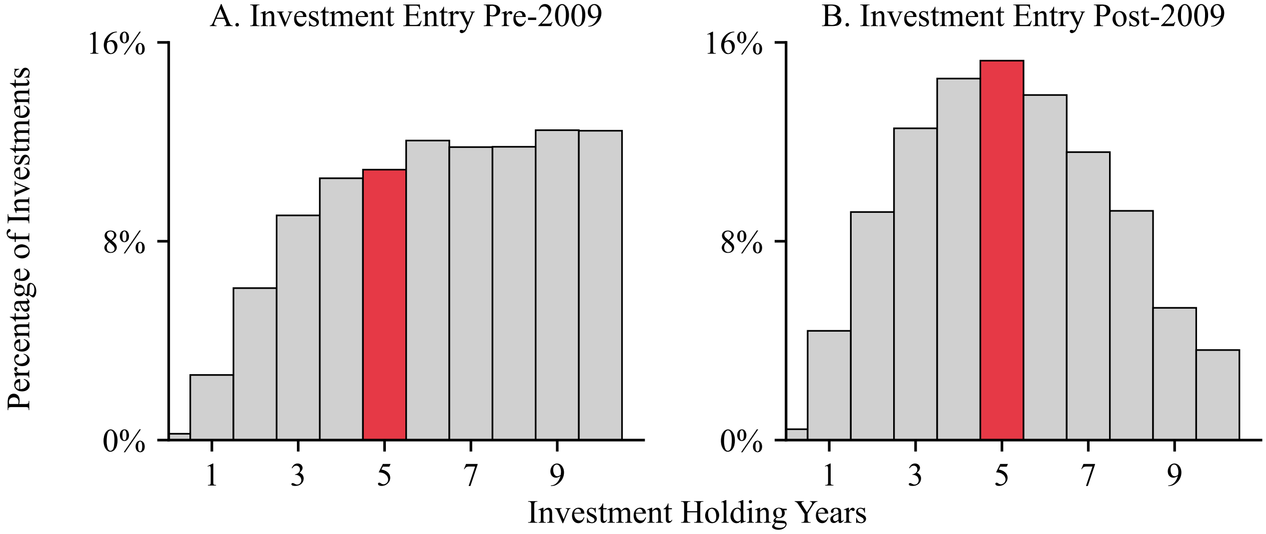
We quantify investors' responsiveness to tax incentives by measuring the excess mass of exits occurring *exactly* at the five-year holding requirement. For the bunching measurement equations and elasticity recovery formulas, see Appendix IA4. Our bunching analysis focuses on VC and angel investments made within two years before and after the QSBS policy change (i.e., between 2007 and 2011), with holding periods tracked up to ten years following initial investment.[30] We employ three complementary estimation

[28]This strategic timing is analogous to tax-motivated trading (see Kaplan (1981); Constantinides (1983); Ritter (1988); Ivković et al. (2005); Sialm (2009)) and consistent with lock-in predictions for privately held businesses (Chari et al. (2005)).

[29]The use of bunching methods is common in tax studies (Saez (2010); Chetty et al. (2011); Kleven and Waseem (2013)).

[30]This narrow window approach is standard practice in bunching, which focuses on periods immediately surrounding policy changes to cleanly identify behavioral responses while minimizing contamination from other factors (Chetty et al. 2011).

Figure 7: Distribution of Holding Periods of Investments Around the QSBS Reform



This figure shows a distribution of holding periods in QSBS-eligible sectors. Sampling considers entry years from 2004 through 2017 for investments achieving an exit (see details in the Data section). Data are from PitchBook.

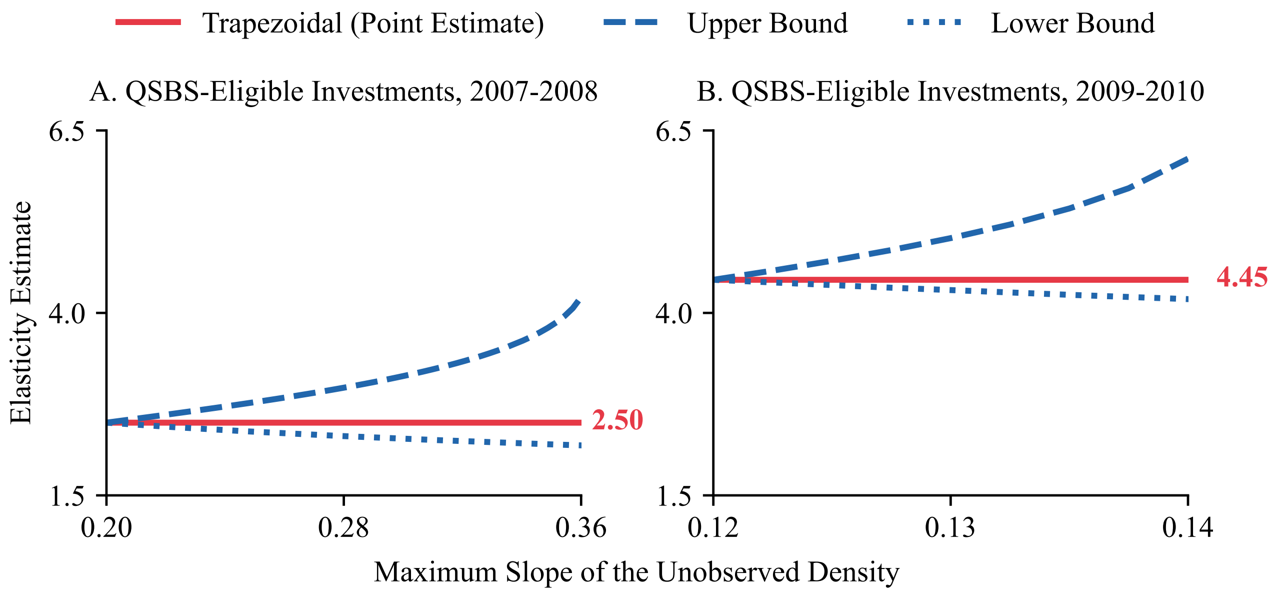
approaches: (1) a standard trapezoidal approximation for point identification; (2) bootstrapped confidence intervals to establish statistical significance; and (3) the partial identification method developed by Bertanha et al. (2023), which yields elasticity bounds under less restrictive identifying assumptions.[31]

Figure 8 illustrates our bunching analysis results. Panel A presents the elasticity estimates for QSBS-eligible sectors in the pre-reform period, revealing a point estimate of 2.50 (shown by the horizontal red line). This baseline elasticity quantifies investors' natural tendency to hold investments for five years absent enhanced tax incentives. Panel B displays the elasticity estimates for eligible sectors in the post-reform period, showing a substantially higher point estimate of 4.45. This increased elasticity indicates that a one percentage point increase in the tax benefit corresponds to a 4.45% increase in the mass of investors exiting precisely at the five-year threshold. The partial identification bounds (dashed and dotted blue lines) widen as the maximum slope increases in both panels, yet remain distinctly elevated in the post-reform period relative to the pre-reform period.

The statistical significance of these patterns is confirmed in Table IA5. For the post-reform eligible investments, Columns (2–3) of Panel A reports narrow 95% confidence intervals of [3.6, 5.3],

[31] Our estimates consider a capital gain tax subsidy of 20% and a slope M of 3.0, which exceeds maximum Ms for which the upper bound is finite (see Bertanha et al. (2023) for implementation details regarding nonparametric bounds).

Figure 8: Point Estimates and Partial Identification Bounds for the Elasticity of Tax Benefits



This figure displays partially identified sets (following Bertanha et al. (2023)) for the elasticity of investment holding-periods. The x-axis plots the slope of the unobserved heterogeneity distribution and the y-axis plots the elasticity. The solid blue curve is the lower bound, the dashed blue curve is the upper bound, and the dotted red line is the trapezoidal (point) estimate. Each unit of elasticity represents a 1% increase in the mass of investors exiting exactly at five-year holding period for each percentage point of QSBS tax subsidy. Estimates consider investments from 2007 to 2010 by VCs and angel investors in QSBS-eligible sectors, M of 3.0, and a capital gain tax subsidy of 20%. Data are from PitchBook.

derived from 1,000 bootstrap iterations, and partial identification bounds of [4.2, 6.1]. Beyond the pre-reform eligible sector comparison (elasticity of 2.50 as shown in Panel A of Figure 8), Panel B of Table IA5 includes two additional comparison groups: ineligible sectors before the reform (elasticity of 0.79) and ineligible sectors after the reform (elasticity of 1.72), with corresponding confidence intervals reported in Column (2). These results suggest that while the five-year mark serves as a natural focal point in venture capital investment horizons, the QSBS tax subsidy significantly amplifies this bunching behavior, with elasticity increases ranging from 78% to 467% depending on the comparison group.

5.1.2 Difference-in-Bunching Approach

We complement the bunching analysis with a difference-in-bunching approach (cf. Brown (2013); Kleven (2016)) that isolates tax-induced behavior from natural investor tendencies to hold investments for five years. Rather than relying solely on extrapolation from regions away from the threshold, this method directly nets out the baseline preference for five-year holding periods by comparing bunching patterns across different groups and time periods. This comparative approach allows us to identify bunching attributable specifically to tax incentives rather than other investment cycle factors.

We compute three difference-in-bunching estimates. First, we compute the difference between post-reform and pre-reform elasticities within QSBS-eligible sectors ($\hat{\epsilon}_{eligible,post} - \hat{\epsilon}_{eligible,pre}$). This specification accounts for any sector-specific factors influencing bunching behavior regardless of enhanced tax benefits. Second, we compute the difference between eligible and ineligible sectors after the QSBS reform ($\hat{\epsilon}_{eligible,post} - \hat{\epsilon}_{ineligible,post}$). This approach controls for contemporaneous forces affecting holding period decisions across all sectors. Third, we compute the difference between post-reform eligible and pre-reform ineligible sectors ($\hat{\epsilon}_{eligible,post} - \hat{\epsilon}_{ineligible,pre}$), which accounts for both temporal trends and sectoral differences in investor holding patterns. For each investor type and comparison group, we estimate the elasticity using the same bunching methodology as before. We then calculate the difference between elasticities, with standard errors computed from 1,000 bootstrap iterations.[32]

Table 2 presents results. Panel A compares eligible sectors before and after the reform. Column (1) shows a statistically significant excess elasticity of 2.0, indicating that the QSBS benefits generate a 2.0% increase in the mass of investors exiting precisely at the five-year mark for each percentage point of tax benefit. Panels B and C present estimates comparing eligible investments with ineligible investments after and before 2009, respectively, with Column (1) showing excess elasticities of 3.7 and 2.7.

PLACE TABLE 2 ABOUT HERE

Our investment-horizon elasticities are economically meaningful compared to other tax elasticity studies. For context, Saez (2010) finds elasticities of reported taxable income of around 0.2–1.0, while Chetty et al. (2011) report estimates of 0.34 for the tax-elasticity of labor supply.

5.2 Regression Discontinuity Design Approach

We next examine how tax incentives shape capital allocation by exploiting the sharp discontinuity created by QSBS's $50 million asset threshold. Portfolio companies whose gross assets exceed $50

[32] Standard errors for differences are calculated assuming independence between treatment and control group elasticities as: $\hat{\epsilon}_{diff} = \hat{\epsilon}_{treatment} - \hat{\epsilon}_{control}$ and $SE(\hat{\epsilon}_{diff}) = \sqrt{SE(\hat{\epsilon}_{treatment})^2 + SE(\hat{\epsilon}_{control})^2}$.

million immediately after an investment round are ineligible for QSBS benefits, while those remaining below this threshold may qualify.[33] This creates a clear cutoff point for a regression discontinuity design. Notably, investment contracts in eligible portfolio companies typically include provisions stating that firms will make reasonable efforts to maintain QSBS eligibility (NVCA (2024)).[34]

In this section, we employ two complementary discontinuity-based approaches to identify the causal effect of QSBS eligibility on forward funding patterns. First, we implement a regression discontinuity design (RDD) that compares outcomes just below and above the threshold within specific time periods. Second, we extend this analysis with a difference-in-discontinuities framework that compares the change in discontinuities across pre-reform and post-reform periods, isolating the policy effect from other factors that might create discontinuities at the threshold.

For these analyses, we use an expanded version of our sample that includes investments both below and above the \$50 million threshold. While our main analyses focus on investments below \$50 million, here we include initial investments ranging from \$20 million to \$80 million.[35] We restrict our sample to QSBS-eligible sectors only, as the threshold is only relevant for investments that would otherwise qualify for the tax benefits. As we explain in detail below, we employ data-driven methods on this sample to determine the optimal bandwidth for each statistical analysis.

5.2.1 RDD Analysis

Our RDD exploits the sharp discontinuity in QSBS tax benefits at the \$50 million investment threshold. We estimate the local average treatment effect by comparing forward funding outcomes for investments just below and just above the \$50 million cutoff. The identifying assumption is that firms with investment sizes near the threshold are similar in unobservable characteristics, with the only meaningful difference

[33] For early-stage startups, gross assets often consist primarily of cash in the balance sheet from the investment round the company is raising (Viswanathan (2020)).

[34] The Investors' Rights Agreement from the National Venture Capital Association explicitly includes a statement that "The Company shall use commercially reasonable efforts to refrain from taking any action that could reasonably be expected to cause the shares of capital stock issued pursuant ... to the Purchase Agreement to fail to qualify as 'qualified small business stock' within the meaning of Section 1202(c) of the Internal Revenue Code" (see NVCA (2024)).

[35] RDD methodological best practices emphasize focusing on observations near the cutoff (see Calonico et al. (2014); Imbens and Kalyanaraman (2012); Lee and Lemieux (2010)) to reduce bias while maintaining estimation efficiency.

being their eligibility for QSBS tax benefits. Our baseline RDD specification takes the following form:

$$\begin{aligned}\text{Forward Funding} =&\alpha + \beta \cdot \mathbb{1}\{\text{Initial Investment}{>}50\} + \sum_{p=1}^{P} \gamma_p \cdot (Initial\ Investment - 50)^p \\ &+ \sum_{p=1}^{P} \delta_p \cdot \mathbb{1}\{\text{Initial Investment}{>}50\} \cdot (Initial\ Investment - 50)^p + \epsilon\end{aligned} \tag{16}$$

where the dependent variable Forward Funding is the natural logarithm of cumulative dollars invested by the same investor type in the five calendar years after the focal deal, net of the initial investment itself. The running variable *initial investment* is centered at the \$50 million threshold, and $\mathbb{1}\{\text{Initial Investment}{>}50\}$ is an indicator for investments exceeding this threshold. The coefficient of interest β captures the discontinuity in forward funding at the threshold, representing the causal effect of *just missing* QSBS's \$50 million gross assets threshold for eligibility for tax benefits. The coefficients γ_p and δ_p correspond to the polynomial terms of order p that flexibly model the relationship between investment size and forward funding below and above the threshold, respectively. We include polynomial terms up to order P, implementing specifications with different polynomial orders (linear, quadratic, cubic) to ensure robustness of our estimates. For estimation, we employ the robust bias-corrected approach developed by Calonico et al. (2014), selecting the optimal bandwidth to minimize the mean squared error at the cutoff point.[36]

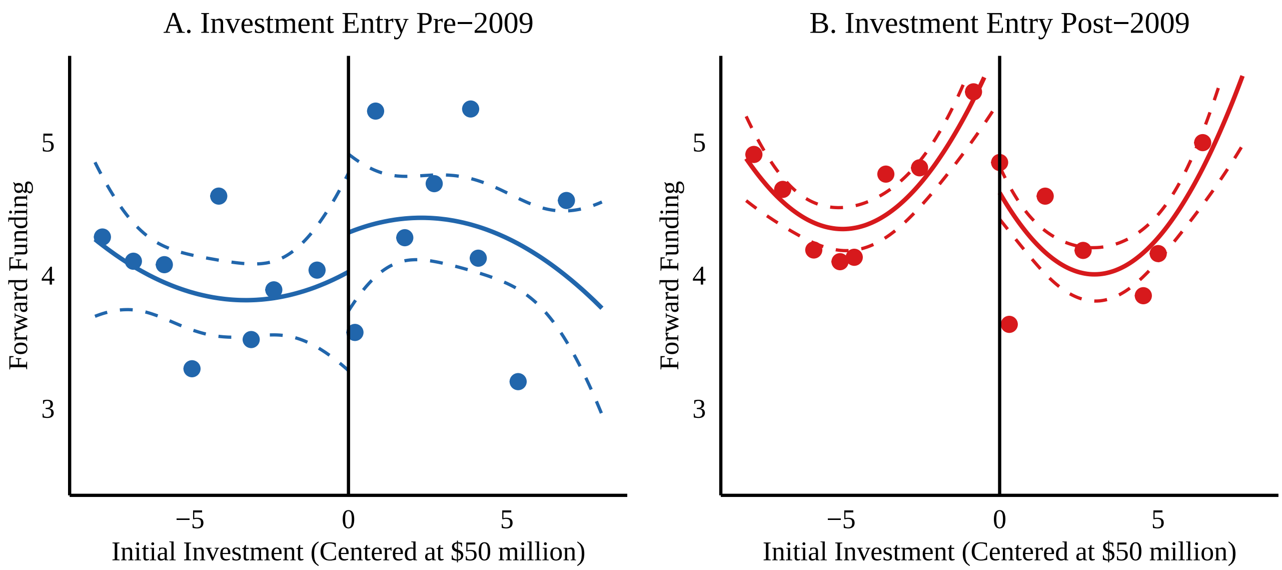
Figure 9 illustrates our RDD approach, plotting the relationship between initial investment size and five-year forward funding.[37] In Panel A (pre-2009 period), we observe no clear discontinuity at the \$50 million threshold, with the 95% confidence intervals (dashed blue lines) overlapping zero. This is consistent with the minimal QSBS tax benefits available during this period. In contrast, Panel B (post-2009 period) reveals a substantial negative discontinuity at the threshold, with investments just above \$50 million receiving significantly less forward funding than those just below. This pattern suggests that tax incentives influence the amount of funding that investors provide to startups.

Table 3 presents our RDD results across different polynomial specifications. For the pre-2009 period (Columns 1–3), we find no statistically significant discontinuity in forward funding across all specifications, with point estimates ranging from −0.10 to −0.57. In contrast, for the post-2009 period

[36]Calonico et al. (2014)'s robust bias-corrected approach accounts for the additional variability introduced by bias correction, producing more reliable confidence intervals without requiring undersmoothing.

[37]The figure displays investments within ±8 million of the threshold (\$42–\$58 million). The optimal bandwidths determined by the MSE method range vary by sample period and polynomial order (see full details in Table 3).

Figure 9: Five-Year Forward Funding Discontinuity at the $50 Million QSBS Threshold



This figure plots regression-discontinuity estimates of the relation between the initial investment size and the natural logarithm of the cumulative dollars invested by VC and angel investors in the five calendar years after the focal deal, net of the initial investment itself. All estimates use quadratic (second-order) polynomial fits and uniform kernel. The markers show binned sample means, the solid line is the polynomial fit on each side of the cutoff, and the vertical line marks the $50 million threshold. Panel A shows deals that occurred before 2009, while Panel B shows deals from 2009 onwards. The sample includes investments between 2004 and 2017 in C-corporations operating in eligible sectors. Dashed lines represent 95% confidence intervals. The bandwidth is $8 million on each side of the cutoff ($42 to $58 million). Data are from PitchBook.

(Columns 4–6), we observe negative and statistically significant discontinuities across all specifications, with larger point estimates ranging from −0.37 to −1.12. These results indicate that investments just above the threshold receive 31% to 67% less forward funding than those just below the threshold after the reform.[38] The optimal bandwidths for each specification range from 3.79 to 13.15.

PLACE TABLE 3 ABOUT HERE

5.2.2 Difference-in-Discontinuities Analysis

We complement the RDD analysis with a difference-in-discontinuities design that directly compares the pre-reform and post-reform discontinuities (cf. Grembi et al. (2016); Bennedsen et al. (2022)). This approach isolates the effect of the tax policy change by netting out any pre-existing discontinuities at the $50 million threshold that are unrelated to the QSBS reform. Additionally, it controls for common time

[38] Percentage changes are computed as $100\times(e^{\beta}-1)$, where β is the coefficient on the indicator for the $50 million threshold.

trends between pre-2009 and post-2009 periods that affect all firms regardless of size. Using the same extended sample of investments ranging from \$20 million to \$80 million in QSBS-eligible sectors, as well as a narrower bandwidth from \$35 million to \$65 million to test robustness, we estimate:

$$
\begin{aligned}
\text{Forward Funding} =& \alpha + \beta \cdot [\mathbb{1}\{\text{Initial Investment}>50\} \times \mathbb{1}\{\text{Post-2009}\}] \\
&+ \gamma_1 \cdot \mathbb{1}\{\text{Initial Investment}>50\} + \gamma_2 \cdot \mathbb{1}\{\text{Post-2009}\} \\
&+ \sum_{p=1}^{P} \delta_p \cdot (Initial\ Investment - 50)^p \\
&+ \sum_{p=1}^{P} \theta_p \cdot \mathbb{1}\{\text{Initial Investment}>50\} \cdot (Initial\ Investment - 50)^p \\
&+ \sum_{p=1}^{P} \lambda_p \cdot \mathbb{1}\{\text{Post-2009}\} \cdot (Initial\ Investment - 50)^p \\
&+ \sum_{p=1}^{P} \mu_p \cdot \mathbb{1}\{\text{Initial Investment}>50\} \cdot \mathbb{1}\{\text{Post-2009}\} \cdot (Initial\ Investment - 50)^p + \epsilon
\end{aligned}
\tag{17}
$$

where the dependent variable remains the natural logarithm of forward funding over five years. The specification includes indicators for exceeding the \$50 million threshold ($\mathbb{1}\{\text{Initial Investment}>50\}$) and for the post-2009 period ($\mathbb{1}\{\text{Post-2009}\}$), as well as their interaction. The coefficient of interest is β, which captures how the discontinuity at the threshold changed after the QSBS reform. The remaining polynomial terms flexibly model the relationship between investment size and forward funding, allowing for different functional forms above and below the threshold, before and after the reform. This approach effectively filters out both fixed discontinuities at the threshold unrelated to the reform and common time trends affecting all investment sizes.

Table IA6 presents our difference-in-discontinuities results. Across all polynomial specifications and bandwidth choices, we find large, negative, and statistically significant difference-in-discontinuities estimates. In the wider bandwidth sample (\$20 to \$80 million) shown in Columns (1)-(3), the estimates range from -0.61 to -1.72, implying decreases in forward funding of 45.8% to 82.1% for investments exceeding the threshold after the reform.[39] The narrower bandwidth sample (\$35 to \$65 million) in Columns (4)-(6) yields even stronger effects, with estimates ranging from -0.96 to -1.64, representing

[39] Percentage changes are computed as $100 \times (e^{\beta} - 1)$, where β is now the coefficient on the interaction term.

reductions of 61.8% to 80.6% in forward funding. These results corroborate our RDD findings that investors allocate significantly more capital to portfolios companies qualifying for tax benefits.

6 Main Empirical Strategy

Our main empirical analysis proceeds in two steps. First, we examine whether investors alter their investment selection decisions as a function of tax subsisides. Second, we study how these decisions affect observed investment outcomes.

6.1 Investment Selection

We first exploit the 2009 QSBS reform as a shock to the expected tax treatment of new investments in eligible sectors to identify changes in venture funding behavior. We do so looking at deal characteristics at the *time of initial investment* using the following linear model:

$$\begin{aligned} Y_{i,f} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Post-2009}\}_{i,f}] \\ & + \beta_2 \cdot \mathbb{1}\{\text{Eligible Sector}\}_f + \beta_3 \cdot \mathbb{1}\{\text{Post-2009}\}_{i,f} \\ & + \alpha_i + \gamma_{s,j} + \lambda_t + \epsilon_{i,f} \end{aligned} \tag{18}$$

where i indexes investors and f indexes portfolio firms. The dependent variable $Y_{i,f}$ represents risk-taking proxies at the time of initial investment, including target firm characteristics (e.g., pre-commercial stage investments, pre-existing debt), information asymmetry indicators (e.g., cross-state investments, new industry entry), external validation reliance (e.g., first startup funding), and risk-sharing approaches (e.g., syndication). The coefficient of interest is β_1 as the associated interaction term that identifies how investment selection changes for eligible sectors *vis-a-vis* ineligible after the QSBS reform.

We employ a set of fixed effects to control for confounding factors. Investor fixed effects (α_i) absorb time-invariant investor characteristics such as investment style, risk preferences, and sector specialization. State–industry fixed effects ($\gamma_{s,j}$) control for systematic differences in investment patterns across industry sectors within each investor home state, accounting for regional specialization in certain industries and local investor networks. Entry year fixed effects (λ_t) capture temporal variation in investment opportunities, including overall funding availability and vintage-specific entrepreneurial quality. Additionally, standard-error clustering at the investor level accounts for potential correlation in the residuals across different investments made by the same investor, ensuring statistical inference is robust to arbitrary correlation patterns within investor portfolios.

6.2 Performance Outcomes

In our second set of main tests, we estimate the effect of the QSBS tax reform on investment outcomes using a triple-difference design that exploits variation in sector eligibility, investor entry timing, and holding period requirements. In these tests, we go beyond studying how investors choose their target companies at the time of initial investment and study how results *evolve over the life of the investment* as investors choose how many years they hold firms in their portfolios so as to benefit from tax subsidies (specifically, less or more than five years). We use the following model:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f,t}] \\ &+ \beta_2 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t}] \\ &+ \beta_3 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f,t}] \\ &+ \beta_4 \cdot [\mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f,t}] \\ &+ \beta_7 \cdot \mathbb{1}\{\text{Eligible Sector}\}_f + \beta_6 \cdot \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} + \beta_7 \cdot \mathbb{1}\{\text{Entry Post-2009}\}_{i,f,t} \\ &+ \alpha_{i,f} + \delta_t + \theta_h + \epsilon_{i,f,t} \end{aligned} \tag{19}$$

where i indexes investors, f indexes portfolio firms, and t indexes years. $Y_{i,f,t}$ includes distress measures (e.g., business failures, funding droughts), performance outcomes (e.g., valuations, unicorn status), and investment exit channels (e.g., PE buyouts, IPOs). Our coefficient of interest is β_1. The specification includes a set of fixed effects meant to isolate the impact of the 2009 QSBS tax subsidy increase from confounding factors. Year fixed effects (δ_t) control for aggregate economic conditions and changes in the entrepreneurial finance environment—such as overall funding availability or macroeconomic shifts that affect all firms simultaneously. Holding period fixed effects (θ_h) absorb systematic patterns in how investments naturally evolve, independent of tax benefits. For example, firms typically raise larger rounds as they mature, and the probability of both failure and successful exit tends to follow predictable patterns over an venture's life. Together, year and holding-period fixed effects also account for cohort-specific shocks that affect all investments initiated in a particular year, like changes in startup formation rates or the quality of entrepreneurial opportunities or technology in different vintages (e.g., a 5-year-old technology in 2006 is different than a 5-year-old technology in 2020).

Beyond these temporal controls, we address potential selection concerns through investor–firm fixed effects ($\alpha_{i,f}$). This addresses several potential confounders. First, it controls for time-invariant investor characteristics that might affect investment behavior, such as investment style (e.g., early *versus* late stage focus), organizational structure (e.g., fund size, partnership composition), or risk preferences. Second, it absorbs firm-specific attributes that could influence outcomes, including business model, founding team quality, or initial growth prospects. Third, it accounts for any assortative matching between investors and firms —for instance, if higher-quality VC firms systematically invest in more promising startups (see Sørensen (2007) and Ewens et al. (2022)).

We cluster standard errors at the investor level to account for potential correlation in the residuals across different investments made by the same investor, which might arise from standard portfolio management practices, risk preferences, or network effects in deal sourcing and exit opportunities. We later demonstrate that our results are stable under alternative clustering schemes.

7 Results on Investment Selection

We begin by examining how tax subsidies affect investment decisions, measuring risk-taking through multiple milestones. Results under Column (1) of Panel A in Table 4 indicate that after the reform, investments in QSBS-eligible sectors become 37% more likely to take place during the pre-commercial stage. This pattern suggests that investors become more willing to back firms at early development stages—periods of greater information asymmetry and risk. The examination of investor heterogeneity in Column (1) in Panels B through D of reveals that VCs (alone) drive this early-stage effect. Indeed, VCs increase by 74% their pre-commercial stage investments. Angel and corporate investors exhibit no increase in interest for investments at the pre-commercial stage.

PLACE TABLE 4 ABOUT HERE

Tax incentives also prompt VCs to fund companies with greater financial risk. Column (2) in Panel B shows that after 2009 VCs increase their propensity to invest in QSBS-eligible firms with pre-existing debt by 183%. Debt increases firm sensitivity to market conditions—specially among early-stage firms with limited cash flows—and introduces fixed payment obligations that can potentially constrain future investment flexibility. Neither angel nor corporate investors show shifts toward debt-carrying companies.

Geographic distance serves as another proxy for risk-taking. Column (3) in Panel B shows that post-2009, VCs increase investments across state boundaries by 16% (+0.08 relative to a mean of 0.46). This greater appetite for distant investments arguably represents increased risk tolerance, as VCs typically have reduced board participation and require higher expected returns on geographically distant investments (Lerner (1995); Chen et al. (2010)).[40] Consistent with our earlier findings, angel and corporate investors (Panels C and D) show no comparable geographic expansion following the QSBS reform.

Additionally, Column (4) of Panel B shows that VCs incur greater risk by significantly increasing investments in unfamiliar industries—defined as industries where each investor made no investments during the 1998–2003 pre-sample window.[41] Specifically, VCs become 6% more likely to invest in these new industries in QSBS-eligible sectors following the reform (+0.04 relative to a mean of 0.62) compared to non-QSBS sectors and pre-2009. Angel and corporate investors show no change in industry selection.

Tax subsidies also modify VCs' selection of investment targets with respect to prior backing by startup financiers. As shown in Column (5) in Panel B, VCs become over twice as likely to provide first funding to companies following the reform—investing in firms that have not received prior backing from VCs, angel investors, corporate investors, accelerators, or private debt funds. This shift toward first funding represents increased risk-taking since financial backing provides quality signals and validation that come from prior screening processes.[42] In contrast, Column (5) in Panels C and D show that angel and corporate investors maintain pre-reform preferences regarding first funding.

Examining syndication patterns, Column (6) shows that tax incentives significantly alter the number of investors participating in funding rounds. Panel B reveals that VC investments in QSBS-

[40] Distance is also naturally associated with higher information asymmetries (Van Nieuwerburgh and Veldkamp (2009)).

[41] Gompers et al. (2008) document that VCs with industry-specific experience outperform novices.

[42] Companies pass through rigorous screening and due diligence processes to receive funding from these startup financiers and receive ongoing monitoring (Gompers et al. (2020); Kerr et al. (2014); Block et al. (2024); Mayya and Huang (2025)).

eligible sectors post-reform become 20% less likely to involve multiple (five or more) investors (–0.09 relative to a mean of 0.46). VCs also become 27% more likely to be sole investors (t = 2.1; not reported). These patterns indicate that VCs are not only selecting riskier ventures but are also choosing to internalize more of that risk—concentrating both upside and downside exposure. In contrast, angel and corporate investors do not show any statistically significant shifts in syndication behavior.

The results from this section show that tax benefits affect risk-taking through the selection of inherently riskier ventures, with effects driven exclusively by VC investors. These differential responses directly confirm Prediction 2 from our conceptual framework: VCs' unique combination of outside capital with incentive-based compensation creates significantly stronger tax sensitivity than angels investing their own capital or corporates operating under different tax regimes. Figure IA7 presents dynamic difference-in-differences estimates, showing coefficients in pre-reform years (2004–2008) remain statistically indistinguishable from zero, supporting the parallel trends assumption.

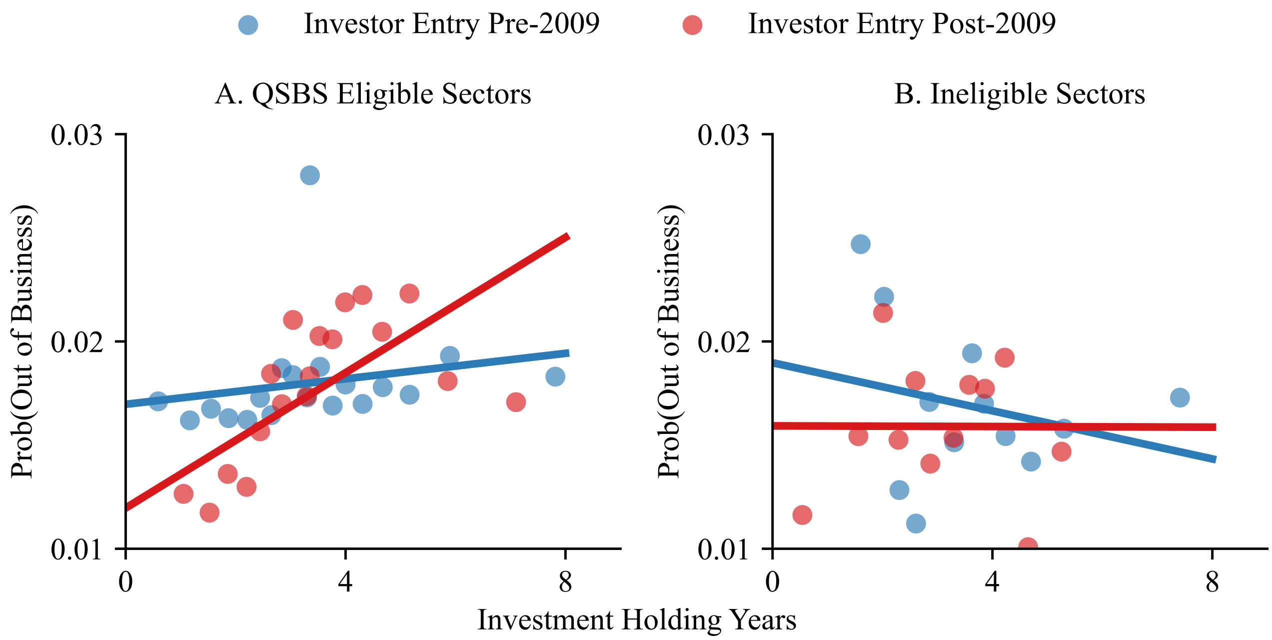
8 Results on Investment Outcomes

We now examine how the shift in investment strategy manifests in investment outcomes. We do so by implementing a triple-difference design that exploits sector eligibility under the QSBS criteria, investment entry timing relative to the 2009 reform, and the program's five-year holding requirement.

8.1 Investment Failure

We first examine how QSBS tax subsidies affect the likelihood of failed investments. Results under Columns (3) and (4) of Panel A in Table 5 show that when investments qualify for tax benefits, QSBS-eligible VC-backed investment firms become 71% more likely to go out of business. To wit, the tabulated triple interaction effect of 0.012 (= $\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$) isolates the differential impact of the tax reform on QSBS-eligible VC investments that satisfy the five-year holding requirement relative to investments that do not meet all three criteria. The double interaction terms capture baseline differences: the 0.002 coefficient on $\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$ is statistically insignificant, indicating no meaningful difference in failure rates for eligible-sector VC investments held long-term prior to the reform, while the −0.025 coefficient on $\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$ shows

Figure 10: Binned Scatterplots of Holding Period on Firm Closure for QSBS-Eligible Sectors



This figure shows the relationship between business closure probabilities and investment holding periods for the QSBS-eligible sectors, pre- and post-2009. Each point shows the mean closure probability within holding period bins (years) after controlling for investor–year fixed effects. Data are from PitchBook.

that ineligible long-held VC investments were significantly less likely to fail after 2009. Our triple-difference estimate thus represents the incremental increase in failure probability of VC-baked ventures specifically attributable to QSBS tax qualification beyond these underlying differences.

PLACE TABLE 5 ABOUT HERE

Figure 10 characterizes the above results. Panel A shows that, among QSBS-eligible VC investments, post-2009 cohorts (red dots) initially exhibit lower business-failure rates than their pre-2009 counterparts (blue dots), but after the five-year holding threshold, post-2009 investments exhibit higher failure rates. In contrast, Panel B reveals that in ineligible sectors, post-2009 investments maintain relatively flat failure rates across holding periods, with no similar increase after the five-year threshold. This pattern is consistent with two driving forces. First, more of these post-2009 deals involve pre-commercial stage ventures, which typically follow longer development timelines and thus stay afloat longer before revealing true performance. Second, the enhanced QSBS tax incentives prompted VCs to keep marginally underperforming firms alive at least until they hit the required five-year mark to lock in the exemption.

Tax-subsidized VC investments also show manifestations of distress through funding droughts. The coefficients under Column (3) of Panel B imply that as investments qualify for tax benefits, VC investments become 169% more likely to experience funding gaps of five or more years (+0.08 relative to a mean of 0.05). Successful startups typically raise new rounds every 12 to 18 months (Gompers (1995)), making such extended periods without capital often precede outright failure. These results are again consistent with the idea that VCs keep poorly selected, risky investments in their portfolios until they hit the required mark to lock in the QSBS tax exemption. Results in Columns (5) through (8) show that these patterns do not at all emerge for angel or corporate investors.[43]

8.2 Valuations and Exit Decisions

We next examine how tax benefits affect firm valuations. Panel A reveals stark differences across investor types. Columns (3) and (4) show that for VC-backed companies, tax benefits have modest effects overall (positive coefficient, marginally insignificant) but generate substantial gains among firms that achieve exits—valuations increase by more than $240 million, representing a 131% gain relative to the sample mean of $185 million. In contrast, Columns (5) and (6) show that angel-backed companies experience significant valuation *declines* of $209 to $399 million when tax benefits apply, while Columns (7) and (8) show that corporate investors have negative but statistically insignificant effects.

PLACE TABLE 6 ABOUT HERE

Panel B of Table 6 shows that tax subsidies significantly affect the probability of achieving unicorn status. As shown in Columns (3) and (4), VC-backed investments that qualify for tax benefits become twice as likely to reach billion-dollar valuations, with this effect increasing to *four times* as likely among investments that achieve an exit.[44] In sharp contrast, Columns (5) and (6) show that angel-backed investments have a *decreasing* probability of achieving unicorn status, though this negative effect becomes statistically insignificant among exits. Corporate investments, reported in Columns (7) and (8), show no statistically significant effects on unicorn probability in either specification.[45]

[43] Failure results are robust to alternative modeling approaches, including logit and probit models (see Columns (3) and (4) in Table IA7) and different standard error clustering schemes (see Columns (3) and (4) in Table IA8).

[44] Table IA9 presents examples of unicorns in the sample, including Uber, Lyft, WhatsApp, and Warby Parker.

[45] Unicorn results are robust to alternative modeling approaches, including logit and probit models (see Columns (3) and (4) in Table IA7) and different standard error clustering schemes (see Columns (3) and (4) in Table IA8).

The increased dispersion of outcomes—with VC investments experiencing both higher failure rates and greater likelihood of unicorn status—is consistent with our conceptual framework's prediction that tax subsidies enable VCs to select marginally riskier ventures with higher return variance. The concentration of these effects exclusively among VCs, while angel and corporate investors show no such patterns, confirms that investor organizational structure and incentive schemes shape responses to tax policy.

Significant changes in exit patterns accompany the above valuation effects. Columns (3) and (4) in Panel A of Table 7 reveal that when investments qualify for tax benefits, VC investments become more likely to exit through private equity (PE) buyouts. However, as Columns (3) and (4) in Panels B and C show, these same investments become less likely to exit through either acquisitions or IPOs. This shift reflects the timing differences in exit channels documented in earlier literature.[46] Columns (5) through (6) in Panels A through C show that angel investors exhibit similar patterns, with a lower likelihood of acquisition outcomes and a higher probability of PE buyout conditional on exiting. In contrast, Columns (7) and (8) reveal that corporate investors show an increase in acquisition outcomes among exited portfolio companies.

Place Table 7 About Here

9 Tax Incentives and Innovation

Our analysis thus far shows that tax subsidies affect VC investment selection and outcomes at the individual deal level. We now examine whether these incentives generate consequences for how capital is allocated across industries, even *within the universe of QSBS-eligible sectors*. We focus on innovation intensity, measured using Kogan et al. (2017)'s patent-based scores.[47] Kogan et al. (2017) quantify the scientific and commercial value of innovation across industries through patent analysis.[48] The authors

[46] Kaplan and Strömberg (2009) show that PE buyouts typically occur later in a company's lifecycle, while Gompers (1996) and Puri and Zarutskie (2012) establish that IPOs and strategic acquisitions are often early exit opportunities.

[47] Innovation entails greater business risk through channels including longer and more uncertain time-to-market cycles (Hellmann and Puri (2000)). Innovative public firms show up to 3× higher stock price volatility (Pástor and Veronesi (2009)).

[48] Citation-weighted innovation (θ_{cw}) captures scientific importance by weighting patents by their subsequent citations in academic literature and patent filings. Stock market-weighted innovation (θ_{sm}) measures commercial value by weighting patents according to stock market reactions upon patent grants. Higher innovation scores indicate industries producing more scientifically important and commercially valuable innovations, respectively.

made publicly available industry-level measures based on patent analysis of 15,787 firms between 1950 and 2010. We manually map PitchBook industry classifications to their sectors and assign the corresponding innovation measures to each investment in our sample.[49]

We construct an investor-year panel dataset to test whether tax subsidies prompt systematic reallocation toward more innovative industries. For each investor i in year t, we compute the average innovation scores of their investments, calculated separately for QSBS-eligible and ineligible deals:

$$\theta^s_{i,t} = \beta_0 + \beta_1 \cdot \mathbb{1}\{\text{Post-2009}\}_t + \alpha_i + \epsilon_{i,t} \tag{20}$$

where $\theta^s_{i,t}$ represents investor i's average innovation measure (computed separately for scientific innovation θ_{cw} and commercial innovation θ_{sm}) in year t for sector type $s \in \{\text{eligible, ineligible}\}$. The coefficient β_1 captures changes in targeting of innovative industries following the 2009 reform. Investor fixed effects (α_i) control for time-invariant investment styles and sector specializations, while standard errors clustered at the investor level account for within-investor correlation across time.

Results in Panel A of Table 8 reveal a pattern of innovation reallocation. Columns (1) and (3) show that VCs increase their targeting of innovative industries *within* QSBS-eligible sectors post-2009, with both scientific value (θ_{cw}) and commercial value (θ_{sm}) measures increasing by 4% relative to the sample mean (of 6.3 and 6.1, respectively). VCs also *reduce* scientific and commercial innovation scores within ineligible sectors by 21% and 19% relative to the mean, respectively. These patterns suggest that tax benefits prompt an "innovation transfer" across sectors: VCs concentrate their most innovative investments in eligible sectors while reducing innovation-intensive investments elsewhere. Panel B of Table 8 shows that angel investors, in contrast, exhibit no significant change in innovation targeting within eligible sectors, actually increasing their focus on innovative companies in ineligible sectors.

Place Table 8 About Here

[49] Kogan et al. (2017) use Fama-French 30 (FF-30) sectors. Our mapping uses PitchBook's industry group level (42 industry units) and relies on the FF-30 sector documentation, which includes the SIC codes included in each FF-30 sector.

10 Heterogeneity in Tax Subsidy Effects

We examine next whether tax-induced risk-taking varies with the economic magnitude of tax subsidies and key characteristics of the investor ecosystem. Portfolio company failure is used as a proxy for risk-taking, estimated under the same triple differences specification used to measure performance outcomes. First, we analyze how state-level variation in capital gains tax rates and QSBS compliance affects the strength of risk-taking responses. Second, we investigate whether VC size shapes risk-taking responses to tax subsidies. Third, we examine how the composition of LPs affects VC firms' willingness to pursue tax-advantaged risk-taking strategies. We discuss these in turn.

10.1 State-Level Tax Heterogeneity

It is important that we examine how the effects we identify vary with the economic magnitude of tax subsidies. We start with a case study of investment by California-based investors. California initially partially complied with the federal-level QSBS exemption, providing qualifying investments with 50% (as opposed to 100%) exemption at the state level. This state-level benefit was economically relevant since the long-term capital gain tax rate in California ranged from 11.2% to 14.1% between 2009 and 2012. Notably, California suddenly eliminated its QSBS exclusion in 2013 after a court ruling that made any investment ineligible to state-level QSBS benefits (maintaining only federal-level benefits available).

Results in Table 9 show that, consistent with the economic magnitude of incentives, risk-taking by California-based VCs was higher when the state complied with the 100% federal-level tax exemption. Column (1) shows that tax-advantaged investments between 2009 and 2012 held for more than five years were 160% more likely to go out of business in comparison to investments in eligible sectors made between 2004 and 2008 and also held for five years or more. On the flip side, as Column (2) shows, similar investments made between 2014 and 2017 (excluding the 2013 transition year) face a more modest increase in failure likelihood: they were 59% more likely to go out of business.

PLACE TABLE 9 ABOUT HERE

We extend our heterogeneity analysis to a broader setting by examining all states that comply with the QSBS program, comparing states with low capital gains tax rates to those with high rates (up to 7% state-level tax *versus* above 7%, representing below *versus* above median state-level tax rate in our sample). All specifications continue to include investor–firm fixed effects, which control for time-invariant investor and firm characteristics—such as their geographical location. The results in Table IA10 reveal stronger risk-taking effects in QSBS-conforming high-tax states—states where the net tax subsidy stemming from compliance with QSBS is larger. Columns (1) and (2) show that low-tax states experience a 58% in business failure likelihood, while high-tax states exhibit a more pronounced 133% increase (results in low-tax states also have lower statistical significance). These systematic differences across tax regimes validate Prediction 1 of our conceptual framework: larger tax subsidies lower investment thresholds further, generating proportionally stronger risk-taking responses.

10.2 VC Firm Size and Risk-Taking

We next analyze whether VC firm size affects risk-taking responses to tax subsidies. Larger VC firms typically command higher carried interest fees (Robinson and Sensoy 2013; Gompers and Lerner 1999), which our conceptual framework shows amplify their tax sensitivity through strengthened convex payoff structures. Using fund-level data from PitchBook, we proxy each VC firm's size with the firm's total net asset value (NAV) across all active funds. We then examine how this size measure interacts with our QSBS treatment indicators (eligible sector and five-year holding) to predict the likelihood that portfolio companies go out of business, analyzing pre- and post-2009 investments separately.

Table 10 presents results analyzing pre-2009 and post-2009 investments separately. Before 2009, when tax benefits were minimal, Column (1) shows no statistically significant relationship between VC firm size and portfolio company business failures in QSBS-eligible investments. Post-2009, however, larger VCs exhibit significantly stronger risk-taking responses to tax subsidies. Column (2) shows a 107% increase in portfolio company failure rates (0.016 relative to a mean of 0.015) for *each* billion-dollar in NAV. Moving from the 25th to 75th percentile of VC firm size (from \$61 million to \$305 million in NAV) is associated with a 26% increase in out-of-business outcomes relative to the mean.[50]

PLACE TABLE 10 ABOUT HERE

[50]The mean (median) VC firm in our sample has \$269 million (\$151 million) in total net asset value.

10.3 LP Sophistication and VC Risk-Taking

We next ask whether risk-taking depends on who supplies a VC firm's capital. Existing evidence suggests that "sophisticated" LPs support greater risk-taking by GPs through three key channels. First, they maintain long-term investment horizons with performance measured over multi-year periods and board directors serving extended terms (Lerner et al. (2008); Ivashina and Lerner (2019)). These long-term goals reduce pressure for interim performance by GPs (Lerner and Schoar (2004)), enabling VCs to pursue riskier investments. Second, sophisticated LPs have "deep pockets" and strong governance structures. They are largely insulated from political pressure, with boards that advise rather than micromanage investment strategies, and are less likely to panic-sell LP stakes when performance declines (Ivashina and Lerner (2019)).[51] Third, they employ professional investment teams experienced in managing risky capital, with long-tenured staff and investment committees drawn from alumni networks of elite institutions (Lerner et al. (2008)). This professional capability enables them to evaluate and support complex, high-risk investment strategies that less sophisticated LPs might not understand or appreciate.

University endowments of elite private institutions represent the most sophisticated LPs in the VC ecosystem. They are by far the best-performing LPs (Lerner et al. (2007)), with Yale achieving 77% annual returns from its VC investments over the last two decades (Ivashina and Lerner (2019)). These institutions combine long-term investment horizons, professional management capabilities, and substantial risk tolerance—with Yale allocating 95% of its assets to risky investments (Yale University (2024)). In contrast, non-elite endowments often lack sophisticated investment officers trained in alternative asset management and prestigious alumni networks that provide deal flow and advisory capabilities (Lerner et al. (2008)). Public university endowments face additional constraints through direct political interference. Their boards often include politically-appointed members—often found to prioritize political gains over investment returns (Andonov et al. (2018))—and exhibit greater home-state bias in their LP investments compared to private counterparts (Hochberg and Rauh (2013)).[52]

[51] Secondary market sales of LP stakes occur at substantial discounts, and the buyers—usually specialized fund-of-funds—rarely provide follow-on capital (Nadauld et al. (2019)). This pushes VC firms toward external fundraising, which is costly due to information asymmetries faced by uninformed new investors regarding GP quality (Lerner and Schoar (2004)).

[52] A recent example illustrates this dynamic: In 2024, Texas Governor Greg Abbott stated "I instructed The University of Texas/Texas A&M Investment Management Company (UTIMCO) to divest from China" (Abbott, Greg (2024)). UT System Board Chairman Kevin Eltife responded: "We welcome this directive from the governor" (Kepner (2024)). UTIMCO subsequently changed its investment benchmarks to reduce Chinese exposure from 67% to 50% of emerging market investments.

Other major LP categories face institutional constraints that limit their capacity to support VC risk-taking. Pension funds—both public and private—often lack the governance structures and talent necessary to evaluate and support high-risk investments. Their boards frequently include politically-appointed members and beneficiaries (such as firefighters) who often lack investment sophistication (Ivashina and Lerner (2019)). Additionally, excessive representation of retirees creates short-termism and risk aversion, while these institutions struggle to retain investment talent due to restrictions on incentive-based compensation.[53] Similar constraints affect other major LP categories (Ivashina and Lerner (2019)). Corporate pension funds often decline to invest in follow-on funds of VCs that deserve it, creating fundraising pressures that arguably affects risk-taking. Insurance companies must maintain statutory reserves and face scrutiny from rating agencies, leading them to prefer conservative investment strategies. Banks face regulatory constraints and often lack talent skilled in evaluating private markets.

We collect detailed fund-level LP composition data from PitchBook and construct proxies for elite university endowments: the fraction of LPs from top 25 SAT-ranked private universities, top 25 private endowments by assets, and Ivy League institutions (cf. Lerner et al. (2008)).[54] SAT ranks are based on minimum scores for admissions, as disclosed by the College Board for the academic year of 2012–2013 (near the midpoint of our sample). Endowment figures are collected from the Department of Education for the same academic year. For each VC firm-year, we calculate these sophistication fractions across all active funds, defined as funds within ten years of their vintage year. We test whether VC firms with higher fractions of sophisticated LPs exhibit stronger risk-taking responses to tax subsidies (proxied by portfolio company failure rates) by interacting these measures with the tax treatment indicators in our baseline specifications. We analyze pre- and post-2009 investments separately.

[53] In 2011, the Teacher Retirement System of Texas (TRS) awarded $8.2 million in bonuses to its investment managers. Tim Lee, the executive director of the Texas Retired Teachers Association, described the bonuses as creating a feeling of "almost, maybe disgust," while Representative Sylvester Turner stated: "I can't justify it. I don't care how well things have performed in their investment portfolio." R. David Kelly, who leads the TRS board, defended the payments stating that investment managers receive lower salaries than they would receive in private entities (Timms and Hoppe (2011); Ivashina and Lerner (2019)).

[54] Top-25 SAT-ranked private universities include (alphabetically): Boston College, Brown University, California Institute of Technology, Carnegie Mellon University, Columbia University, Cornell University, Dartmouth College, Duke University, Emory University, Harvard University, Johns Hopkins University, MIT, Northwestern University, New York University, Princeton University, Rice University, Stanford University, Tulane University, Tufts University, University of Pennsylvania, University of Southern California, Vanderbilt University, Washington University in St. Louis, and Yale University. Top-25 private endowments include (alphabetically): Columbia University, Cornell University, Dartmouth College, Duke University, Emory University, Harvard University, MIT, Northwestern University, Princeton University, Rice University, Stanford University, University of Chicago, University of Notre Dame, University of Pennsylvania, University of Southern California, Vanderbilt University, Washington University in St. Louis, and Yale University.

Table 11 presents results. Before 2009—when tax incentives were minimal—we observe no differential effects across VCs with varying fractions of elite private endowment LPs (Columns 1, 3, and 5). Post-2009, however, VCs backed by more private elite endowment LPs exhibit dramatically stronger responses to tax incentives. Specifically, Columns (2), (4), and (6) show that a 10 percentage point increase in the fraction of elite private endowment LPs amplifies the baseline increase in portfolio company failure rate (0.013) by two to three *times*. For example, Column (2) shows that VCs with *only* top 25 SAT-ranked private university LPs exhibit coefficients of 0.212 (an 11.8-fold increase relative to the mean of 0.018 and a magnitude 16.3 times larger than the baseline increase of 0.013). These results confirm that sophisticated LPs enable stronger risk-taking responses when tax incentives favor such behavior.

PLACE TABLE 11 ABOUT HERE

11 Concluding Remarks

This paper examines whether tax subsidies prompt investors to fund riskier ventures. Our analysis of the QSBS program yields several findings. First, tax incentives significantly shape VC investments. When and where tax subsidies become available, VCs strategically shift toward riskier ventures: they become more likely to investment in pre-commercial stage startups and to back firms carrying pre-existing debt. VCs also become more likely to invest across state lines, provide a company's first funding, and less likely to syndicate. This risk-taking strategy generates consequential outcomes—tax-qualified investments experience higher failure rates and greater funding gaps, but also achieve higher valuations and are more likely to reach unicorn status. Additionally, the response is uniquely concentrated among VC partnerships—we find no comparable risk-shifting among angel investors or corporations.

Our findings advance the understanding of how tax policy affects entrepreneurial financial markets in two important ways. First, they establish that investor organizational structure matters for policy transmission—we show that tax incentives may work effectively through VC-based investment.Second, tax policy can help overcome financing frictions by encouraging VC investors to fund marginally riskier ventures that would otherwise go unfunded. While critics have argued that programs like the QSBS primarily benefit sophisticated investors who would fund innovative ventures regardless, our evidence suggests a more nuanced inference. Tax benefits effectively expand the frontier of entrepreneurial investment by altering risk-return tradeoffs, particularly when channeled through intermediaries combining outside capital with strong performance incentives. Future research could further explore the private *versus* social benefits of these tax incentives, and their broader welfare implications.

References

Abbott, Greg, 2024, Governor Abbott Directs State Agencies To Divest Portfolios From China, Press release, Accessed June 14, 2025.

Abdulrauf, Zahrah, Gerald Auten, Paul R. Organ, and Quinton White, 2025, Quantifying the 100% Exclusion of Capital Gains on Small Business Stock, Working Paper 127 Office of Tax Analysis.

Agrawal, Ajay, Carlos Rosell, and Timothy Simcoe, 2020, Tax Credits and Small Firm R&D Spending, *American Economic Journal: Economic Policy* 12, 1–21.

Akcigit, Ufuk, John Grigsby, Tom Nicholas, and Stefanie Stantcheva, 2022, Taxation and Innovation in the Twentieth Century, *The Quarterly Journal of Economics* 137, 329–385.

Akcigit, Ufuk, and William R Kerr, 2018, Growth through Heterogeneous Innovations, *Journal of Political Economy* 126, 1374–1443.

Andonov, Aleksandar, Yael V. Hochberg, and Joshua D. Rauh, 2018, Political Representation and Governance: Evidence from the Investment Decisions of Public Pension Funds, *Journal of Finance* 73, 2041–2086.

Arora, Ashish, Andrea Fosfuri, and Thomas Rønde, 2021, Waiting for the Payday? The Market for Startups and the Timing of Entrepreneurial Exit, *Management Science* 67, 1453–1467.

Axelson, Ulf, Tim Jenkinson, Per Strömberg, and Michael S. Weisbach, 2013, Borrow Cheap, Buy High? The Determinants of Leverage and Pricing in Buyouts, *Journal of Finance* 68, 2223–2267.

Axelson, Ulf, Per Strömberg, and Michael S. Weisbach, 2009, Why Are Buyouts Levered? The Financial Structure of Private Equity Funds, *Journal of Finance* 64, 1549–1582.

Barber, Brad M., and Ayako Yasuda, 2017, Interim Fund Performance and Fundraising in Private Equity, *Journal of Financial Economics* 124, 172–194.

Bena, Jan, and Kai Li, 2014, Corporate Innovations and Mergers and Acquisitions, *The Journal of Finance* 69, 1923–1960.

Bennedsen, Morten, Elena Simintzi, Margarita Tsoutsoura, and Daniel Wolfenzon, 2022, Do Firms Respond to Gender Pay Gap Transparency?, *Journal of Finance* 77, 2051–2091.

Bertanha, Marinho, Andrew H. McCallum, and Nathan Seegert, 2023, Better Bunching, Nicer Notching, *Journal of Econometrics* 237, 105383.

Block, Joern, Young Soo Jang, Steven N Kaplan, Anna Schulze, and Isil Erel, 2024, A Survey of Private Debt Funds, *The Review of Corporate Finance Studies* 13, 335–383.

Brown, Kristine M., 2013, The Link Between Pensions and Retirement Timing: Lessons from California Teachers, *Journal of Public Economics* 98, 1–14.

Calonico, Sebastian, Matias D. Cattaneo, and Rocio Titiunik, 2014, Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs, *Econometrica* 82, 2295–2326.

Campello, Murillo, Janet Gao, and Qiping Xu, 2025, Personal Taxes and Firm Skill Hiring: Evidence from 27 Million Job Postings, *Management Science* forthcoming.

Cattaneo, Matias D., Michael Jansson, and Xinwei Ma, 2020, Simple Local Polynomial Density Estimators, *Journal of the American Statistical Association* 115, 1449–1455.

Chari, V.V., Mikhail Golosov, and Aleh Tsyvinski, 2005, Business Start-ups, The Lock-in Effect, and Capital Gains Taxation, Working Paper.

Chemmanur, Thomas J., Elena Loutskina, and Xuan Tian, 2014, Corporate Venture Capital, Value Creation, and Innovation, *The Review of Financial Studies* 27, 2434–2473.

Chen, Henry, Paul Gompers, Anna Kovner, and Josh Lerner, 2010, Buy Local? The Geography of Venture Capital, *Journal of Urban Economics* 67, 90–102.

Chen, Jun, and Joan Farre-Mensa, 2023, The Effects of the Qualified Small Business Stock Exemption on Entrepreneurship and Innovation, Working Paper.

Chetty, Raj, John N. Friedman, Tore Olsen, and Luigi Pistaferri, 2011, Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records, *The Quarterly Journal of Economics* 126, 749–804.

Chirinko, Robert S., and Daniel J. Wilson, 2008, State Investment Tax Incentives: A Zero-Sum Game?, *Journal of Public Economics* 92, 2362–2384.

Chung, Ji-Woong, Berk A. Sensoy, Léa Stern, and Michael S. Weisbach, 2012, Pay for Performance from Future Fund Flows: The Case of Private Equity, *The Review of Financial Studies* 25, 3259–3304.

Cochrane, John H., 2005, The Risk and Return of Venture Capital, *Journal of Financial Economics* 75, 3–52.

Constantinides, George M., 1983, Capital Market Equilibrium with Personal Tax, *Econometrica* 51, 611–636.

Curtis, E. Mark, and Ryan A. Decker, 2018, Entrepreneurship and State Taxation, Discussion Paper, 2018–003 Finance and Economics Discussion Paper.

Denes, Matthew, Sabrina T. Howell, Filippo Mezzanotti, Xinxin Wang, and Ting Xu, 2023, Investor Tax Credits and Entrepreneurship: Evidence from U.S. States, *The Journal of Finance* 78, 1955–2011.

Dimitrova, Lora, and Sapnoti K. Eswar, 2023, Capital Gains Tax, Venture Capital, and Innovation in Start-Ups, *Review of Finance* 27, 1471–1519.

Edwards, Alexander, and Maximilian Todtenhaupt, 2020, Capital Gains Taxation and Funding for Start-ups, *Journal of Financial Economics* 138, 549–571.

Ewens, Michael, Alexander Gorbenko, and Arthur Korteweg, 2022, Venture Capital Contracts, *Journal of Financial Economics* 143, 131–158.

Ewens, Michael, Charles M. Jones, and Matthew Rhodes-Kropf, 2013, The Price of Diversifiable Risk in Venture Capital and Private Equity, *The Review of Financial Studies* 26, 1854–1889.

Ewens, Michael, and Matthew Rhodes-Kropf, 2015, Is a VC Partnership Greater Than the Sum of Its Partners?, *The Journal of Finance* 70, 1081–1113.

Fajgelbaum, Pablo D., Eduardo Morales, Juan Carlos Suárez Serrato, and Owen Zidar, 2019, State Taxes and Spatial Misallocation, *Review of Economic Studies* 86, 333–376.

Feenberg, Daniel Richard, and Elizabeth Coutts, 1993, An Introduction to the TAXSIM Model, *Journal of Policy Analysis and Management* 12, 189–194.

Freedman, Matthew, Shantanu Khanna, and David Neumark, 2022, Combining Rules and Discretion in Economic Development Policy: Evidence on the Impacts of the California Competes Tax Credit, *Journal of Public Economics* 211, 104777.

Giroud, Xavier, and Joshua Rauh, 2019, State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data, *Journal of Political Economy* 127, 1262–1316.

Gocmen, Ararat, Clara Martinez-Toledano, and Vrinda Mittal, 2025, Private Capital Markets and Inequality, Working Paper.

Gompers, Paul, 1996, Grandstanding in the Venture Capital Industry, *Journal of Financial Economics* 42, 133–156.

Gompers, Paul, Anna Kovner, Josh Lerner, and David Scharfstein, 2008, Venture Capital Investment Cycles: The Impact of Public Markets, *Journal of Financial Economics* 87, 1–23.

Gompers, Paul, and Josh Lerner, 1999, An Analysis of Compensation in the U.S. Venture Capital Partnership, *Journal of Financial Economics* 51, 3–44.

Gompers, Paul A., 1995, Optimal Investment, Monitoring, and the Staging of Venture Capital, *The Journal of Finance* 50, 1461–1489.

Gompers, Paul A., Will Gornall, Steven N. Kaplan, and Ilya A. Strebulaev, 2020, How Do Venture Capitalists Make Decisions?, *Journal of Financial Economics* 135, 169–190.

Gompers, Paul A., and Josh Lerner, 1998, What Drives Venture Capital Fundraising?, *Brookings Papers on Economic Activity: Microeconomics* 1998, 149–204.

Graham, John R., and Mark T. Leary, 2011, A Review of Empirical Capital Structure Research and Directions for the Future, *Annual Review of Financial Economics* 3, 309–345.

Graham, Paul, 2010, High Resolution Fundraising, *Paul Graham Essays* Accessed June 14, 2025.

Grembi, Veronica, Tommaso Nannicini, and Ugo Troiano, 2016, Do Fiscal Rules Matter?, *American Economic Journal: Applied Economics* 8, 1–30.

Hall, Bronwyn, and John Van Reenen, 2000, How Effective are Fiscal Incentives for R&D? A Review of the Evidence, *Research Policy* 29, 449–469.

Hall, Bronwyn H., and Josh Lerner, 2010, The Financing of R&D and Innovation, in Bronwyn H. Hall, and Nathan Rosenberg, ed.: *Handbook of the Economics of Innovation*vol. 1 . pp. 609–639 (Elsevier).

Hall, Robert E., and Susan E. Woodward, 2010, The Burden of the Nondiversifiable Risk of Entrepreneurship, *American Economic Review* 100, 1163–1194.

Haltiwanger, John, Ron S Jarmin, and Javier Miranda, 2013, Who Creates Jobs? Small versus Large versus Young, *The Review of Economics and Statistics* 95, 347–361.

Harris, Robert S., Tim Jenkinson, Steven N. Kaplan, and Ruediger Stucke, 2023, Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds, *Journal of Corporate Finance* 81, 102361.

Hellmann, Thomas, and Manju Puri, 2000, The Interaction between Product Market and Financing Strategy: The Role of Venture Capital, *The Review of Financial Studies* 13, 959–984.

Hochberg, Yael V., Alexander Ljungqvist, and Yang Lu, 2007, Whom You Know Matters: Venture Capital Networks and Investment Performance, *The Journal of Finance* 62, 251–301.

Hochberg, Yael V., and Joshua D. Rauh, 2013, Local Overweighting and Underperformance: Evidence from Limited Partner Private Equity Investments, *The Review of Financial Studies* 26, 403–451.

Howell, Sabrina T., 2017, Financing Innovation: Evidence from R&D Grants, *American Economic Review* 107, 1136–1164.

Imbens, Guido, and Karthik Kalyanaraman, 2012, Optimal Bandwidth Choice for the Regression Discontinuity Estimator, *The Review of Economic Studies* 79, 933–959.

IRS, 1993, 26 U.S.C. § 1202 - Partial Exclusion for Gain from Certain Small Business Stock, Department of the Treasury.

Ivashina, Victoria, and Josh Lerner, 2019, *Patient Capital: The Challenges and Promises of Long-Term Investing* (Princeton University Press: Princeton, NJ) first edn.

Ivković, Zoran, James Poterba, and Scott Weisbenner, 2005, Tax-Motivated Trading by Individual Investors, *American Economic Review* 95, 1605–1630.

Kaplan, Steven, 1981, The Holding Period Distinction of the Capital Gains Tax, NBER Working Paper No. 762.

Kaplan, Steven N., and Antoinette Schoar, 2005, Private Equity Performance: Returns, Persistence, and Capital Flows, *The Journal of Finance* 60, 1791–1823.

Kaplan, Steven N., and Per Strömberg, 2009, Leveraged Buyouts and Private Equity, *Journal of Economic Perspectives* 23, 121–146.

Kepner, Lily, 2024, The University of Texas System Will Divest From China: How Gov. Abbott Influenced Decision, *Austin American-Statesman* Accessed June 14, 2025.

Kerr, William R., Josh Lerner, and Antoinette Schoar, 2014, The Consequences of Entrepreneurial Finance: Evidence from Angel Financings, *The Review of Financial Studies* 27, 20–55.

Keuschnigg, Christian, and Soren Bo Nielsen, 2003, Tax Policy, Venture Capital, and Entrepreneurship, *Journal of Public Economics* 87, 175–203.

Kleven, Henrik Jacobsen, 2016, Bunching, *Annual Review of Economics* 8, 435–464.

Kleven, Henrik Jacobsen, and Mazhar Waseem, 2013, Using Notches to Uncover Optimization Frictions and Structural Elasticities: Theory and Evidence from Pakistan, *The Quarterly Journal of Economics* 128, 669–723.

Kogan, Leonid, Dimitris Papanikolaou, Amit Seru, and Noah Stoffman, 2017, Technological Innovation, Resource Allocation, and Growth, *The Quarterly Journal of Economics* 132, 665–712.

Lee, Aileen, 2013, Welcome To The Unicorn Club: Learning From Billion-Dollar Startups, TechCrunch.

Lee, David S., and Thomas Lemieux, 2010, Regression Discontinuity Designs in Economics, *Journal of Economic Literature* 48, 281–355.

Lerner, Josh, 1994, The Syndication of Venture Capital Investments, *Financial Management* 23, 16–27.

Lerner, Josh, 1995, Venture Capitalists and the Oversight of Private Firms, *Journal of Finance* 50, 301–318.

Lerner, Josh, 2022, Government Incentives for Entrepreneurship, in Austan Goolsbee, and Benjamin Jones, ed.: *Innovation and Public Policy* . pp. 213–235 (University of Chicago Press).

Lerner, Josh, and Antoinette Schoar, 2004, The Illiquidity Puzzle: Theory and Evidence from Private Equity, *Journal of Financial Economics* 72, 3–40.

Lerner, Josh, Antoinette Schoar, and Jialan Wang, 2008, Secrets of the Academy: The Drivers of University Endowment Success, *Journal of Economic Perspectives* 22, 207–222.

Lerner, Josh, Antoinette Schoar, and Wan Wongsunwai, 2007, Smart Institutions, Foolish Choices: The Limited Partner Performance Puzzle, *The Journal of Finance* 62, 731–764.

Lin, Leming, and Mark J Flannery, 2013, Do Personal Taxes Affect Capital Structure? Evidence from the 2003 Tax Cut, *Journal of Financial Economics* 109, 549–565.

Ma, Song, 2020, The Life Cycle of Corporate Venture Capital, *The Review of Financial Studies* 33, 358–394.

Mayya, Raveesh, and Peng Huang, 2025, Startup Accelerators, Information Asymmetry, and Corporate Venture Capital Investments, *Management Science* Forthcoming.

Metrick, Andrew, and Ayako Yasuda, 2010, The Economics of Private Equity Funds, *The Review of Financial Studies* 23, 2303–2341.

Metrick, Andrew, and Ayako Yasuda, 2021, *Venture Capital and the Finance of Innovation* (Wiley) 3rd edn.

Nadauld, Taylor D., Berk A. Sensoy, Keith Vorkink, and Michael S. Weisbach, 2019, The Liquidity Cost of Private Equity Investments: Evidence from Secondary Market Transactions, *Journal of Financial Economics* 132, 158–181.

NVCA, 2024, NVCA Model Investors' Rights Agreement, Model Legal Document.

NVCA, 2025, National Venture Capital Association (NVCA) 2025 Yearbook, Annual Report Washington, DC.

Pástor, Ľuboš, and Pietro Veronesi, 2009, Technological Revolutions and Stock Prices, *American Economic Review* 99, 1451–1483.

Pindyck, Robert S., 1988, Irreversible Investment, Capacity Choice, and the Value of the Firm, *American Economic Review* 78, 969–985.

Poterba, James M., 1989, Venture Capital and Capital Gains Taxation, *Tax Policy and the Economy* 3, 47–67.

Puri, Manju, and Rebecca Zarutskie, 2012, On the Life Cycle Dynamics of Venture-Capital- and Non-Venture-Capital-Financed Firms, *The Journal of Finance* 67, 2247–2293.

Ritter, Jay R., 1988, The Buying and Selling Behavior of Individual Investors at the Turn of the Year, *The Journal of Finance* 43, 701–717.

Robinson, David T., and Berk A. Sensoy, 2013, Do Private Equity Fund Managers Earn Their Fees? Compensation, Ownership, and Cash Flow Performance, *The Review of Financial Studies* 26, 2760–2797.

Saez, Emmanuel, 2010, Do Taxpayers Bunch at Kink Points?, *American Economic Journal: Economic Policy* 2, 180–212.

Sialm, Clemens, 2009, Tax Changes and Asset Pricing, *American Economic Review* 99, 1356–1383.

Slattery, Cailin, and Owen Zidar, 2020, Evaluating State and Local Business Incentives, *Journal of Economic Perspectives* 34, 90–118.

Sørensen, Morten, 2007, How Smart Is Smart Money? A Two-Sided Matching Model of Venture Capital, *The Journal of Finance* 62, 2725–2762.

Spiro, Michael P., 2019, Private Equity and Qualified Small Business Stock: Tax Implications of Various Holding Company Structures for Control Investments, *The Journal of Private Equity* 22, 10–29.

Takebe, T., R. Imai, and S. Ono, 2018, The Current Status of Drug Discovery and Development as Originated in United States Academia: The Influence of Industrial and Academic Collaboration on Drug Discovery and Development, *Clinical and Translational Science* 11, 597–606.

Timms, Ed, and Christy Hoppe, 2011, Texas Teacher Pension Fund Gave More in Bonuses Than All Other State Agencies Combined, Analysis Shows, *The Dallas Morning News* Accessed on June 14, 2025.

Van Nieuwerburgh, Stijn, and Laura Veldkamp, 2009, Information Immobility and the Home Bias Puzzle, *The Journal of Finance* 64, 1187–1215.

Viswanathan, Manoj, 2020, The Qualified Small Business Stock Exclusion: How Startup Shareholders Get $10 Million (or more) Tax-Free, *Columbia Law Review Forum* 120, 29–64.

Wong, Chi Heem, Kien Wei Siah, and Andrew W Lo, 2019, Estimation of Clinical Trial Success Rates and Related Parameters, *Biostatistics* 20, 273–286.

Yale University, 2024, Yale University Financial Report 2023–2024, Accessed June 14, 2025.

Zwick, Eric, and James Mahon, 2017, Tax Policy and Heterogeneous Investment Behavior, *American Economic Review* 107, 217–248.

Table 1: Summary Statistics

	All Portfolio Companies						Portfolio Companies Achieving an Exit					
	Mean	SD	P10	P50	P90	N	Mean	SD	P10	P50	P90	N
Panel A: Investment Characteristics												
Holding Years	3.374	2.618	0.000	3.000	7.000	1,052,649	2.732	2.317	0.000	2.000	6.000	464,363
$\mathbb{1}${Holding Years $\geq$ 5}	0.321	0.467	0.000	0.000	1.000	1,052,649	0.219	0.413	0.000	0.000	1.000	464,363
Investment Entry Year	2012.8	3.363	2007	2014	2017	1,052,649	2012.0	3.411	2007	2013	2016	464,363
$\mathbb{1}${Post-2009}	0.858	0.349	0.000	1.000	1.000	1,052,649	0.811	0.391	0.000	1.000	1.000	464,363
$\mathbb{1}${Eligible Sector}	0.887	0.317	0.000	1.000	1.000	1,052,611	0.901	0.298	1.000	1.000	1.000	464,363
Panel B: Investment Performance												
$\mathbb{1}${Out of Business}	0.019	0.135	0.000	0.000	0.000	1,052,649	0.042	0.201	0.000	0.000	0.000	464,363
$\mathbb{1}${Five Years Without Funding}	0.064	0.245	0.000	0.000	0.000	1,052,649	0.026	0.159	0.000	0.000	0.000	464,363
Valuation ($ billions)	0.316	2.361	0.006	0.037	0.400	277,908	0.405	3.115	0.006	0.040	0.431	136,610
$\mathbb{1}${Unicorn}	0.048	0.213	0.000	0.000	0.000	277,908	0.050	0.219	0.000	0.000	0.000	136,610
Panel C: Investment Exit Paths												
$\mathbb{1}${Private Equity Buyout}	0.007	0.083	0.000	0.000	0.000	1,052,649	0.016	0.125	0.000	0.000	0.000	464,363
$\mathbb{1}${Acquisition}	0.044	0.206	0.000	0.000	0.000	1,052,649	0.100	0.301	0.000	0.000	1.000	464,363
$\mathbb{1}${IPO}	0.005	0.070	0.000	0.000	0.000	1,052,649	0.011	0.104	0.000	0.000	0.000	464,363

This table presents summary statistics for our investor–firm–year level sample used in triple-difference regressions, including investments in C-corporations from 2004 to 2017 (tracked from 2004 to 2022). The sample tracks each portfolio–firm pairing from initial investment year until investor exit. For the full sample construction details, see Section 4. Statistics are presented separately for all investments and those that experienced any exit. Panel A reports investment characteristics. Panel B shows portfolio company performance measures. Panel C reports portfolio company exit paths. Data are from PitchBook.

Table 2: Difference-in-Bunching Estimates: Elasticity of Holding Periods to Tax Benefits

Statistical Model	Trapezoidal Approximation (Elasticity ϵ)	Observations	
		Eligible	Counterfactual
	(1)	(2)	(3)
Panel A: QSBS-Eligible Sectors, Post-2009 versus Pre-2009			
Elasticity (ϵ)	1.958***	25,708	24,215
	(4.13)		
Panel B: QSBS-Eligible versus Ineligible Sectors, Post-2009			
Elasticity (ϵ)	3.668***	25,708	2,162
	(8.08)		
Panel C: QSBS-Eligible Post-2009 versus Ineligible Pre-2009			
Elasticity (ϵ)	2.731***	25,708	1,605
	(4.64)		

This table reports difference-in-bunching elasticity estimates for QSBS tax benefits. Each unit of elasticity represents a 1% increase in the mass of investors exiting precisely at five-year holding period for each percentage point of tax subsidy. For example, an elasticity of 2.0 means the mass of investors exiting investments at the five-year mark increases by 2% for each 1% of tax subsidy. Panel A presents the difference between eligible investments (eligible sectors, investor entry post-2009) and eligible investments pre-2009. Panel B presents the difference between eligible investments and ineligible investments, both post-2009. Panel C presents the difference between eligible investments post-2009 and ineligible investments pre-2009. Elasticity estimates are obtained using a trapezoidal approximation; the t-statistics (in parentheses) are based on bootstrap standard errors (1,000 replications). Observations refer to the number of investor–firm-years. The sample includes investments from 2007 to 2010. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 3: Regression Discontinuity Estimates: QSBS-Qualification Status on Forward Funding

Dependent Variable:	Forward Funding					
	Pre-2009			Post-2009		
	Linear (1)	Quadratic (2)	Cubic (3)	Linear (4)	Quadratic (5)	Cubic (6)
$\mathbb{1}\{\text{Initial Investment}>50\}$	−0.100	−0.568	−0.173	−1.116***	−0.374***	−0.689***
	(−0.29)	(−0.98)	(−0.27)	(−9.53)	(−2.68)	(−4.94)
Observations	1,679	1,679	1,679	5,702	5,702	5,702
Bandwidth	3.79	4.96	7.67	5.65	5.50	13.15

This table presents regression discontinuity design (RDD) estimates of the effect of the $50 million investment-size threshold on forward funding. Investments above this threshold are ineligible for QSBS benefits. The dependent variable is the natural logarithm of the cumulative dollars invested by venture capital and angel investors in the five calendar years after the focal deal, net of the initial investment itself. Columns 1-3 show results for the pre-2009 period, while columns 4-6 show results for the post-2009 period. Each column shows a polynomial specification (linear, quadratic, or cubic) using a uniform kernel. The full sample includes investments within the $20–80 million range (i.e., −$30M to +$30M around the threshold) between 2004 and 2017 in C-corporations operating in QSBS-eligible sectors. For estimation, we employ the robust bias-corrected approach developed by Calonico et al. (2014) and implemented using the rdrobust package, which accounts for potential bias in the local polynomial estimators near the cutoff. Reported bandwidths are the optimal data-driven bandwidths determined using the Mean Squared Error (MSE) minimization method (mserd). The reported t-statistics (shown in parentheses) and significance levels are based on heteroskedasticity-robust nearest neighbor variance estimation (NN-VCE) for the local polynomial RD estimator. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Data are from PitchBook.

Table 4: Impact of QSBS Tax Benefits on Investment Selection

	Development	Cap. Structure	Proximity	Industry	Certification	Syndication
Dependent Variable:	$\mathbb{1}$ {Pre-Commercial}	$\mathbb{1}$ {Has Debt}	$\mathbb{1}$ {Diff. State}	$\mathbb{1}$ {New Industry}	$\mathbb{1}$ {First Funding}	$\mathbb{1}$ {Multi-Investor}
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Investors						
$\mathbb{1}$ {Eligible} × $\mathbb{1}$ {Post}	0.014***	0.006	0.050***	0.034**	0.023***	−0.060***
	(2.87)	(1.61)	(3.81)	(2.16)	(2.82)	(−5.04)
Observations	126,721	126,721	115,016	51,197	126,721	126,721
Adjusted R^2	0.09	0.01	0.33	0.38	0.44	0.28
Mean Dependent Variable	0.038	0.006	0.493	0.661	0.045	0.451
Panel B: Venture Capital						
$\mathbb{1}$ {Eligible} × $\mathbb{1}$ {Post}	0.023***	0.011*	0.075***	0.039*	0.015**	−0.092***
	(4.09)	(1.90)	(3.81)	(1.80)	(2.32)	(−5.42)
Observations	60,264	60,264	54,839	27,335	60,264	60,264
Adjusted R^2	0.08	0.00	0.28	0.38	0.12	0.20
Mean Dependent Variable	0.031	0.006	0.463	0.624	0.010	0.458
Panel C: Angel						
$\mathbb{1}$ {Eligible} × $\mathbb{1}$ {Post}	−0.000	−0.001	−0.035	−0.022	0.015	−0.033
	(−0.02)	(−0.63)	(−0.80)	(−0.68)	(0.95)	(−0.81)
Observations	26,775	26,775	25,059	6,367	26,775	26,775
Adjusted R^2	0.05	0.01	0.30	0.20	0.03	0.21
Mean Dependent Variable	0.023	0.003	0.421	0.856	0.005	0.714
Panel D: Corporate						
$\mathbb{1}$ {Eligible} × $\mathbb{1}$ {Post}	−0.018	−0.013	−0.073	0.076	0.010	−0.001
	(−0.98)	(−1.48)	(−1.05)	(1.33)	(0.29)	(−0.01)
Observations	8,723	8,723	6,795	4,713	8,723	8,723
Adjusted R^2	0.11	−0.04	0.29	0.39	0.28	0.12
Mean Dependent Variable	0.042	0.007	0.594	0.622	0.035	0.396
Investor FE	✓	✓	✓	✓	✓	✓
State–Industry FE	✓	✓	✓	✓	✓	✓
Entry Year FE	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓

This table presents estimates of the effect of QSBS tax benefits on investment selection. The dependent variables are organized into six categories: (1) Pre-commercial stages (including stealth mode, product-beta stage, clinical/pre-clinical trials, and recent grant recipients); (2) Pre-existing debt; (3) Geography, with an indicator for investors and firms headquartered in different states; (4) New Industry, identifying industries where the investor did not invest in the pre-sample period (1998–2003); (5) First Funding, with an indicator for firms not backed by VCs, angel investors, corporate investors, accelerators or private debt at the time of the initial investment; and (6) Multi-Investor, with an indicator for deals with five or more investors (above the sample median). $\mathbb{1}$ {Eligible} indicates QSBS-eligible sectors, and $\mathbb{1}$ {Post} is an indicator for investments made after 2009. Fixed effects include investor, investor state–industry, and investment entry year. For investors headquarted abroad, state FE considers the country (North American countries) or the continent (other countries). The sample is at the investor–firm level, and includes investments from 2004–2017. *t*-statistics based on standard errors clustered at the investor level shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 5: Impact of QSBS Tax Benefits on Portfolio Company Failure: Triple-Difference Regressions

	All Investors		VCs		Angels		Corporates	
	All Firms (1)	Exited (2)	All Firms (3)	Exited (4)	All Firms (5)	Exited (6)	All Firms (7)	Exited (8)
Panel A: Dependent Variable = $\mathbb{1}\{$Out of Business$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.011***	0.037***	0.012***	0.041***	0.001	0.023*	0.004	0.015
	(5.04)	(6.42)	(3.92)	(4.94)	(0.34)	(1.87)	(0.68)	(0.95)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.001	−0.004	0.002	−0.002	0.011***	0.018*	0.005	0.004
	(0.59)	(−0.83)	(0.79)	(−0.37)	(4.03)	(1.70)	(1.05)	(0.41)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.024***	−0.072***	−0.025***	−0.074***	−0.014***	−0.057***	−0.010*	−0.034**
	(−11.11)	(−12.39)	(−7.76)	(−8.85)	(−4.69)	(−4.72)	(−1.79)	(−2.28)
Observations	1,050,884	462,661	412,453	197,964	302,134	118,027	85,845	43,066
Adjusted R^2	0.11	0.11	0.11	0.10	0.11	0.10	0.09	0.09
Mean Dependent Variable	0.018	0.042	0.017	0.035	0.019	0.048	0.015	0.029
Panel B: Dependent Variable = $\mathbb{1}\{$Five Years Without Funding$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.080***	0.083***	0.083***	0.098***	0.048	0.017	0.063	0.065
	(6.16)	(5.73)	(4.78)	(5.22)	(1.36)	(0.42)	(1.57)	(1.34)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.108***	−0.100***	−0.076***	−0.085***	−0.045	−0.010	−0.175***	−0.169***
	(−8.82)	(−7.39)	(−4.59)	(−4.76)	(−1.31)	(−0.25)	(−4.79)	(−3.92)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.083***	−0.092***	−0.088***	−0.107***	−0.065*	−0.011	−0.072*	−0.084*
	(−6.54)	(−6.34)	(−5.13)	(−5.64)	(−1.95)	(−0.28)	(−1.81)	(−1.74)
Observations	1,050,884	462,661	412,453	197,964	302,134	118,027	85,845	43,066
Adjusted R^2	0.32	0.19	0.29	0.15	0.31	0.18	0.34	0.23
Mean Dependent Variable	0.064	0.026	0.049	0.019	0.069	0.025	0.067	0.034
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓	✓	✓

This table presents estimates of the effect of QSBS tax benefits on measures of portfolio company failure. Panel A examines portfolio companies that went out of business using an indicator variable equals to one if the firm closed. Panel B examines funding gaps through an indicator equal to one when portfolio companies go five or more years without raising new funding. $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor–firm–year level and includes years from 2004–2022 and investment entry years from 2004–2017. Results are shown for all investors (split between all portfolio companies and those that experienced an exit) and by investor type, where Venture Capital includes traditional VC firms, Angel includes individual angel investors and angel groups, and Corporate includes corporate venture capital and other investments by corporations. Shaded cells highlight the coefficients of primary interest. t-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 6: Impact of QSBS Tax Benefits on Portfolio Company Valuations: Triple-Difference Regressions

	All Investors		VCs		Angels		Corporates	
	All Firms (1)	Exited (2)	All Firms (3)	Exited (4)	All Firms (5)	Exited (6)	All Firms (7)	Exited (8)
Panel A: Dependent Variable = Valuation ($ billions)								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.001	0.052	0.072	0.243**	−0.209***	−0.399***	−0.013	−0.101
	(−0.04)	(0.79)	(1.52)	(2.39)	(−3.93)	(−3.41)	(−0.12)	(−0.46)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.101***	−0.277***	−0.176***	−0.416***	0.131***	0.046	−0.149	−0.085
	(−3.67)	(−4.72)	(−4.21)	(−4.62)	(2.62)	(0.44)	(−1.46)	(−0.44)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.117***	0.018	0.033	−0.188*	0.357***	0.459***	0.038	0.090
	(3.92)	(0.28)	(0.72)	(−1.89)	(7.03)	(3.95)	(0.36)	(0.41)
Observations	234,019	108,908	109,866	54,192	66,978	27,946	18,768	9,632
Adjusted R^2	0.36	0.40	0.38	0.41	0.34	0.36	0.39	0.42
Mean Dependent Variable	0.180	0.190	0.181	0.185	0.184	0.192	0.186	0.196
Panel B: Dependent Variable = $\mathbb{1}\{\textit{Unicorn}\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.005	0.026	0.051**	0.140***	−0.119***	−0.132	0.036	−0.102
	(0.29)	(0.84)	(2.04)	(3.11)	(−3.36)	(−1.54)	(0.52)	(−1.38)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.043***	−0.133***	−0.083***	−0.212***	0.088***	−0.031	−0.086	0.019
	(−2.84)	(−4.76)	(−3.82)	(−5.46)	(2.59)	(−0.37)	(−1.33)	(0.30)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.057***	0.021	0.016	−0.093**	0.155***	0.142*	−0.010	0.103
	(3.49)	(0.70)	(0.65)	(−2.13)	(4.64)	(1.69)	(−0.16)	(1.37)
Observations	238,534	111,530	111,436	55,154	68,622	28,957	19,008	9,777
Adjusted R^2	0.29	0.36	0.28	0.34	0.32	0.41	0.26	0.29
Mean Dependent Variable	0.054	0.059	0.052	0.054	0.064	0.074	0.046	0.048
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓	✓	✓

This table presents estimates of the effect of QSBS tax benefits on portfolio company valuations. Panel A examines firm valuation in billions of dollars, with the bottom and top 1% of observations trimmed to ensure outliers do not drive the results. Panel B examines the likelihood of achieving unicorn status (valuation exceeding $1 billion). $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor–firm–year level and includes years from 2004–2022 and investment entry years from 2004–2017. Results are shown for all investors (split between all portfolio companies and those that experienced an exit) and by investor type, where Venture Capital includes traditional VC firms, Angel includes individual angel investors and angel groups, and Corporate includes corporate venture capital and other investments by corporations. Shaded cells highlight the coefficients of primary interest. *t*-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 7: Impact of QSBS Tax Benefits on Investment Exit Paths: Triple-Difference Regressions

	All Investors		VCs		Angels		Corporates	
	All Firms (1)	Exited (2)	All Firms (3)	Exited (4)	All Firms (5)	Exited (6)	All Firms (7)	Exited (8)
Panel A: Dependent Variable = $\mathbb{1}\{$Private Equity Buyout$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.007***	0.020***	0.009***	0.023***	0.002	0.029**	−0.001	−0.003
	(3.06)	(3.37)	(2.75)	(2.79)	(0.57)	(1.99)	(−0.23)	(−0.20)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.006**	−0.021***	−0.006**	−0.020***	0.002	−0.015	0.002	−0.001
	(−2.57)	(−3.88)	(−1.99)	(−2.95)	(0.47)	(−1.07)	(0.45)	(−0.05)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.007***	−0.021***	−0.007**	−0.022***	−0.002	−0.029**	0.004	0.003
	(−2.90)	(−3.65)	(−2.21)	(−2.72)	(−0.64)	(−2.08)	(0.75)	(0.21)
Observations	1,050,884	462,661	412,453	197,964	302,134	118,027	85,845	43,066
Adjusted R^2	0.05	0.05	0.05	0.05	0.04	0.04	0.05	0.05
Mean Dependent Variable	0.007	0.016	0.007	0.015	0.005	0.014	0.008	0.016
Panel B: Dependent Variable = $\mathbb{1}\{$Acquisition$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.022***	−0.046***	−0.027***	−0.070***	−0.069***	−0.128***	0.024	0.062*
	(−4.60)	(−4.18)	(−3.51)	(−3.84)	(−7.53)	(−4.44)	(1.42)	(1.80)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.019***	0.009	0.021***	0.012	0.057***	0.065**	−0.020	−0.075**
	(4.15)	(0.95)	(3.19)	(0.88)	(6.49)	(2.39)	(−1.31)	(−2.55)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.038***	0.031***	0.048***	0.060***	0.083***	0.097***	−0.009	−0.087**
	(7.54)	(2.86)	(6.25)	(3.38)	(8.75)	(3.39)	(−0.53)	(−2.54)
Observations	1,050,884	462,661	412,453	197,964	302,134	118,027	85,845	43,066
Adjusted R^2	0.12	0.14	0.12	0.15	0.12	0.15	0.12	0.15
Mean Dependent Variable	0.043	0.098	0.051	0.106	0.039	0.100	0.053	0.106
Panel C: Dependent Variable = $\mathbb{1}\{$IPO$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.006***	−0.006	−0.007**	−0.008	−0.002	0.028	−0.008	−0.012
	(−2.94)	(−1.21)	(−2.11)	(−1.07)	(−0.34)	(1.14)	(−1.57)	(−1.04)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.008***	0.011**	0.009***	0.012*	0.004	−0.023	0.011**	0.019*
	(4.24)	(2.56)	(2.99)	(1.76)	(0.61)	(−0.96)	(2.43)	(1.94)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.004**	0.001	0.005	0.002	−0.001	−0.036	0.006	0.003
	(2.39)	(0.30)	(1.61)	(0.23)	(−0.27)	(−1.50)	(1.23)	(0.29)
Observations	1,050,884	462,661	412,453	197,964	302,134	118,027	85,845	43,066
Adjusted R^2	0.05	0.03	0.05	0.02	0.01	0.00	0.06	0.03
Mean Dependent Variable	0.005	0.011	0.006	0.013	0.003	0.007	0.007	0.013
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓	✓	✓

This table presents estimates of the effect of QSBS tax benefits on investment exit paths. Panel A examines the likelihood of portfolio company exits through private equity buyouts. Panel B examines acquisitions. Panel C examines initial public offerings (IPOs). $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor–firm–year level and includes years from 2004–2022 and investment entry years from 2004–2017. Results are shown for all investors (split between all portfolio companies and those that experienced an exit) and by investor type, where Venture Capital includes traditional VC firms, Angel includes individual angel investors and angel groups, and Corporate includes corporate venture capital and other investments by corporations. Shaded cells highlight the coefficients of primary interest. *t*-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 8: Industry Innovation in Investment Selection: Eligible *versus* Ineligible Sectors

Dependent Variable:	Scientific Innovation (θ_{cw})		Commercial Innovation (θ_{sm})	
QSBS Eligibility:	Eligible Sectors	Ineligible	Eligible Sectors	Ineligible
	(1)	(2)	(3)	(4)
Panel A: Venture Capital Investors				
$\mathbb{1}\{\text{Post-2009}\}$	0.235***	−0.745***	0.234***	−0.713***
	(4.60)	(−3.32)	(4.62)	(−3.25)
Observations	17,364	2,483	17,364	2,483
Adjusted R^2	0.26	0.22	0.29	0.22
Mean Dependent Variable	6.321	3.626	6.088	3.675
Panel B: Angel Investors				
$\mathbb{1}\{\text{Post-2009}\}$	0.147	0.700**	0.129	0.696**
	(1.58)	(2.48)	(1.40)	(2.51)
Observations	12,192	1,452	12,192	1,452
Adjusted R^2	0.12	0.09	0.12	0.09
Mean Dependent Variable	5.831	2.820	5.575	2.883
Investor FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓

This table reports regression estimates of the effect of the 2009 QSBS reform on investor innovation targeting. The dependent variables are industry-level innovation measures from Kogan et al. (2017): θ_{cw} captures scientific value through citation-weighted patent importance, while θ_{sm} measures commercial value through stock market reactions to patent grants. Financial and utility investments are not considered in this analysis as innovation scores are not available for these industries. For each investor-year, we compute the average innovation complexity of their portfolio, calculated separately for QSBS-eligible and non-eligible sectors. $\mathbb{1}\{\text{Post-2009}\}$ indicates years after the 2009 QSBS reform. Panel A includes investments by VC firms from 2004–2017, and Panel B includes investments by angel investors from 2004–2017. Standard errors are clustered at the investor level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 9: Heterogeneity of VC Risk-Taking: California Before *versus* After QSBS Subsidy Elimination

Dependent Variable:	$\mathbb{1}\{\text{Out of Business}\}$	
California State-Level QSBS Subsidy:	Available (Before 2013)	Eliminated (After 2013)
	(1)	(2)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.016***	0.010**
	(2.72)	(2.19)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.002	0.003
	(0.49)	(0.61)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.015**	−0.021***
	(−2.45)	(−4.18)
Observations	77,445	119,512
Adjusted R^2	0.05	0.13
Mean Dependent Variable	0.010	0.017
Year FE	✓	✓
Holding Period FE	✓	✓
Investor × Firm FE	✓	✓
Clustered SE (Investor)	✓	✓

This table presents a case study of California-based VC investors and the effect of QSBS eligibility changes that occurred in the state in 2013. Before 2013, QSBS investments made by California taxpayers were eligible for a 50% capital gain subsidy at the state level. Starting 2013, state-level QSBS subsidy became no longer available for these investments. Column (1) focuses on investments by California-based investors during the QSBS-eligible period (2009–2012 entry years), while Column (2) focuses on investments made by California-based investors after the state eliminated QSBS benefits (2014–2017 entry years). The transition year 2013 is excluded from both periods. In both cases, we compare outcomes to the pre-sample window (2004–2008 entry years). The dependent variable is an indicator for portfolio company closure. $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor–firm–year level, and includes traditional VC firms in California only. Shaded cells highlight the coefficients of primary interest. *t*-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 10: Heterogeneity of VC Risk-Taking: VC Firm Size

Dependent Variable:	$\mathbb{1}\{\text{Out of Business}\}$	
	Pre-2009 Investments	Post-2009 Investments
	(1)	(2)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \text{NAV}$	0.014	0.016**
	(0.94)	(2.03)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.001	0.007
	(−0.10)	(1.33)
Observations	33,441	68,915
Adjusted R^2	0.04	0.09
Mean Dependent Variable	0.005	0.015
Year FE	✓	✓
Holding Period FE	✓	✓
Investor × Firm FE	✓	✓
Clustered SE (Investor)	✓	✓

This table presents the effect of QSBS tax benefits and VC firm size on portfolio company failure rates. The analysis compares investments made before 2009 (Column 1) and after 2009 (Column 2). Firm size is proxied by NAV (total net asset value across all active funds), measured in billions of dollars. The dependent variable is an indicator for portfolio company closure. $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Eligible Sector}\}$ indicates QSBS-qualifying sectors. The sample is at the investor–firm–year level, includes traditional VC firms only. Regressions include the individual AUM terms, all two-way interactions, and constants (omitted for brevity). Shaded cells highlight the coefficients of primary interest. *t*-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 11: Heterogeneity of VC Risk-Taking: Fraction of Sophisticated Limited Partners

Dependent Variable:	$\mathbb{1}\{$Out of Business$\}$					
Fraction of LPs that are:	Top 25 SAT (Private Universities)		Top 25 Endowment (Private Universities)		Ivy League Universities	
	Pre-2009	Post-2009	Pre-2009	Post-2009	Pre-2009	Post-2009
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Eligible}\} \times$ Fraction of LP Type	0.052	0.212***	0.070	0.174***	0.080	0.173**
	(1.18)	(4.48)	(1.61)	(3.03)	(1.47)	(2.42)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Eligible}\}$	−0.001	0.013***	−0.001	0.013***	−0.001	0.013***
	(−0.19)	(5.58)	(−0.19)	(5.48)	(−0.24)	(5.73)
Observations	49,451	156,736	49,451	156,736	49,451	156,736
Adjusted R^2	0.05	0.11	0.05	0.11	0.05	0.11
Mean Dependent Variable	0.006	0.018	0.006	0.018	0.006	0.018
Year FE	✓	✓	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓

This table examines how elite private endowment LP representation affects VC risk-taking responses to QSBS tax benefits, comparing pre-2009 and post-2009 periods. LP share variables measure the annual fraction of each VC firm's active fund portfolio (funds within ten years of vintage) backed by three elite private institution categories: Top 25 SAT-ranked private universities, Top 25 private endowments by assets, and Ivy League institutions. The dependent variable indicates portfolio company closure. $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held five or more years, and $\mathbb{1}\{\text{Eligible Sector}\}$ indicates QSBS-qualifying sectors. Regressions include individual LP measure terms, all two-way interactions, and constants (omitted for brevity). Sample includes traditional VC firms at the investor-firm-year level. Standard errors clustered at the investor level. Shaded cells highlight the coefficients of primary interest. t-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Internet Appendix to

“Tax Incentives and Venture Capital Risk-Taking”

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IA1 Model Details and Extensions

In this appendix, we provide the mathematical foundations underlying our investment threshold analysis, present detailed tax sensitivity calculations, and examine robustness under alternative parameter specifications. We discuss these in turn.

IA1.1 Model Equations

Parameter Definitions. The parameters $\beta_+ > 1$ and $\beta_- < 0$ are the "fundamental economy parameters" in the language of Pindyck (1988) (solutions to a quadratic equation featuring risk and return parameters) and given by:

$$\beta_\pm = \frac{1}{2} - \frac{\mu}{\sigma^2} \pm \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2(r+\eta)}{\sigma^2}}. \tag{A1}$$

Coefficient Definitions. The coefficients $b_1 > 0$ and $b_2 > 0$ are defined as:

$$b_1 = \frac{r - \beta_-\mu + \eta}{(r+\eta)\,(r-\mu+\eta)(\beta_+ - \beta_-)}\, h^{1-\beta_+}, \tag{A2}$$

$$b_2 = \frac{r - \beta_+\mu + \eta}{(r+\eta)\,(r-\mu+\eta)(\beta_+ - \beta_-)}\, h^{1-\beta_-}. \tag{A3}$$

Value-Matching and Smooth-Pasting Conditions. Let the option value be given by $G(X) = a\,X^{\beta_+}$. Then, imposing value-matching and smooth-pasting at $X = X^*$ yields:

$$(1-\tau_b)\left[b_2(X^*)^{\beta_-} + \frac{X^*}{r-\mu+\eta} - \frac{h}{r+\eta}\right] + \frac{\alpha I}{r+\eta} - I = a\,(X^*)^{\beta_+}, \tag{A4}$$

$$(1-\tau_b)\left[\frac{b_2\,\beta_-\,(X^*)^{\beta_-}}{r-\mu+\eta}\right] = a\,\beta_+\,(X^*)^{\beta_+}. \tag{A5}$$

Solving the smooth-pasting condition for a gives:

$$a\,(X^*)^{\beta_+} = (1-\tau_b)\left[\frac{b_2\,\beta_-}{\beta_+}\,(X^*)^{\beta_-} + \frac{X^*}{\beta_+(r-\mu+\eta)}\right]. \tag{A6}$$

Finally, the value-matching condition can be written as:

$$(1-\tau_b)\left[\frac{b_2(\beta_+-\beta_-)}{\beta_+}(X^*)^{\beta_-}+\frac{\beta_+-1}{\beta_+(r-\mu+\eta)}X^*-\frac{h}{r+\eta}\right]+\frac{\alpha I}{r+\eta}-I=0. \tag{A7}$$

IA1.2 Tax Sensitivity Analysis

We quantify the differential responsiveness of investor types to tax policy changes by computing the tax sensitivity of investment thresholds as the absolute value of the partial derivative $|\partial X^*/\partial\tau_K|$ for each volatility level. This analysis computes numerical derivatives using central differences across the tax rate range from 2% to 38% (avoiding boundary effects where central differences cannot be calculated), then averages these derivatives to obtain a representative measure of tax responsiveness for each investor type. The resulting tax sensitivity measures capture how much investment thresholds change per unit change in the capital gains tax rate, providing a direct comparison across VCs and angel investors.

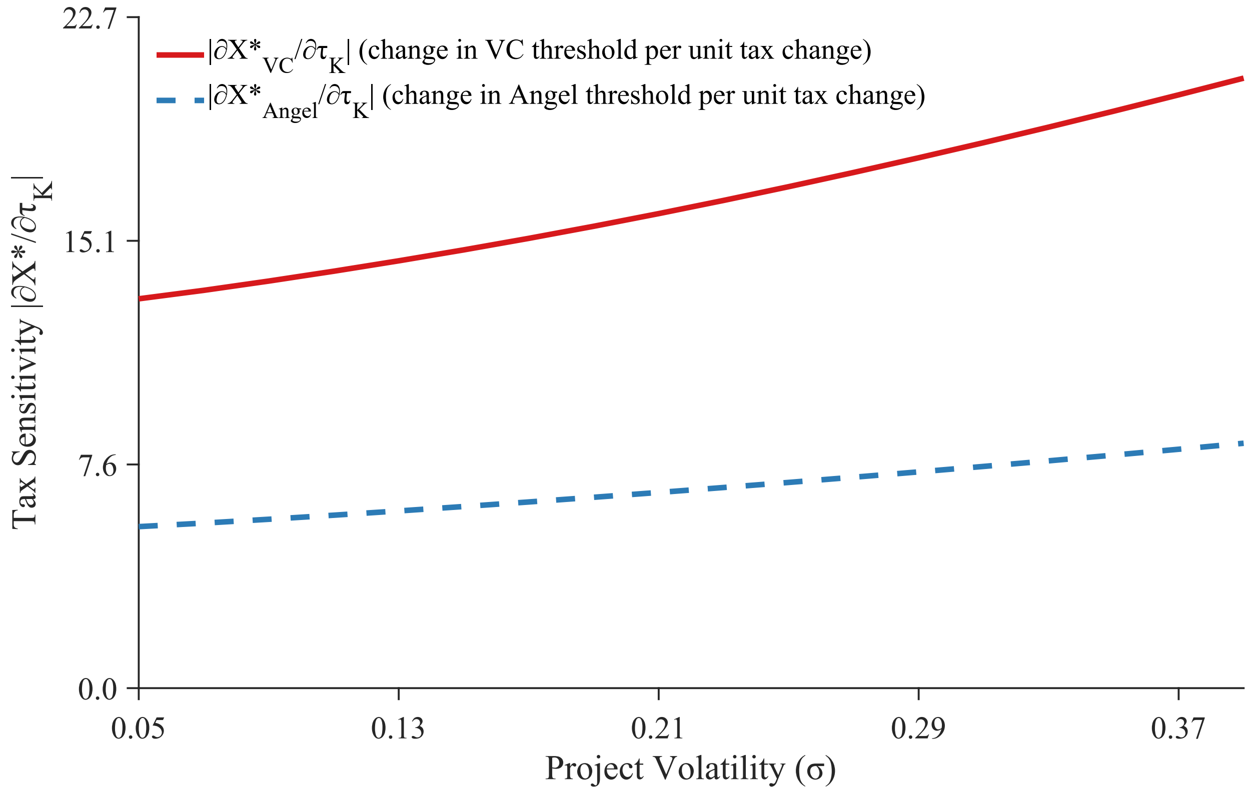
Figure IA1 reveals two key findings that support our theoretical predictions. First, venture capitalists exhibit approximately twice the tax sensitivity of angel investors across all volatility levels, with VC tax sensitivity ranging from 12–22 while angel sensitivity ranges from 5–8. Second, this differential sensitivity gap widens with project volatility, as evidenced by the steeper slope of the VC curve compared to the angel curve. The increasing divergence occurs because VCs' option-like payoff structure, driven by carried interest compensation, amplifies the value of tax subsidies more significantly for high-risk investments where the convexity benefits are most pronounced.

IA1.3 Alternative Parameter Choices

We examine how investment thresholds respond to capital gains taxes under alternative parameter calibrations that reflect the heterogeneity observed in venture capital markets. Our baseline analysis uses conservative parameter choices, but actual VC funds exhibit considerable variation in key structural features. We test four specific alternatives: higher GP capital commitment to reflect funds where GPs contribute larger personal investments,[55] zero hurdle rates to capture funds without preferred returns

[55] Robinson and Sensoy (2013) document that 56% of VC funds have GP contribution of 1%, but 26% have contribution higher than 1% (and 18% lower than 1%). The median (mean) is 1.78% (1%) with standard deviation 5.09%.

Figure IA1: Tax Sensitivity of Investment Thresholds: VC *versus* Angel Investors



This figure shows the tax sensitivity of investment thresholds, measured as $|\partial X^*/\partial \tau_K|$, as a function of project volatility (σ) for venture capitalists and angel investors. Tax sensitivity is calculated as the average absolute derivative across the capital gains tax rate range from 2% to 38%. The red solid line represents VC tax sensitivity, while the blue dashed line represents Angel tax sensitivity. All other parameters follow the baseline calibration from Figure 1. Higher values indicate greater responsiveness to tax policy changes.

to limited partners,[56] higher reputation costs based on upper-bound estimates from the literature,[57] and extended volatility ranges to encompass a broader spectrum of startup risk profiles.[58]

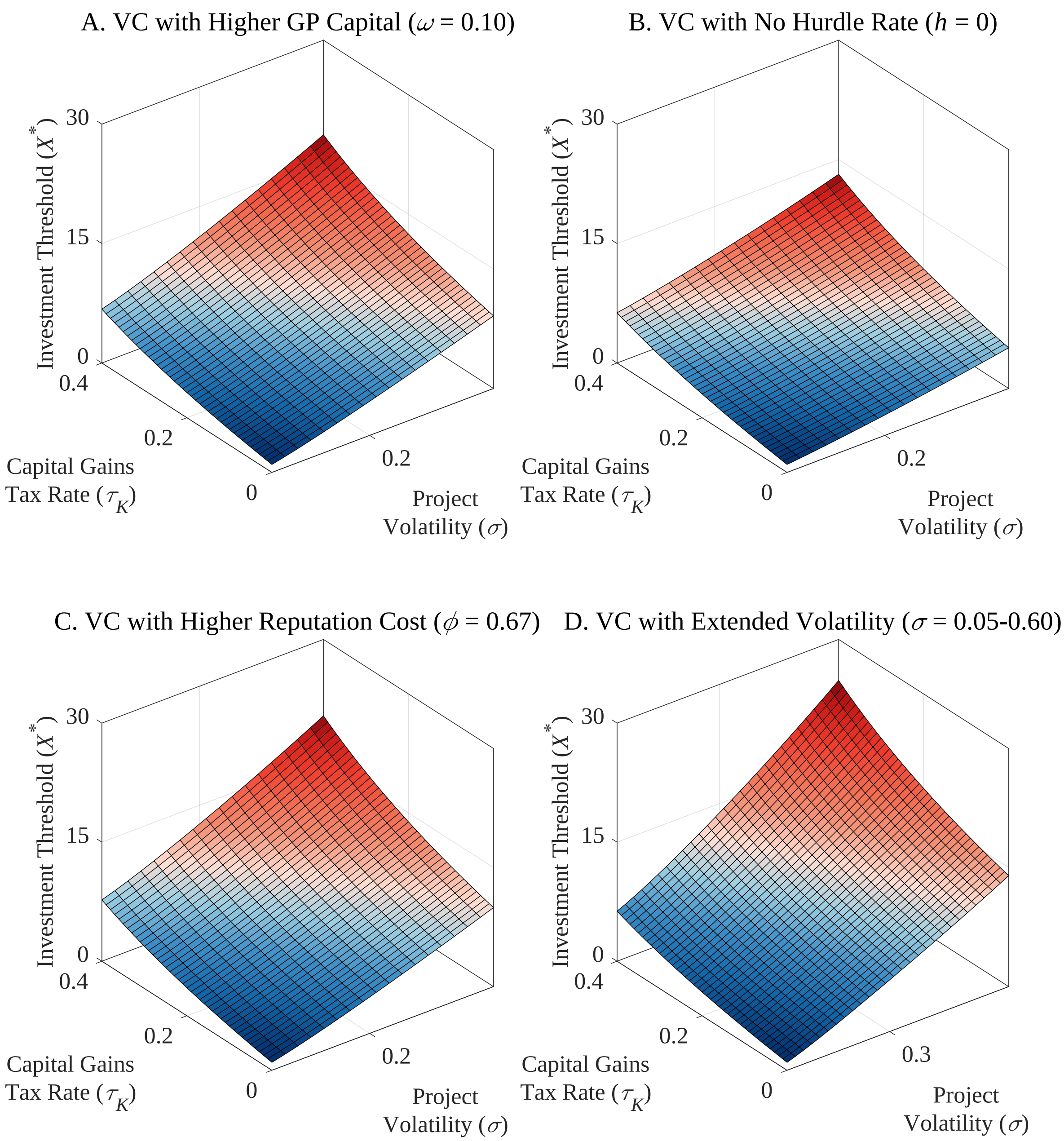
Figure IA2 presents these four alternative specifications. Panel A increases GP capital commitment to 10%, Panel B eliminates hurdle rates, Panel C raises reputation costs to 0.67, and Panel D extends project volatility to 0.60. The fundamental relationship holds across all cases: investment thresholds decline with lower capital gains taxes, with steeper declines for riskier projects.

[56] Analyzing a sample of 42 VC funds, Metrick and Yasuda (2010) document that 45% have a hurdle rate. Conditional on having a hurdle rate, 70% set it at 8%, 18% set it higher than 8%, and 12% set it lower than 8%.

[57] In our main analysis we consider implicit-to-explicit performance ratios for second-time VC funds from Chung et al. (2012). In the extension, we use the higher ratio observed for first-time VC funds.

[58] In our baseline, we use top and top quartile (annualized) idiosyncratic risk measures from Ewens et al. (2013) for our project volatility range. In the extension, we expand the upper limit by 50% (from 0.40 to 0.60).

Figure IA2: Minimum Investment Thresholds by Tax Rate and Risk Level – Alternative Parameters



This figure shows how minimum investment thresholds (X^*) vary with effective tax rates (τ_K) and project volatility (σ) under alternative parameter choices. Panel A considers GP personal commitment $\omega = 0.10$ instead of $\omega = 0.01$, recognizing that some GPs contribute larger fractions of a VC fund from their personal capital (see Robinson and Sensoy (2013)). Panel B shows VCs with hurdle rate $h = 0$ instead of $h = 0.08$, recognizing that many VC funds do not have a hurdle rate (see Metrick and Yasuda (2010)). Panel C considers a ratio of indirect-to-direct pay for performance of 0.44, the upper limit in Chung et al. (2012), yielding a reputation cost of $\varphi = 0.67$ instead of $\varphi = 0.54$. Panel D increases the project volatility range from 0.05–0.40 to 0.05–0.60. In each panel, all other parameters are the same as those used in Panel A of Figure 1.

IA2 Parameter Sensitivity Analysis

We conduct sensitivity analyses examining how three key model parameters affect investment selectivity and tax responsiveness: reputation costs (φ) and GP capital commitment (ω) for VCs, and project failure rates (η) that affect both VCs and angel investors. We discuss each sensitivity analysis in turn.

Figure IA3 examines reputation costs (φ), a VC-specific parameter that reflects career consequences for general partners. Panel A shows that higher reputation costs increase investment thresholds as GPs become more selective to protect their future fundraising ability. Panel B reveals that tax sensitivity increases simultaneously because the marginal value of tax subsidies grows when operating at higher selectivity levels. In other words, when reputation concerns push VC investment decisions toward higher-quality projects, the option value of tax benefits becomes more pronounced.

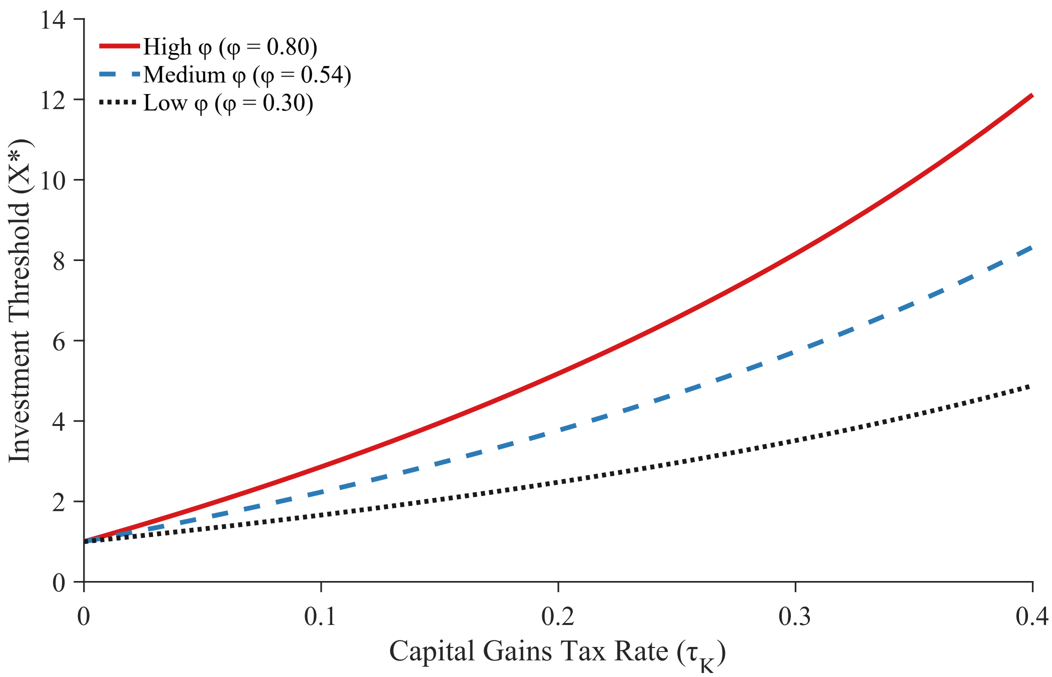
Figure IA4 presents similar results for GP personal commitment (ω), another VC-specific parameter. Panel A shows that higher GP capital contributions increase investment selectivity as fund managers have greater personal exposure to downside risk. Panel B reveals that this increased selectivity also amplifies tax responsiveness, as GPs with more personal capital at stake become more sensitive to factors that affect investment returns, including tax benefits.

Figure IA5 examines project failure rates (η), which affect both VCs and angel investors. Panel A shows that as the likelihood of business failure increases, both investor types require higher expected cash flows to justify investment, raising selectivity thresholds across all tax rates. Panel B shows that heightened failure risk amplifies tax responsiveness for both investor types, with VCs exhibiting stronger sensitivity increases. This occurs because VCs' convex payoff structure creates option-like returns where tax subsidies disproportionately enhance the value of successful outcomes, making these benefits especially valuable when downside risks are elevated. Angels' linear payoffs generate only proportional responses to tax changes regardless of failure rates.

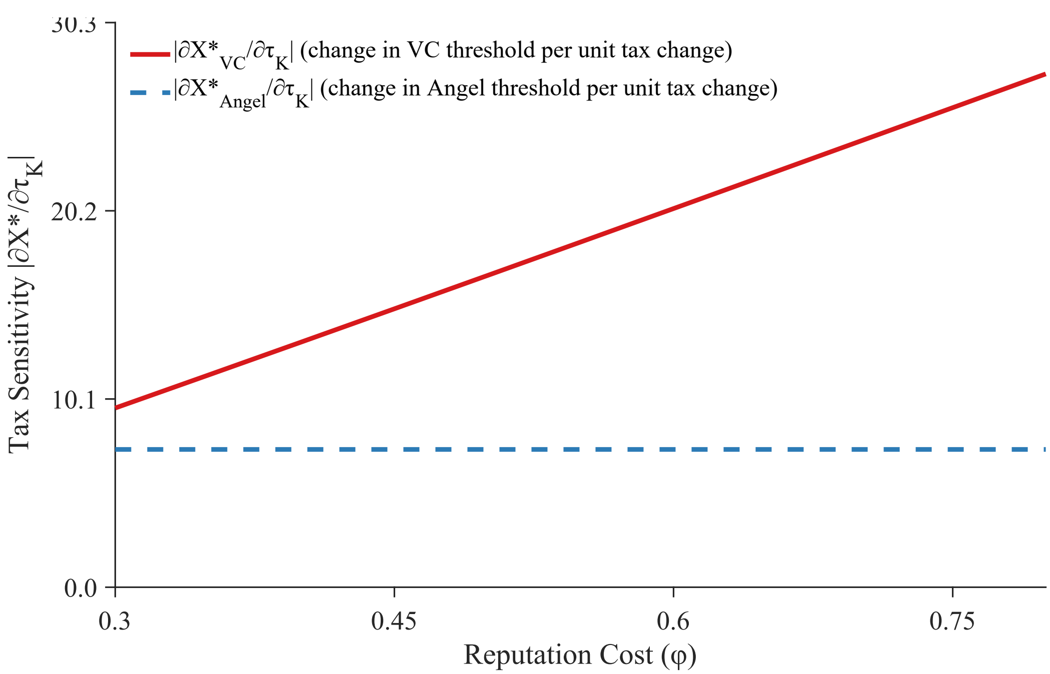
These sensitivity analyses show that factors increasing investment selectivity also amplify tax responsiveness. While potentially counterintuitive, this relationship follows directly from the mathematical structure of our model (positive cross-partial derivatives $\frac{\partial^2 X^*}{\partial \tau_K \partial \varphi} > 0$, $\frac{\partial^2 X^*}{\partial \tau_K \partial \omega} > 0$, and $\frac{\partial^2 X^*}{\partial \tau_K \partial \eta} > 0$). Economically, investors operating at higher selectivity levels are closer to the margin of investment decisions, making them more responsive to policy changes that affect expected returns.

Figure IA3: Impact of Reputation Costs on VC Investment Thresholds and Tax Sensitivity

(a) VC Investment Thresholds *versus* Capital Gains Tax Rates by Reputation Cost Level



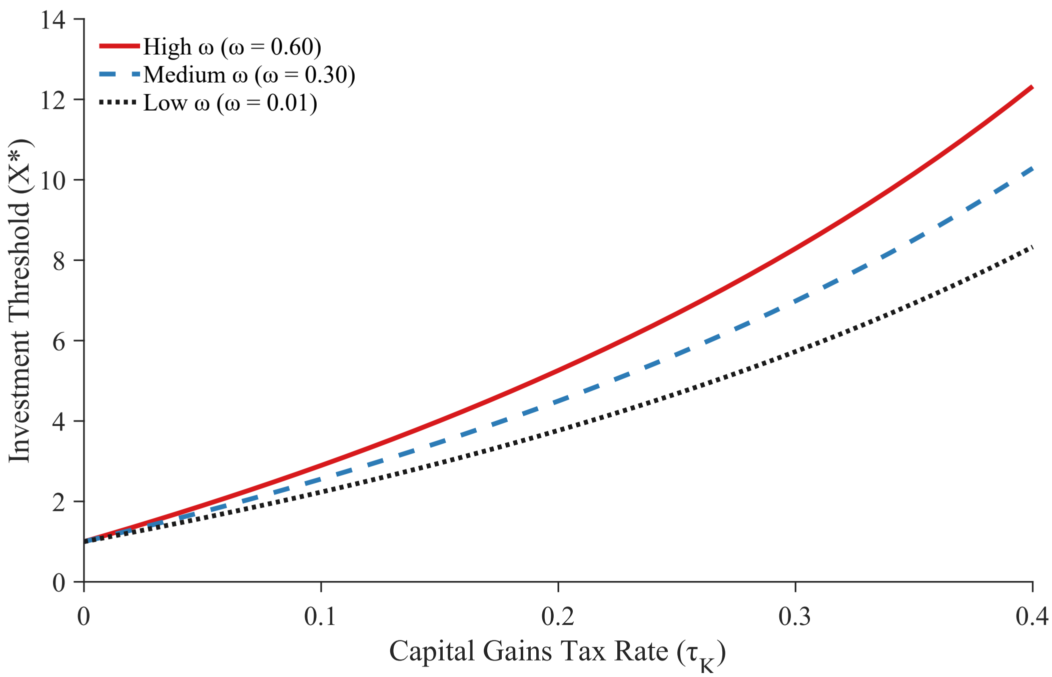
(b) Tax Sensitivity as a Function of Reputation Costs: VC *versus* Angel Investors



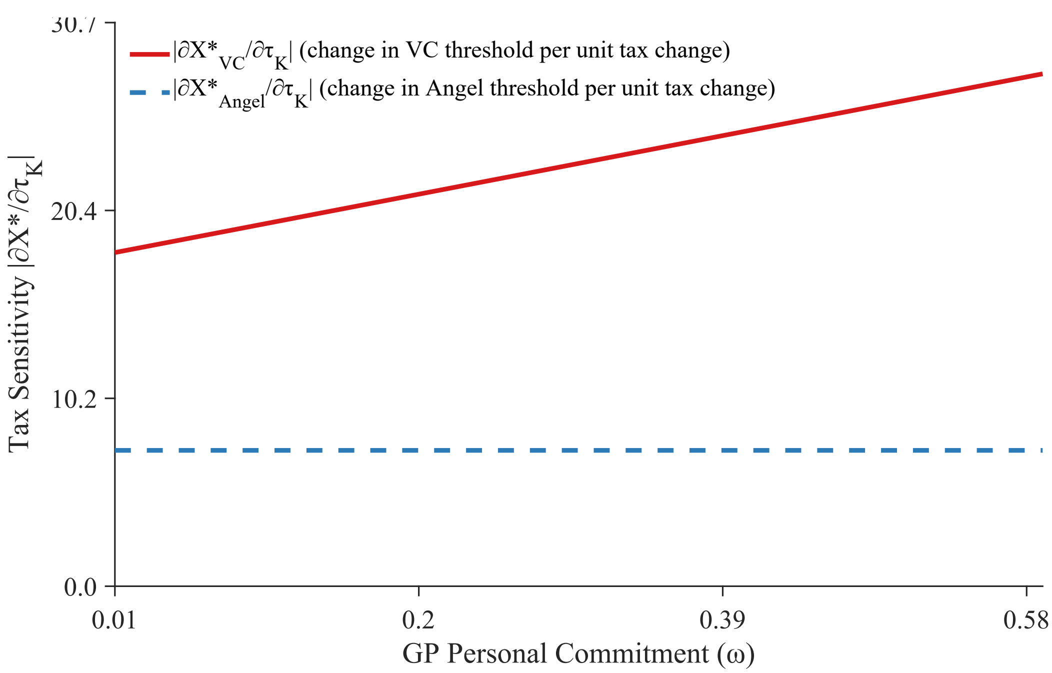
This figure examines how reputation costs (φ), a VC-specific parameter, affect VC investment behavior. Panel A shows minimum investment thresholds (X^*) as functions of capital gains tax rates (τ_K) for different VC reputation cost levels. Panel B shows how tax sensitivity, measured as $|\partial X^*/\partial \tau_K|$, changes with GP reputation costs. Both analyses consider a fixed project volatility $\sigma = 0.3$. All other parameters follow the baseline calibration from Figure 1. Reputation costs (φ) reflect career consequences of VC investment performance (Chung et al. (2012); Barber and Yasuda (2017)). Angels do not face reputation costs in our framework since they invest their own capital and therefore do not face fundraaising consequences.

Figure IA4: Impact of GP Capital Commitment on VC Investment Thresholds and Tax Sensitivity

(a) VC Investment Thresholds *versus* Capital Gains Tax Rates by GP Commitment Level



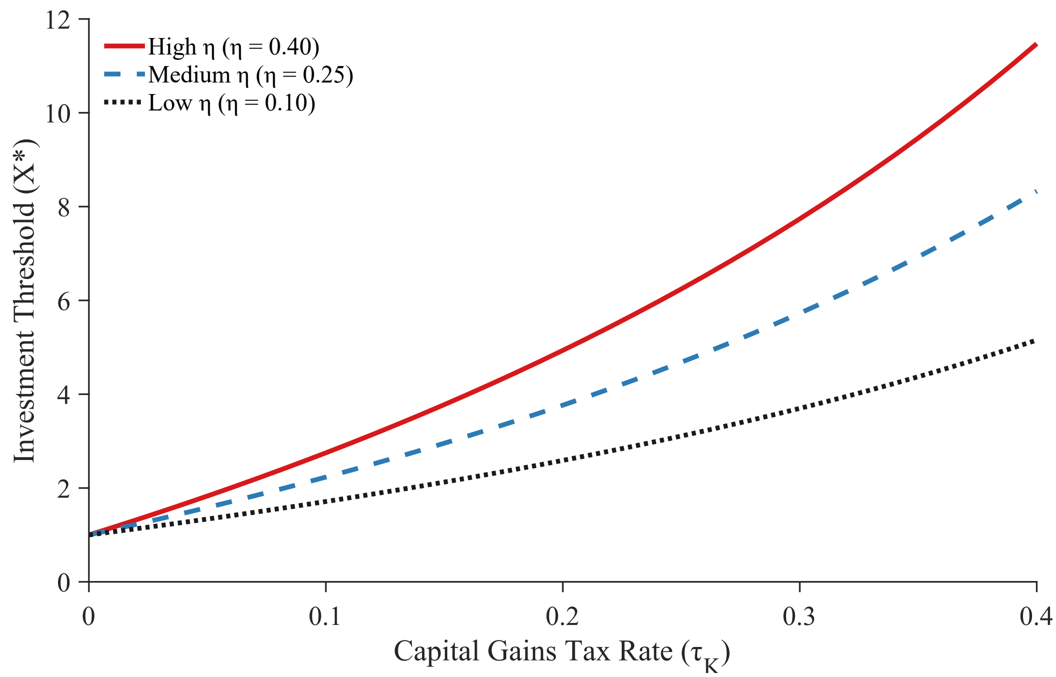
(b) Tax Sensitivity as a Function of GP Capital Commitment: VC *versus* Angel Investors



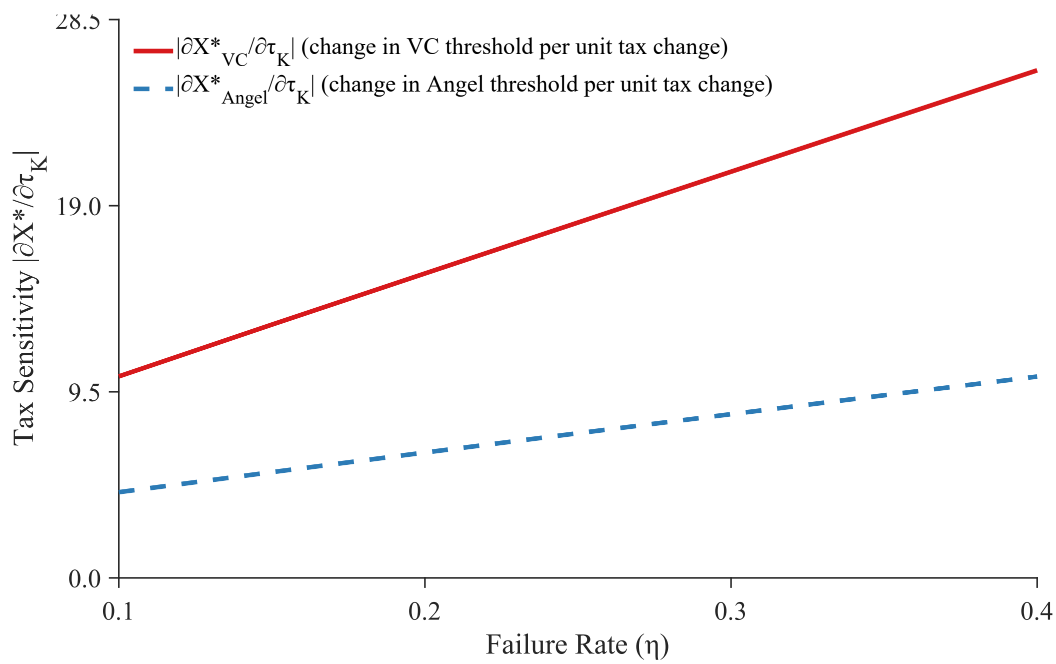
This figure analyzes how GP personal commitment (ω), a VC-specific parameter, influences VC investment thresholds and tax responsiveness. Panel A presents minimum investment thresholds (X^*) across different capital gains tax rates (τ_K) for varying levels of GP capital contribution. Panel B shows how tax sensitivity, measured as $|\partial X^*/\partial \tau_K|$, changes with GP personal commitment. Both analyses consider a fixed project volatility $\sigma = 0.3$. All other parameters follow the baseline calibration from Figure 1. The personal commitment parameter ω represents the fraction of fund capital contributed by general partners. Angels invest their own capital entirely and do not have this parameter structure.

Figure IA5: Impact of Project Failure Rates on Investment Thresholds and Tax Sensitivity

(a) VC Investment Thresholds *versus* Capital Gains Tax Rates by Failure Rate Level



(b) Tax Sensitivity as a Function of Project Failure Rates: VC *versus* Angel Investors



This figure analyzes how sudden project failure rates (η) influence both VC and Angel investment thresholds and tax responsiveness. Panel A presents minimum investment thresholds (X^*) across different capital gains tax rates (τ_K) for varying failure rate assumptions, showing responses for both investor types. Panel B shows how tax sensitivity, measured as $|\partial X^*/\partial \tau_K|$, changes with project failure rates for VCs (solid red line) and Angels (dashed blue line). Both analyses consider a fixed project volatility $\sigma = 0.3$. All other parameters follow the baseline calibration from Figure 1. The failure rate parameter η represents the Poisson intensity of sudden business failure, with $1/\eta$ corresponding to expected project lifetime.

IA3 QSBS Tax Benefits - Case Study

This appendix provides a hypothetical case study illustrating QSBS tax implications. We examine a California-based investor allocating \$10 million to acquire equity in an early-stage company. In all cases, we assume the investment qualifies under QSBS criteria (gross assets below \$50 million at investment time) and yields the same return: the position appreciates to \$110 million by March 29, 2019—a \$100 million gain. We quantify federal and state tax liabilities across different investment periods to demonstrate the economic significance of these tax provisions.

IA3.1 Federal-Level Tax

Scenario 1: Investment after September 28, 2010

Under the 100% exclusion period, the tax treatment would be:

- Federal Tax: The entire \$100 million gain is tax-exempt (0% effective rate)
- Maximum Exclusion: The greater of \$10 million or 10× the investment basis. In this case, 10×\$10 million = \$100 million, meaning the entire gain qualifies for the exclusion.

IA3.1.1 Scenario 2: Investment after February 17, 2009, before September 28, 2010

Under the 75% exclusion period, the tax treatment would be:

- Federal Tax: 75% of the \$100 million gain (\$75 million) is tax-exempt
- Taxable Amount: \$25 million
- Federal Tax Due: \$5.95 million (\$25 million × 23.8%)

IA3.1.2 Scenario 3: Investment before February 17, 2009

Under the pre-ARRA period, the tax treatment would be:

- Federal Tax Rate: Fixed 14% rate on QSBS gains (instead of percentage exclusion)
- Federal Tax Due: \$14 million (\$100 million × 14%)

IA3.2 California State-Level Tax

California maintained its own QSBS provisions rather than automatically conforming to federal rules. From 1993 to 2012, the state offered a consistent 50% capital gains exclusion regardless of federal changes. This benefit was eliminated on January 1, 2013 by a state court ruling.

IA3.2.1 Scenario 1: Investment with California tax filed before 2013

- California exclusion: 50% of gain exempt (fixed rate regardless of federal exclusion)
- Taxable amount: $50 million (50% of $100 million gain)
- California tax due: $6.65 million ($50 million × 13.3%)

IA3.2.2 Scenario 2: Investment with California tax filed after 2013

- California exclusion: 0% (no QSBS benefit)
- Taxable amount: $100 million (entire gain)
- California tax due: $13.3 million ($100 million × 13.3%)

IA3.3 Total Tax Liability (Federal + California)

Table IA1: Tax Liability on a $100M Capital Gain from a $10M QSBS Investment

Investment Scenario		Tax on $100M Gain		
Federal QSBS Status	California QSBS Status	Federal	CA	Total
100% Exclusion (Post-Sept 2010)	50% Exclusion (Pre-2013)	$0	$6.65M	$6.65M
100% Exclusion (Post-Sept 2010)	No Benefit (Post-2013)	$0	$13.3M	$13.3M
75% Exclusion (Feb 2009-Sept 2010)	50% Exclusion (Pre-2013)	$5.95M	$6.65M	$12.6M
75% Exclusion (Feb 2009-Sept 2010)	No Benefit (Post-2013)	$5.95M	$13.3M	$19.25M
14% Rate (Pre-Feb 2009)	50% Exclusion (Pre-2013)	$14M	$6.65M	$20.65M
14% Rate (Pre-Feb 2009)	No Benefit (Post-2013)	$14M	$13.3M	$27.3M

IA4 Bunching Estimation Framework

This appendix outlines the structural model and key equations for the bunching analysis of QSBS tax incentives on investment behavior.

Agent Optimization Problem. An investor chooses the optimal holding period h for a portfolio company investment to maximize expected utility:

$$\max_{h} \quad U(h) = u(h) - T(h) \tag{A8}$$

where $u(h)$ represents the gross utility from holding the investment for period h, capturing factors such as expected returns, portfolio diversification, and liquidity needs, while $T(h)$ represents the tax burden as a function of holding period.

Tax Function with QSBS Kink. The QSBS qualification creates a discontinuous change in the effective tax rate at the 5-year threshold:

$$T(h) = \begin{cases} t_0 \cdot G & \text{if } h < 5 \text{ years} \\ (t_0 - s) \cdot G & \text{if } h \geq 5 \text{ years} \end{cases} \tag{A9}$$

where G represents realized capital gains, t_0 is the standard capital gains tax rate, and $s = 0.20$ represents the QSBS tax subsidy. This creates a strong incentive to hold investments for at least five years, generating the tax kink: $\Delta\tau = s = 0.20$.

Bunching Parameter. The key parameter of interest measures the excess mass of observations at the kink point relative to a smooth counterfactual distribution:[59]

$$B = \int_{h_L}^{h_U} [f_1(h) - f_0(h)]\, dh \tag{A10}$$

where B measures the excess mass of investors exiting at five years, $f_0(h)$ is the counterfactual density absent the tax kink, $f_1(h)$ is the observed density with the kink, and the integration covers the bunching region around h = 5 years. The bounds h_L and h_U represent the bunching window around the 5-year kink and are computed using non-parametric methods from Cattaneo et al. (2020).

[59] This follows the bunching framework of Saez (2010) and Chetty et al. (2011), who measure excess mass at tax kinks. Equation (A10) represents the general formulation that both papers implement empirically: Saez (2010) estimates the counterfactual using adjacent income bins, while Chetty et al. (2011) uses polynomial fitting. Our implementation uses the `bunchbounds` approach of Bertanha et al. (2023) and difference-in-bunching identification (Brown (2013); Kleven (2016)).

Difference-in-Bunching Identification. To isolate tax-induced behavior from natural tendencies to hold investments for five years, we employ a difference-in-bunching approach:

$$\Delta B_i^{DB} = B_{\text{eligible,post}} - B_{\text{control}_i} \quad \text{where control}_i \in \{B_{\text{eligible,pre}}; B_{\text{non-eligible,post}}; B_{\text{non-eligible,pre}}\} \tag{A11}$$

These specifications control for sector-specific bunching patterns and temporal trends unrelated to QSBS benefits, providing clean estimates of tax-induced behavioral responses.

Structural Elasticity Recovery. The compensated elasticity can be recovered from the bunching estimate:

$$\varepsilon = \frac{B}{h^* \cdot |\Delta \log(1-\tau)|} = \frac{B}{h^* \cdot |\log(1-0.20)|} = \frac{B}{h^* \cdot 0.2231} \tag{A12}$$

where ε is the compensated elasticity of holding period with respect to the net-of-tax rate and $|\log(0.80)| = 0.2231$ represents the log change in the net-of-tax rate. Each unit of elasticity represents a 1% increase in investors exiting at the five-year threshold for each percentage point of QSBS tax subsidy.

Implementation Parameters. The bunching estimation uses the following specifications:

$$\text{Kink point:} \quad \bar{h} = 5 \text{ years} \tag{A13}$$

$$\text{Subsidy rates:} \quad s_0 = 0 \text{ (pre-kink)}, \quad s_1 = \log(0.80) = -0.2231 \text{ (post-kink)} \tag{A14}$$

$$\text{Bandwidth parameter:} \quad m = 3 \text{ (polynomial degree for density estimation)} \tag{A15}$$

The negative sign in s_1 reflects the reduced tax burden. The parameter $m = 3$ fits a cubic polynomial, excluding the bunching region, to estimate the counterfactual distribution.

Statistical Inference. We implement two approaches for robust inference. First, bootstrap standard errors with $R = 1,000$ replications provide robust inference, as in Chetty et al. (2011):

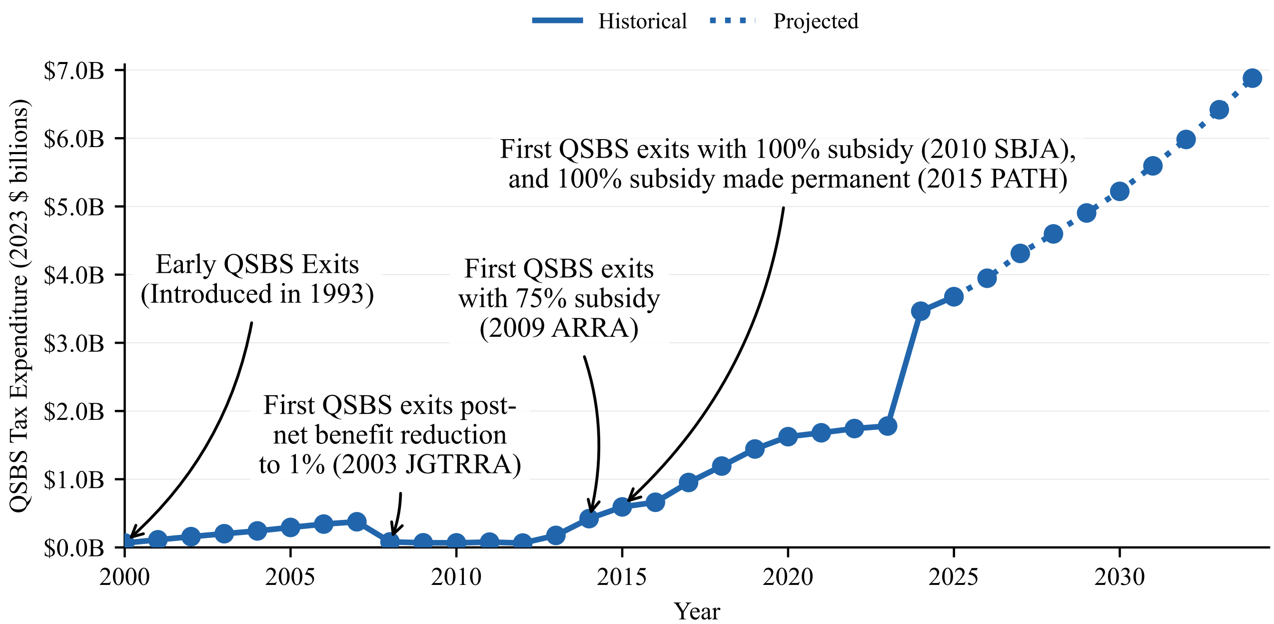
$$SE_{\text{bootstrap}}(B) = \sqrt{\frac{1}{R-1}\sum_{r=1}^{R}\left(B^{(r)} - \bar{B}\right)^2} \tag{A16}$$

where $\bar{B} = \frac{1}{R}\sum_{r=1}^{R} B^{(r)}$ is the bootstrap mean.

Second, standard errors for difference-in-bunching estimates assume independence between the two groups in each pairwise comparison:

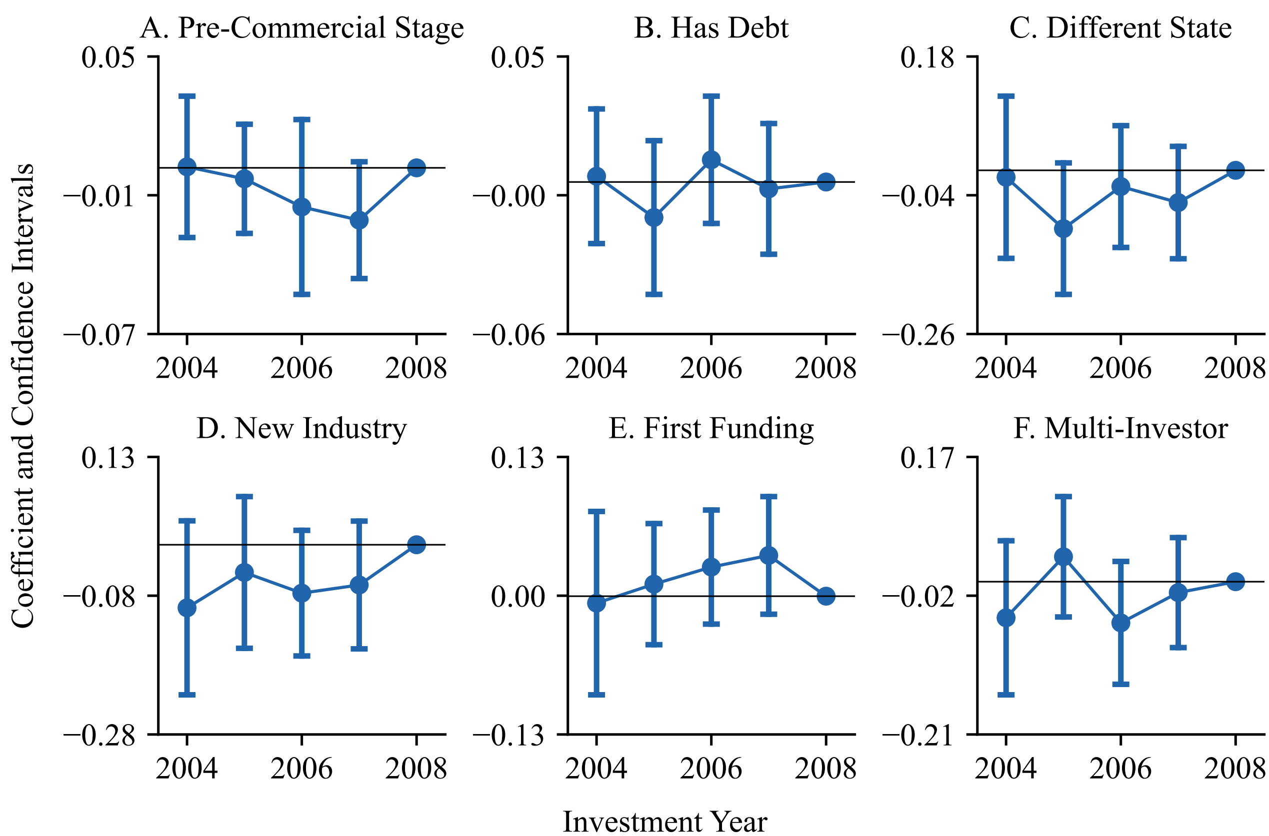
$$SE(\Delta B_i^{DB}) = \sqrt{SE(B_{\text{eligible,post}})^2 + SE(B_{\text{control}_i})^2} \tag{A17}$$

Figure IA6: Federal Tax Expenditures from the QSBS Tax Benefits



This figure illustrates the evolution of federal tax expenditures attributable to the Qualified Small Business Stock (QSBS) program from 2000 through 2034, with all values inflation-adjusted to 2023 dollars using the PCE Price Index. Federal tax expenditures reflect the government's foregone revenue from preferential tax treatment for QSBS investments. Figures do not include state-level QSBS tax expenditures. Key milestones annotated reflect changes from the following reforms: (1) *1993 QSBS Introduction:* QSBS became available on August 11, 1993 with the enactment of I.R.C. Section 1202 by Congress. (2) *2003 JGTRRA:* The Jobs and Growth Tax Relief Reconciliation Act (signed by President Bush) reduced the maximum long-term capital gains tax rate from 20% to 15%, thereby lowering the tax incentive for new QSBS investments—a change reflected in a decline in fiscal spending by 2008, as QSBS must be held for five years to qualify for subsidies. (3) *2009 ARRA:* The American Recovery and Reinvestment Act (signed by President Obama) introduced a 75% exclusion for QSBS-eligible investments, with the first qualifying exits emerging in 2014. (4) *2010 SBJA:* The Small Business Jobs Act (signed by President Obama) increased the exclusion to 100% as a temporary stimulus measure, with initial exits benefiting from this higher exclusion appearing in 2015. (5) *2015 PATH Act:* The Protecting Americans from Tax Hikes Act (signed by President Obama) made the 100% exclusion permanent. Data are from the U.S. Department of the Treasury.

Figure IA7: Dynamic Difference-in-Differences: Investment Selection



This figure shows dynamic difference-in-difference estimates for investment selection indicators during the pre-period (2004–2008), with 2008 set as the baseline year. The post-period (2009–2017) is included in the analysis but omitted in the plots. Panel A shows investments in pre-commercial stage companies. Panel B shows investments in companies with outstanding debt. Panel C shows investments in companies located in different states from the investor. Panel D shows investments in industries where the investor has no prior experience (1998–2003). Panel E shows first funding investments in companies without prior financial backing. Panel F shows investments involving five or more investors (above-median syndication). All specifications include fixed effects (investor, state–industry, and investment year) and standard errors clustered at the investor level. Confidence intervals are at the 99% level. Data are from PitchBook.

Table IA2: Timeline of QSBS Exemptions at Federal and State Levels

Year	Policy or Event
1993	Federal QSBS program is introduced under Section 1202, fixing the tax rate on QSBS gains at 14%.
2009	Federal QSBS exclusion is increased to 75% for investments made after February 17, 2009.
2010	Federal QSBS exclusion is increased to 100% for investments made after September 27, 2010.
2013	California eliminates its QSBS exclusion after a court ruling citing constitutional issues.
2015	100% federal QSBS exemption is made permanent under the PATH Act.
2016	Utah adopts QSBS conformity, offering full exclusion at the state level.
2022	Massachusetts adopts QSBS conformity, providing state-level exemptions for qualifying investments.
Ongoing	New Jersey, Pennsylvania, Mississippi, and Alabama maintain non-conformity with federal QSBS.

This table provides a timeline of key events related to the Qualified Small Business Stock (QSBS) exemptions. The 1993 federal QSBS program established a flat 14% tax rate for qualifying gains, independent of the long-term capital gains tax rate. In contrast, the 2009 and 2010 changes introduced exclusions that tracked the long-term capital gains tax rate (75% and 100%, respectively). In all cases—both at the federal and state levels—investors must hold the stock for a minimum of 5 years to qualify for the exemptions. Unless otherwise noted, states complied with federal exclusions for QSBS, offering corresponding benefits at the state level.

Table IA3: Sectors Eligible for QSBS Tax Benefits

Accessories	Aerospace and Defense	Agricultural Chemicals
Air	Alternative Energy Equipment	Animal Textiles
Application Software	Application Semiconductors	Automation Software
Automotive	Beverages	Biotechnology
Broadcasting	Building Products	Buildings and Property
Business Equipment	Business Software	Cable Service Providers
Catalog Retail	Clothing	Coal Equipment
Commodity Chemicals	Communication Software	Computers and Peripherals
Connectivity Products	Cruise Lines	Database Software
Decision Analysis	Department Stores	Diagnostic Equipment
Discovery Tools	Distributors	Drug Delivery
Drug Discovery	Educational Software	Electric Utilities
Electrical Equipment	Electronic Components	Electronic Equipment
Electronics	Energy Infrastructure	Energy Marketing
Energy Production	Energy Storage	Energy Transportation
Enterprise Systems	Entertainment Software	Fiberoptic Equipment
Financial Software	Food Products	Footwear
Gas Utilities	General Merchandise	General Semiconductors
Holding Companies	Home Furnishings	Household Appliances
Household Products	Industrial Chemicals	Industrial Supplies
Information Services	Infrastructure	Internet Retail
Internet Providers	Internet Software	Logistics
Luxury Goods	Machinery	Marine
Media Technology	Medical Records	Medical Supplies
Metal Containers	Mineral Textiles	Monitoring Equipment
Movies and Entertainment	Multi-Utilities	Network Software
Office Electronics	Oil and Gas Equipment	Operating Systems
Personal Products	Pharmaceuticals	Plastic Containers
Publishing	Rail	Raw Materials
Recreational Goods	Road	Security Services
Social Content	Social Software	Software Development
Specialty Chemicals	Specialty Retail	Storage (IT)
Surgical Devices	Synthetic Textiles	Systems Management
Telecommunications	Therapeutic Devices	Transportation Equipment
Vertical Software	Water Utilities	Wireless Equipment

This table presents our mapping of industries that qualify for QSBS tax benefits under Internal Revenue Code Section 1202 to PitchBook's industry code classification. Based on the statute's guidelines for qualified trades or businesses, we manually categorize PitchBook's industry codes as eligible for QSBS benefits, focusing on capital-intensive sectors that require substantial investment for growth. The categorization follows the program's explicit exclusion of sectors where the human capital where the human capital constitutes the primary asset, such as professional services, financial services, hospitality, and farming.

Table IA4: Mean Differences by QSBS Eligibility Status and Investment Year

	Pre-Period Investments (2004–2008)				Post-Period Investments (2009–2017)			
	Mean		*t*-Test		Mean		*t*-Test	
Variable	Eligible (1)	Ineligible (2)	Difference (3)	*t*-stat (4)	Eligible (7)	Ineligible (8)	Difference (9)	*t*-stat (10)
Panel A: Investment Characteristics								
Holding Years	3.828	3.785	0.043	1.323	3.289	3.213	0.076	6.741
$\mathbb{1}\{\text{Holding Years} \geq 5\}$	0.387	0.390	-0.003	-0.638	0.310	0.304	0.005	3.242
Investment Entry Year	2006.351	2006.473	-0.122	-3.657	2013.787	2013.990	-0.203	-9.857
$\mathbb{1}\{\text{Post}\}$	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000
Panel B: Investment Performance								
$\mathbb{1}\{\text{Out of Business}\}$	0.006	0.006	-0.000	-0.415	0.021	0.016	0.004	10.166
$\mathbb{1}\{\text{Five Years Without Funding}\}$	0.086	0.137	-0.051	-8.971	0.058	0.069	-0.011	-7.228
Valuation ($ billions)	0.186	0.233	-0.048	-0.950	0.327	0.410	-0.083	-3.214
$\mathbb{1}\{\text{Unicorn}\}$	0.027	0.038	-0.011	-1.945	0.049	0.068	-0.019	-7.523
Panel C: Exit Paths								
$\mathbb{1}\{\text{Private Equity Buyout}\}$	0.004	0.004	0.000	0.000	0.008	0.008	-0.000	-0.000
$\mathbb{1}\{\text{Acquisition}\}$	0.022	0.022	0.000	0.000	0.048	0.050	-0.002	-1.333
$\mathbb{1}\{\text{IPO}\}$	0.002	0.001	0.001	2.000	0.005	0.006	-0.001	-1.667

This table presents mean differences across sectors eligible and ineligible for QSBS exemption. The sample is at the investor–firm–year level and includes investments in C-corporations. Columns (1) to (4) present statistics on investments from 2004 to 2008, while Columns (7) to (10) present statistics on investments from 2009 to 2017. Investments tracked from 2004 to 2022, an until the investor exits the investment. For each variable, the "eligible" columns report the mean for QSBS-eligible sectors and the "ineligible" columns report the mean for QSBS-ineligible sectors. "Difference" denotes the raw difference between eligible and ineligible sectors. *t*-statistic are based on standard errors clustered by investor. Data are from PitchBook.

Table IA5: Baseline Bunching Estimates: Elasticity of Tax Benefits

Statistical Model	Trapezoidal Approximation	Bootstrapped CI (95%)	Nonparametric Bounds (M = $\hat{M}$)	Observations
	(1)	(2)	(3)	(4)
Panel A: Potentially QSBS-Eligible Investments				
Eligible Sectors, Post-2009 Investment				
Elasticity (ϵ)	4.454***	[3.573, 5.335]	[4.188, 6.113]	25,708
	(9.91)			
Panel B: QSBS-Ineligible Investments				
Eligible Sectors, Pre-2009 Investment				
Elasticity (ϵ)	2.496***	[2.198, 2.795]	[2.185, 4.217]	24,215
	(16.40)			
Ineligible Sectors, Post-2009 Investment				
Elasticity (ϵ)	0.786***	[0.658, 0.913]	[0.691, 0.998]	2,162
	(12.08)			
Ineligible Sectors, Pre-2009 Investment				
Elasticity (ϵ)	1.723***	[0.980, 2.467]	[1.447, 3.221]	1,605
	(4.54)			

This table presents bunching elasticity estimates for different investor categories. Panel A presents results for eligible investments (eligible sectors with investor entry after 2009). Panel B presents results for ineligible investments (eligible sectors pre-2009 or either ineligible sectors post- or pre-2009). Column (1) shows the trapezoidal approximation to point-identify the elasticity, with t-statistics in parentheses calculated from standard errors obtained using 1,000 bootstrap iterations. Column (2) presents the bootstrapped 95% confidence intervals for the elasticity estimates. Column (3) shows the Bertanha et al. (2023) nonparametric bounds for the elasticity with M = $\hat{M}$ (the maximum slope M for which the upper bound is finite). Column (4) shows the number of observations for each subsample. The sample is at the investor–firm–year level and includes investments in C-corporations part of QSBS eligible sectors, covering investment entries from 2007 to 2010 (2 years before and after the policy change). Estimates consider M of 3.0 and a tax of 20% (federal capital gain tax rate). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook and NBER TAXSIM.

Table IA6: Difference-in-Discontinuities Estimates: Funding Responses to the \$50 Million Threshold

Dependent Variable:	Forward Funding					
	Bandwidth: \$20 to \$80 million			Bandwidth: \$35 to \$65 million		
	Linear (1)	Quadratic (2)	Cubic (3)	Linear (4)	Quadratic (5)	Cubic (6)
$\mathbb{1}\{\text{Investment}>50\} \times \mathbb{1}\{\text{Post-2009}\}$	-0.612^{***}	-0.715^{***}	-1.720^{***}	-0.962^{***}	-1.638^{***}	-1.295^{***}
	(−3.13)	(−2.80)	(−4.64)	(−3.89)	(−4.26)	(−2.69)
Observations	7,381	7,381	7,381	2,535	2,535	2,535
Adjusted R^2	0.08	0.09	0.09	0.03	0.04	0.05

This table presents difference-in-discontinuities estimates (following Grembi et al. (2016)) of the effect of the \$50 million QSBS investment size threshold on forward funding. The dependent variable is the natural logarithm of the cumulative dollars invested by venture capital and angel investors in the five calendar years after the focal deal, net of the initial investment itself. Columns (1)-(3) use a wider bandwidth of 20–80 million, while columns (4)-(6) use a narrower bandwidth of 35–65 million. Each column reports a distinct polynomial specification. $\mathbb{1}\{\text{Investment}>50\} \times \mathbb{1}\{\text{Post-2009}\}$ is the difference-in-discontinuity estimator: the interaction of being above the \$50 million threshold and making the initial investment post-2009. t-statistics based on standard errors clustered at the investor level are in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. Data are from PitchBook.

Table IA7: Impact of QSBS Tax Benefits on Investment Outcomes: Estimation with Binary Models

	$\mathbb{1}$\{Out of Business\}		$\mathbb{1}$\{Unicorn\}	
	Logit	Probit	Logit	Probit
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{Eligible}\}\times\mathbb{1}\{\text{Holding}\geq 5\}\times\mathbb{1}\{\text{Post}\}$	0.397^{***}	0.182^{***}	0.440^{**}	0.203^{**}
	(3.81)	(3.57)	(2.34)	(2.31)
$\mathbb{1}\{\text{Eligible}\}\times\mathbb{1}\{\text{Holding}\geq 5\}$	0.243^{***}	0.110^{***}	0.302^{***}	0.123^{***}
	(8.68)	(8.46)	(7.02)	(6.47)
$\mathbb{1}\{\text{Holding}\geq 5\}\times\mathbb{1}\{\text{Post}\}$	-5.632^{***}	-2.317^{***}	-6.067^{***}	-2.469^{***}
	(−137.37)	(−105.32)	(−106.44)	(−82.30)
$\mathbb{1}\{\text{Eligible}\}\times\mathbb{1}\{\text{Post}\}$	0.059	0.033	-0.256^{**}	-0.102^{*}
	(0.79)	(0.94)	(−2.12)	(−1.79)
$\mathbb{1}\{\text{Holding}\geq 5\}$	-0.238^{***}	-0.108^{***}	-0.617^{***}	-0.257^{***}
	(−13.22)	(−13.50)	(−28.05)	(−28.56)
$\mathbb{1}\{\text{Post}\}$	0.789^{***}	0.407^{***}	1.394^{***}	0.629^{***}
	(16.78)	(20.35)	(26.81)	(28.59)
$\mathbb{1}\{\text{Eligible}\}$	0.007	0.004	−0.085	−0.030
	(0.14)	(0.20)	(−1.04)	(−0.94)
Observations	413,150	413,150	127,556	127,556
Pseudo R^2	0.022	0.024	0.030	0.034

This table presents estimates of the effect of QSBS tax benefits on VC-backed investment outcomes using binary models. All variables are demeaned by year to control for time-varying factors. Columns (1) and (2) show results for business closure outcomes, while Columns (3) and (4) shows results for unicorn status. For each outcome, results are shown using logit (Columns 1 and 3) and probit (Columns 2 and 4) estimators. $\mathbb{1}$\{Eligible\} is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}$\{Post\} indicates investments made after 2009. Year demeaning removes year-specific unobserved heterogeneity such as market conditions and regulatory changes. The sample is at the investor-firm-year level and includes years from 2004–2022 and investment entry years from 2004–2017. Shaded cells highlight the coefficients of primary interest. t-statistics are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table IA8: Impact of QSBS Tax Benefits on Investment Outcomes: Alternative Clustering Schemes

	$\mathbb{1}\{\text{Out of Business}\}$		$\mathbb{1}\{\text{Unicorn}\}$	
	Investor–Year Clustering (1)	Investor–Firm Clustering (2)	Investor–Year Clustering (3)	Investor–Firm Clustering (4)
$\mathbb{1}\{\text{Eligible}\}\times\mathbb{1}\{\text{Holding}\geq 5\}\times\mathbb{1}\{\text{Post}\}$	0.012***	0.012***	0.051**	0.051**
	(3.90)	(3.76)	(2.39)	(2.05)
$\mathbb{1}\{\text{Eligible}\}\times\mathbb{1}\{\text{Holding}\geq 5\}$	0.002	0.002	−0.083***	−0.083***
	(0.79)	(0.76)	(−4.36)	(−3.73)
$\mathbb{1}\{\text{Holding}\geq 5\}\times\mathbb{1}\{\text{Post}\}$	−0.025***	−0.025***	0.016	0.016
	(−8.03)	(−7.75)	(0.75)	(0.65)
Observations	412,453	412,453	111,436	111,436
Adjusted R^2	0.11	0.11	0.28	0.28
Mean Dependent Variable	0.017	0.017	0.052	0.052
Year FE	✓	✓	✓	✓
Holding-Period FE	✓	✓	✓	✓
Investor–Firm FE	✓	✓	✓	✓

This table presents estimates of the effect of QSBS tax benefits on VC-backed investment outcomes using alternative standard error clustering schemes. Columns (1) and (2) present results for failure and funding outcomes, while Columns (3) and (4) present results for valuation and unicorn status. For each outcome, results are shown with standard errors clustered at the investor-year level (columns 1 and 3), and investor-firm level (columns 2 and 4). $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor-firm-year level and includes years from 2004–2022 and investment entry years from 2004–2017. Shaded cells highlight the coefficients of primary interest. *t*-statistics are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table IA9: Examples of QSBS-Eligible Unicorn Investments

Company	Location	Select QSBS-Eligible Investors (Entry Year)
Uber	San Francisco, CA	Jason Calacanis (2010), Alfred Lin (2010), Scott Banister (2010), David Sacks (2010), James Pallotta (2010), Jeremy Stoppelman (2010), Scott Belsky (2010), Ashton Kutcher (2010), Matthew Ocko (2010), First Round Capital (2010)
Rivian	Irvine, CA	Michigan Economic Development (2015), Town Council (2016)
WhatsApp	Menlo Park, CA	Sequoia Capital (2011)
Livongo	Mountain View, CA	7wireVentures (2013), General Catalyst (2014), Kevin Colleran (2014), Slow Ventures (2014), Kleiner Perkins (2015), Threshold Ventures (2015), Sapphire Ventures (2016), Cowen Healthcare Investments (2016)
Juno Therapeutics	Seattle, WA	Memorial Sloan Kettering Cancer Center (2013), Seattle Children's Hospital (2013), Fred Hutchinson Cancer Research Center (2013), Biomark Capital (2013), CL Alaska L.P. and JT Line Partners (2013)
Snap Group	Santa Monica, CA	Rick Marini (2012), Greg Yaitanes (2012), Lightspeed Venture Partners (2012), Saint Francis High School (2012)
Lyft	San Francisco, CA	Troy Carter (2009), Justin Mateen (2009), fbFund REV (2009), Collaborative Fund (2009), Anthony Saleh (2010), David Sacks (2010), Benjamin Ling (2010), Keith Rabois (2010), Tyler Willis (2010), K9 Ventures (2010), Floodgate Fund (2010)
Medallia	Pleasanton, CA	Sequoia Capital (2012)
Auris	Redwood City, CA	Johns Hopkins Technology Ventures (2011), Miraki Innovation (2011), Kleiner Perkins (2011), Highland Capital Partners (2011)
Tesaro	Waltham, MA	New Enterprise Associates (2010)
Auth0	Bellevue, WA	Bessemer Venture Partners (2014), Guillermo Rauch (2014), K9 Ventures (2014), Steve Coast (2014), Portland Seed Fund (2014), NXTP Ventures (2014), Draper Cygnus (2014), Founders' Co-op (2015), Trinity Ventures (2016)
Veeam	Columbus, OH	ABRT VC (2013)
DraftKings	Boston, MA	Jordan Mendell (2012), Accomplice VC (2012), Atlas Venture (2012), Hub Angels Investment Group (2012), Icon Ventures (2012), Boston Seed Capital (2012), Crofton Capital (2012)
Spark Therapeutics	Philadelphia, PA	4BIO Capital (2017)
Bumble	Austin, TX	Badoo (2014)
Warby Parker	New York, NY	First Round Capital (2011), Shervin Pishevar (2011), David Tisch (2011), Menlo Ventures (2011), Tiger Global Management (2011), SV Angel (2011), Lerer Hippeau (2011), Thrive Capital (2011), Andrew Boszhardt (2011)
Drift	Boston, MA	General Catalyst (2015), CRV (2015), Dharmesh Shah (2015), Wayne Chang (2015), Mike Volpe (2015), Brian Shin (2015), JD Sherman (2015), John Kinzer (2015), Philip Harrell (2015), Florian Leibert (2015), Founder Collective (2015)
Lucid Group	Newark, CA	Venrock (2009), Tsing Capital (2009), LeTV (2011)
EdgeConneX	Herndon, VA	True Ventures (2010), Comcast Ventures (2010), Meritage Funds (2011), TDF Ventures (2011), Providence Equity Partners (2012), Akamai Technologies (2012), Brown Brothers Harriman Capital Partners (2013)
Pipedrive	New York, NY	Bessemer Venture Partners (2011), Insight Partners (2011), Atomico (2011), Andrew McLoughlin (2011), Christopher Muenchhoff (2011), Peep Vain (2011), InterWest Partners (2011), TMT Investments (2011), Thomas Korte (2012)

This table presents select QSBS-eligible companies that achieved unicorn status (valuation of $1 billion or more). Only investors who joined after 2009 in rounds raising less than $50 million are shown. For brevity, not all investors are listed. Data are from PitchBook.

Table IA10: Heterogeneity of VC Risk-Taking: Low- *versus* High-Capital Gain Tax Rate States

Dependent Variable:	$\mathbb{1}$\{Out of Business\}	
State-Level Capital Gain Tax Rate:	Less than 7% (Below Median)	More than 7% (Above Median)
	(1)	(2)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.011*	0.016***
	(1.87)	(3.49)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.003	-0.000
	(0.65)	(-0.04)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	-0.021***	-0.021***
	(-3.53)	(-4.24)
Observations	121,479	140,086
Adjusted R^2	0.11	0.07
Mean Dependent Variable	0.019	0.012
Year FE	✓	✓
Holding Period FE	✓	✓
Investor × Firm FE	✓	✓
Clustered SE (Investor)	✓	✓

This table presents the effect of QSBS tax benefits on VC investment outcomes by state-level capital gain tax rates. Column (1) focuses on investments made by investors headquartered in states with capital gains tax rates below 7% at the time of investment exit (including those in zero-tax states), while Column (2) focuses on investments made by investors based in states with tax rates at or above 7%. The dependent variable is an indicator for portfolio company closure. $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor–firm–year level, and includes traditional VC firms only. Additionally, the sample excludes states not complying with QSBS exemption; as such, it does not include Pennsylvania, New Jersey, Mississippi, Alabama, Massachusets, and only includes California up to the 2012 entry year and Utah after 2016 entry year. Shaded cells highlight the coefficients of primary interest. *t*-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook and NBER TAXSIM.