Tax Incentives and Venture Capital Risk-Taking*

Murillo Campello† *University of Florida & NBER*

Guilherme Junqueira‡ *University of Florida*

January 28, 2026

Abstract

Do tax subsidies prompt investors to take on risk? We address this question within a framework in which venture capitalists (VCs) combine outside funding with incentive-based compensation and examine a policy that cut capital gains taxes on startup investments. Using bunching, regression discontinuity, triple-differences, and matching designs that exploit industry eligibility, investment vintage, and holding-period requirements, our study analyzes data from 158 thousand investor–firm pairings over two decades. We first identify strategic investment timing, with subsidies prompting clustering at tax-eligible holding-period thresholds. We then document strategic capital allocation, with firms just below eligibility thresholds receiving more funding than those just above. Most notably, when and where tax subsidies apply, VCs shift their project selection toward riskier ventures: they invest more into pre-commercial stage startups, become more likely to provide startups with their initial capital, become more likely to invest in industries in which they have no prior experience, and more in firms with pre-existing debt, while becoming less likely to co-syndicate their investments. These portfolio firms eventually show higher failure rates. On the flip side, the increased risk-taking yields salient return outcomes: tax-subsidized VC-backed ventures attain higher valuations at exit and are more likely to reach "unicorn status." None of these patterns are observed for comparable non-VC investors receiving the 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.

Keywords: Tax Policy, Venture Capital, Risk-Taking, Entrepreneurial Financing
JEL Classification: G24, G23, H25, O31

*For comments and discussions, we thank Andres Almazan, Vicente Bermejo, Philip Coyle (discussant), Lora Dimitrova, Antoine Hubert de Fraisse, Brian Gibbons, Alexander Gorbenko (discussant), Irem Guceri (discussant), Thomas Hellmann (discussant), Yael Hochberg, Blake Jackson, Tim Jenkinson, Niels Johannesen, Luiz Ricardo Kabbach, Adrienne Lees, Josh Lerner, Yuchen Lin (discussant), Andrea Minardi, Jon Moreno-Medina, Pradeep Muthukrishnan, Marcel Olbert, Jim Poterba, Ignacio Requeijo (discussant), Jonathan Reuter, Jordan Richmond, Jay Ritter, David Robinson, Michael Ryngaert, Kevin Schneider, Lea Stern, Yuehua Tang, Steven Utke, Michael Weisbach, Mark Westerfield, Ting Xu (discussant), and Tim Zhang. We also thank workshop participants at the NBER Economic Analysis of Business Taxation Spring 2025, NBER Public Economics Fall 2025, NBER Place-Based Policies and Entrepreneurship Fall 2025, Private Capital Symposium 2025 at London Business School, Private Equity Research Consortium (PERC) Symposium Spring 2025 at University of Oxford, Finance Theory Group Summer School 2025 at University of Washington, Spanish Finance Association's 32^{nd} Finance Forum, University of Oregon Summer Finance Conference 2025, University of Oxford Centre for Business Taxation Doctoral Conference 2025, Latin American and Caribbean Economic Association Conference 2025, University of Milan, University of Cambridge, University of Alabama, Indiana University, Bank of England, CUNEF Universidad, University of Naples Federico II, Insper Instituto de Ensino e Pesquisa, and University of São Paulo.

†Corresponding author. Warrington College of Business, University of Florida & NBER. E-mail: campello@ufl.edu.

‡Warrington College of Business, University of Florida. E-mail: gjunqueira@ufl.edu.

1 Introduction

Young, entrepreneurial firms account for 20% of gross job creation and 26% of productivity growth in the economy (Haltiwanger et al. (2013); Akcigit and Kerr (2018)). They face financing challenges because capital market frictions impair risk-sharing between entrepreneurs and investors (Hall and Lerner (2010)). These frictions also create tensions in the design of 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 (NVCA (2025)). These investors can overcome financing frictions by combining risky capital with intensive screening and monitoring. It is argued that tax subsidies encourages investors to fund high-potential ventures, particularly at early stages where funding frictions are most severe (Poterba (1989); Rin et al. (2006)). On the flip side, providing benefits to investors with high-risk tolerance and sophisticated capabilities may simply create opportunities for tax arbitrage and boost returns to existing strategies without improving investment into new ventures (Lerner (2013)).

This paper examines how tax policy affects capital allocation and risk-taking in entrepreneurial markets by comparing 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 (who combine outside capital with incentive-based compensation) and angel investors (who primarily use their own capital)? Second, can tax subsidies affect not only the level of company funding 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. To wit, 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 capital gain tax subsidies. Lower investment thresholds then lead VCs to select new, marginal projects that are riskier—ventures with higher variance in potential outcomes (including failure rates)

that could otherwise go unfunded. These effects emerge even after accounting for general partners' (GPs') capital contributions to VC funds and reputational costs associated with future fundraising.

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 the 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 1%. The 2009 reform excluded 75% of gains on QSBS-eligible investments from taxation. The Small Business Jobs Act (SBJA) of 2010 boosted this benefit by *fully eliminating* capital gains taxes on 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. 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 (158 thousand in total) from initial investment through exit. These data allow for tests contrasting how VCs, angels, and corporate investors respond to tax subsidies throughout the full investment lifecycle—from initial selection through valuation milestones, exit strategies (e.g., IPOs), and failures.

We start by looking at the elasticity of investors' responses to tax subsidies via bunching methods. Specifically, we estimate the extent to which investors cluster at the five-year minimum holding period required for QSBS qualification. We identify significant bunching at the 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 difference-in-bunching approach that compares eligible *versus* ineligible sectors and pre- *versus* post-reform periods. Our tests show 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. In contrast, we find no evidence of bunching at the $50 million asset threshold, suggesting that investors and companies do not strategically manipulate deal sizes to qualify for QSBS benefits.

We next examine capital allocation responses to tax subsidies using a regression discontinuity design (RDD) that exploits this same $50 million eligibility cutoff. The absence of bunching at this threshold supports the continuity assumption required for valid RDD inference. 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 33–64% less follow-on funding than those just below. That is, once QSBS benefits were enhanced, investors committed significantly more capital to portfolio companies that met tax-subsidy eligibility requirements.

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-by-industry, industry-by-year, investor state-by-year, and industry-by-firm state fixed effects. We show that VCs select businesses with higher fundamental risk *when* and *where* tax benefits become available: in eligible sectors after 2009, VC investments become 81% more likely to take place in pre-commercial stage startups—early development phases with highly uncertain viability. VCs also become three times more likely to invest in firms carrying pre-existing debt, reflecting a willingness to accept greater financial risk, 9% more likely to invest in states away from their domicile, where information asymmetries are greater, and 8% more likely to enter industries in which they have no previous track record. VCs also reduce their reliance on external certification and risk-sharing: they become 58% more likely to provide a startup's first funding, and 16% less likely to participate in investment syndicates. In stark contrast, angel and corporate investors show no significant changes in their investment selection criteria along any of these dimensions.

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. Notably, combining 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.

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 (2% of investor–firm–year observations; failures account for 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. These patterns are also unique to VC; 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 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 noting 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).

A potential concern is that our results could be driven by systematic differences across industries classified as eligible and ineligible under QSBS. We address this through matched sample analyses comparing firms *within product verticals*—market-oriented classifications that group companies based on customer segments and market applications rather than traditional industry codes. Critically, because QSBS eligibility is determined by the *nature of business activities* rather than these market-oriented verticals, individual verticals contain both eligible and ineligible firms.[1] This enables within-vertical comparisons exploiting variation in tax treatment. Using Coarsened Exact Matching on vertical, state, and investment year, we find results that closely align with our main specifications—ruling out alternative explanations based on differences in growth potential, technological trajectories, or expertise requirements.

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, this excess failure likelihood fell by two-thirds (to 59%). In extended analyses, we show that these patterns extend beyond California. Eligible VC-backed investments in QSBS-compliant high capital gain tax states embed 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. Theses tests speak to features of our model related to compensation structures and risk tolerance. 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 study how the composition of VC limited partners (LPs) affects risk-taking responses. Using fund-level LP composition data, we construct measures of "sophisticated" capital supply based on the intensity of

[1] For example, the FoodTech vertical includes both eligible food manufacturing companies and ineligible food delivery platforms; EdTech combines eligible educational software platforms with ineligible training service providers.

[2] The non-conforming states are: Pennsylvania, Mississippi, Alabama, California (after 2013), Utah (before 2016), Massachusetts (before 2022), and New Jersey (before 2025).

elite private university endowment LPs, which maintain long-term 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 the QSBS-induced increase in failure rates by two to three times.

Beyond individual investment decisions, we find evidence that tax subsidies create cross-sectoral capital reallocation effects. While a precise evaluation would require a structural model and data not available in our setting, we can examine this indirectly through capital calls from LPs. We show that funds holding tax-qualified investments make significantly more capital calls, while funds with comparable ineligible-sector investments experience reduced inflows. This suggests that tax benefits influence not only project-level selection but also capital flows across sectors. Notably, these 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 show that VCs increase their targeting of 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.

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 subsidies (Chirinko and Wilson (2008); Fajgelbaum et al. (2019); Slattery and Zidar (2020)) and the effects of taxation on innovation (Akcigit et al. (2022)). Theoretical work by Keuschnigg and Nielsen (2003) shows how taxes affect VCs and entrepreneurial activity, with a focus on the role of managerial advice in enhancing startup survival rates. 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)), though policies to promote entrepreneurship often face challenges (Lerner (2022)).

More recent papers examine policies targeting entrepreneurial investment. Abdulrauf et al. (2025) look at individual tax return data and report 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 do not consider whether tax changes affect investment selection or risk-taking. Chen and Farre-Mensa (2023) document that the QSBS increased firm births (counts) and patenting; the authors focus on aggregate entrepreneurship outcomes rather than investor-level risk-taking behavior and heterogeneity. Dimitrova and Eswar (2023) use staggered state-level tax changes to show that higher taxes reduce VC-backed firms' patent counts and citations. Denes et al. (2023) look at angel investor tax credits and find that while these programs increase angel investment activity, they fail to yield real economic effects; the authors do not consider portfolio composition or risk-taking dimensions. 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. Furthermore, we show that these tax-motivated dynamics may change the allocation of capital across different sectors of the economy, with the potential to shape the innovation process.

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 evidence that tax subsidies may expand the frontier of venture investment by encouraging funding of riskier ventures—that could otherwise remain unfunded—suggests that tax policy may enable the experimental, high-risk investments that create transformative economic value.

The remainder of the paper is organized as follows. Section 2 presents our conceptual framework, Section 3 details our institutional setting, and Section 4 describes our data sampling. Section 5 analyses timing and allocation responses to tax subsidies. After describing our empirical strategy in Section 6, we examine investment selection in Section 7 and present investment performance in Section 8. We study data heterogeneity in Section 9 and analyze cross-sectoral effects in Section 10. Section 11 concludes.

2 Conceptual Framework

We develop a simple conceptual framework to help explain 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, VCs' monitoring effort, and investment levels (e.g., Poterba (1989); Gompers and Lerner (1998); Keuschnigg and Nielsen (2003); Denes et al. (2023)). We instead focus on the option-like incentives of GPs—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 capital gain tax subsidies 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 tax subsidies lower their effective investment threshold far more than they do for angel investors, with this differential sensitivity widening as project risk increases.

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 $r > \mu$.

[3] Startups may suddenly fail through product rejection, funding collapse, or competitive displacement; Merton (1976) models such shocks as jump processes and Hall and Woodward (2010) documents that three-quarters of venture-backed companies expire without returning cash. η represents a geometric depreciation rate; given η, a project lasts $\frac{1}{\eta}$ years on average.

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 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 subsidies. These investors differ in their capital sources, incentive structures, and tax treatment. Since corporate investors are exposed to corporate income taxes rather than capital gains taxes, we focus our model analysis on VCs and angels (we use corporate investors as controls in latter empirical tests). 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 investment theses that guide their capital allocation strategies, with project selection being their primary value-addition mechanism.[4] They do so combining manage-

[4] Gompers et al. (2020) survey 885 institutional venture capitalists and find deal selection is rated as VC's most important value-creation activity; the average VC screens 200 companies to make four investments annually.

ment 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 fee rate on committed capital I net of ordinary income taxes, 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:

$$V_{VC}(X) = \underbrace{\frac{\alpha I}{r+\eta}}_{\substack{\text{management} \\ \text{fee PV}}} + \underbrace{(1-\tau_K)\,\gamma \times \begin{cases} b_1 X^{\beta_+}, & X \le h, \\ b_2 X^{\beta_-} + \dfrac{X}{r-\mu+\eta} - \dfrac{h}{r+\eta}, & X \ge h, \end{cases}}_{\text{carried interest value}} \tag{5}$$

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 own resources (median of 1%, cf Robinson and Sensoy (2013)), creating direct downside exposure beyond the carried interest incentive structure. Brown and Volckmann (2024) show that GP commitment levels influence risk-taking behavior in fund management. GPs also face reputation costs as investment performance 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, showing 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:

$$(1-\tau_K)\gamma \left[b_2 \frac{\beta_+ - \beta_-}{\beta_+} (X^*)^{\beta_-} + \frac{\beta_+ - 1}{\beta_+(r-\mu+\eta)} X^* - \frac{h}{r+\eta} \right] + \underbrace{\frac{\alpha I}{r+\eta}}_{\substack{\text{fee} \\ \text{income}}} - \underbrace{\omega I}_{\substack{\text{GP} \\ \text{capital}}} - \underbrace{(1-\omega) I \varphi}_{\substack{\text{reputation} \\ \text{cost}}} = 0. \tag{7}$$

[5] Chung et al. (2012) document a pay-for-performance ratio of 0.18–0.44 for VCs. I.e., 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.

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.

2.2.2 Angel Investors

Angels invest their own capital (Kerr et al. (2014)). We consider two financing structures representing over 90% of angel financing (Angel Capital Association (2020)): direct equity and convertible debt.

Direct Equity Financing. Upon investment, an angel investor holding equity 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 using direct equity is:

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

Convertible Debt Financing. Over one-third of angel investments use convertible notes (Angel Capital Association (2020)), which provide debt-like protection with an option to convert to equity upon a subsequent financing event. We model this as a two-stage compound option. The angel provides initial capital I as debt with coupon rate c (net of ordinary income taxes). Upon conversion, the angel pays a fraction $\delta < 1$ of the prevailing equity value—typically a 20–30% discount (Loutskina and Chaplinsky (2023)). During the creditor period before conversion, the angel faces flow costs ξ capturing agency

costs and limited control rights.[6] After conversion, the angel holds equity with value:

$$V_{A,3}(X) = (1-\tau_K)\frac{X}{r-\mu+\eta}. \tag{10}$$

Before conversion but after investing, the angel is a creditor with an alive conversion option:

$$V_{A,2}(X) = \underbrace{\frac{cI}{r}}_{\substack{\text{coupon}\\ \text{PV}}} + \underbrace{\left[(1-\delta)(1-\tau_K)\frac{\bar{X}}{\rho} - \frac{cI}{r} + I - \frac{\xi\bar{X}}{\rho}\right]\left(\frac{X}{\bar{X}}\right)^{\beta_+}}_{\text{conversion option value}} + \underbrace{\frac{\xi X}{\rho}}_{\substack{\text{flow cost}\\ \text{offset}}}, \tag{11}$$

where $\rho \equiv r-\mu+\eta$ and $\bar{X}$ is the conversion threshold at which the angel optimally converts debt to equity.

The option value to provide the initial financing is:

$$V_{A,1}(X) = \underbrace{\left[V_{A,2}(X^*) - I\right]}_{\substack{\text{net value at}\\ \text{investment}}}\underbrace{\left(\frac{X}{X^*}\right)^{\beta_+}}_{\substack{\text{option}\\ \text{discount}}}, \tag{12}$$

where X^* is the investment threshold at which the angel optimally provides financing.

Solving the smooth-pasting conditions yields the investment threshold:

$$X^* = \frac{\beta_+}{\beta_+ - 1}\cdot\frac{r-\mu+\eta}{\xi}\cdot\frac{r-c}{r}\cdot I. \tag{13}$$

We specify agency costs as $\xi = \tilde{\xi}(1-\tau_K)$, reflecting that flow costs during the creditor period scale with the after-tax equity value at stake. Intuitively, when capital gains taxes are high, the potential after-tax equity upside is lower, reducing the intensity of conflicts between angel creditors and entrepreneurs over value-creating activities. This yields:

$$X^* = \frac{\beta_+}{\beta_+ - 1}\cdot\frac{r-\mu+\eta}{\tilde{\xi}(1-\tau_K)}\cdot\frac{r-c}{r}\cdot I. \tag{14}$$

[6] About 90% of angel convertible notes are unsecured and fewer than 6% include board seats, leaving investors with weak control rights (Nanda et al. (2012)). The conversion discount also creates incentive misalignment: since angels convert at a discount to the Series A price, they benefit from lower Series A valuations while entrepreneurs seek higher ones—potentially undermining collaborative value creation. Moreover, most convertible notes mature without triggering conversion, which requires a subsequent equity round of sufficient size, forcing costly renegotiations at maturity (Chaplinsky and Becker (2019)).

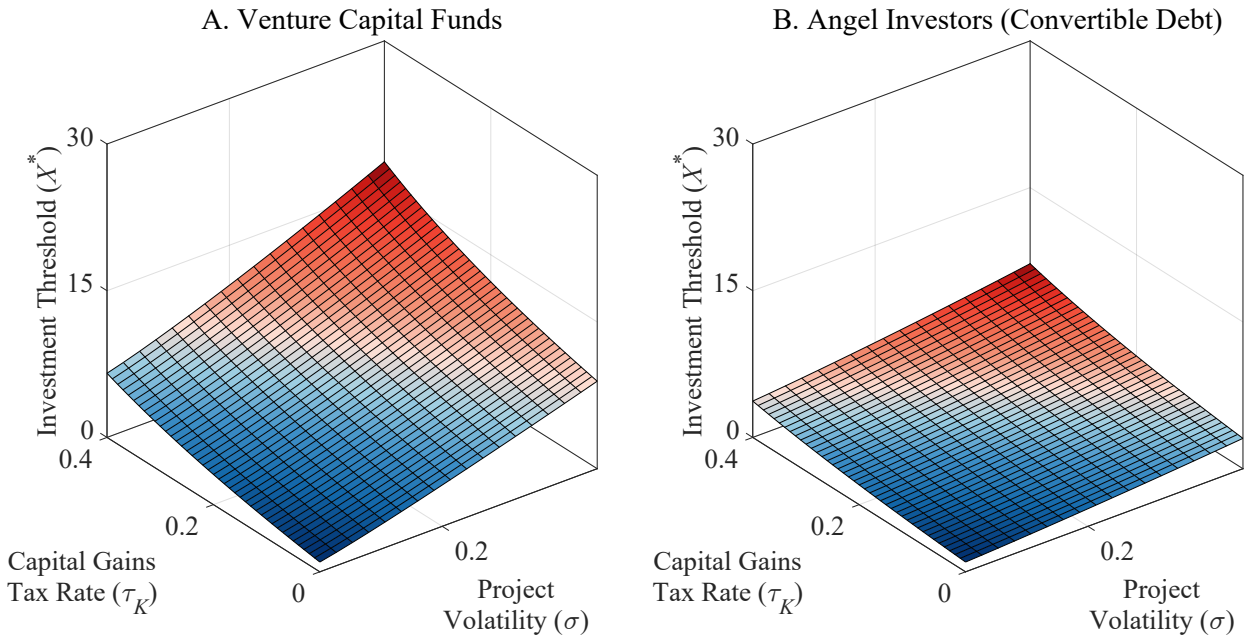
While convertible notes introduce option-like features through conversion discounts and coupon income, the terminal payoff after conversion remains linear in project outcomes—unlike VCs whose carried interest creates a convex terminal payoff. Two key distinctions drive differential tax sensitivity. First, angels invest their own capital and bear full downside risk on personal wealth, whereas VCs deploy predominantly outside capital. Second, the nature of optionality differs: angel conversion discounts provide a one-time valuation adjustment at the conversion decision, after which the payoff becomes linear in firm value. In contrast, VC carried interest creates a permanently convex terminal payoff—20% of profits exceeding the hurdle rate in unlimited upside—that amplifies as returns grow. Consequently, angels' investment thresholds respond proportionally to tax changes, whereas VCs' convex payoffs generate amplified responses that increase with project risk.

2.2.3 Comparative Depiction: Model Calibration

We use Figure 1 to illustrate our calibrated model's key predictions borrowing parameters from the existing literature. The figure shows investment thresholds as a function of both tax rates and asset risk for VCs and angels using convertible debt. We focus on convertible debt in the main comparison because it represents over one-third of angel investments and provides a more conservative test of VC–angel differences by giving angels option-like timing features.[7] 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). This differential persists because angels invest their own capital and bear full downside risk, whereas VCs deploy predominantly outside capital with convex carried interest compensation. 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 robustness analyses—including angel financing structure comparisons, alternative VC parameters, and sensitivity tests—see Appendices IA1.2 to IA1.5.

[7] Figure IA1 presents the corresponding comparison between angel financing structures, showing that direct equity angels are even less responsive to tax changes than convertible debt angels.

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



This figure shows how minimum investment thresholds (X^*) vary with effective capital gains tax rates (τ_K) and project volatility (σ). The parameters used are: discount rate $r = 0.07$, drift rate $\mu = 0.03$, after-ordinary-income-tax management fee $\alpha = 0.0126$ (2% gross fee taxed at 37% rate), 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 3.25× stronger negative reputation effects (computed as the fundraising benefit of escaping poor performance relative to achieving exceptional performance based on Barber and Yasuda (2017)). For the angel analysis, after-ordinary-income-tax coupon $c = 0.0441$ (7% gross coupon taxed at 37% rate), conversion discount $\delta = 0.70$, and agency cost intensity $\tilde{\xi} = 0.30$ calibrated to the limited monitoring and control rights typical of convertible note financing (Loutskina and Chaplinsky (2023); Nanda et al. (2012)).

2.3 Testable Predictions

Our model yields three predictions about how tax subsidies shape venture investment. We frame them in practical terms using the QSBS tax program as a surrogate for an increase in capital gains tax subsidies:

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:

$$\frac{\partial X^*}{\partial \tau_K} > 0. \tag{15}$$

Prediction 2: VCs exhibit the strongest response to QSBS tax subsidies

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

$$\left|\frac{\partial X^*_{VC}}{\partial \tau_K}\right| > \left|\frac{\partial X^*_{Angel}}{\partial \tau_K}\right|. \tag{16}$$

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

The VC–angel differential sensitivity of investment thresholds to taxation becomes more pronounced for high-risk projects. That is, as project risk increases, VCs' investment thresholds become even more responsive to tax changes compared to angel investors:

$$\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \sigma} > \frac{\partial^2 X^*_{Angel}}{\partial \tau_K \partial \sigma}. \tag{17}$$

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:

$$\frac{\partial}{\partial \gamma}\left(\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \sigma}\right) > 0. \tag{18}$$

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. 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.[8]

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.[9] This structure means the partnership itself pays no taxes; instead, all gains and losses flow 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.[10]

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

[8] Corporate VC arms are funded by their corporate parents (Chemmanur et al. (2014)). If a corporate VC arm were to raise external LP capital, the LP—not the corporate VC—may qualify for QSBS benefits if the LP is an individual.

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

[10] 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.

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). Alternatively, GPs can be structured as legal entities (e.g., LLC, S-Corporation, or management companies), which are typically organized as pass-through entities. In these cases, the tax treatment eventually flows to the partners of the legal entity, who remain eligible for QSBS benefits.

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)). 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, and hospitality. These restrictions concentrate QSBS tax benefits into technology, pharmaceutical and biotechnology, and other capital-intensive businesses. Table IA3 lists all QSBS-eligible sectors.

3.2.2 Shareholder Eligibility Requirements

Shareholder eligibility for tax benefit considers three dimensions. First, investors must acquire stock at original issuance 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. Third, the maximum exclusion per issuing

corporation is bounded by the greater of $10 million or ten times the initial investment basis.[11]

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%.[12] 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.[13]

A series of reforms later revitalized the program. First, the American Recovery and Reinvestment Act (ARRA) of 2009 changed it to a 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.

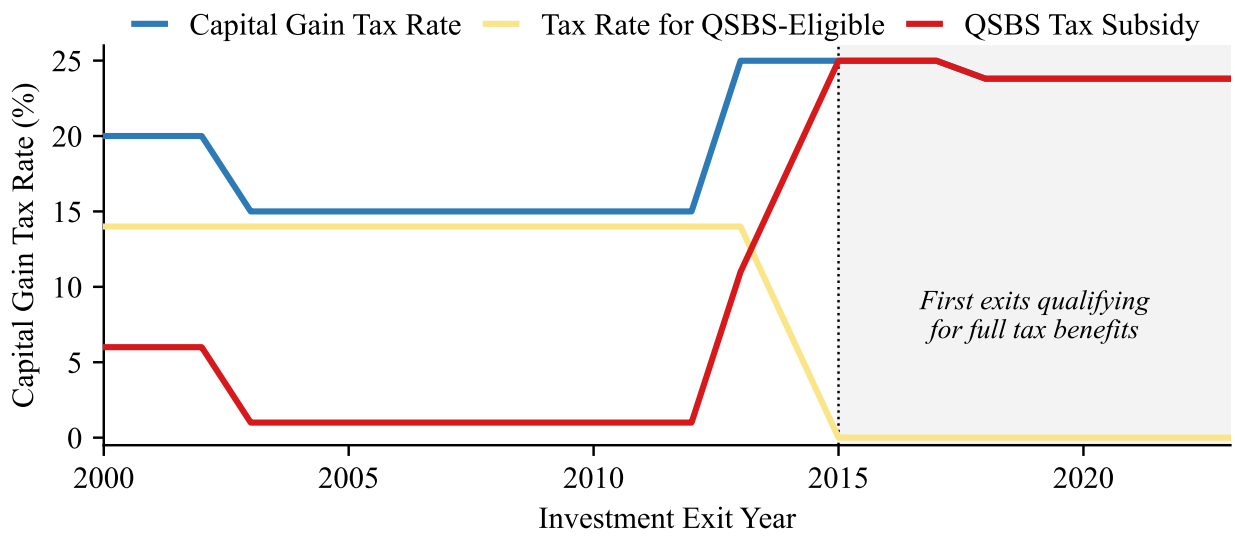
Figure 2 depicts the evolution of QSBS tax benefits since 2000. When the federal capital gains tax rate (blue line) peaked at 25% in 2015, investments that qualified under the post-2010 SBJA provisions and exited in 2015 were completely exempt from federal capital gains taxes (yellow line), thus representing a subsidy of 25 percentage points (red line). As shown in Figure IA7, the program's fiscal impact has scaled 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). Looking forward,

[11] 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.

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

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

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.

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 IA2.

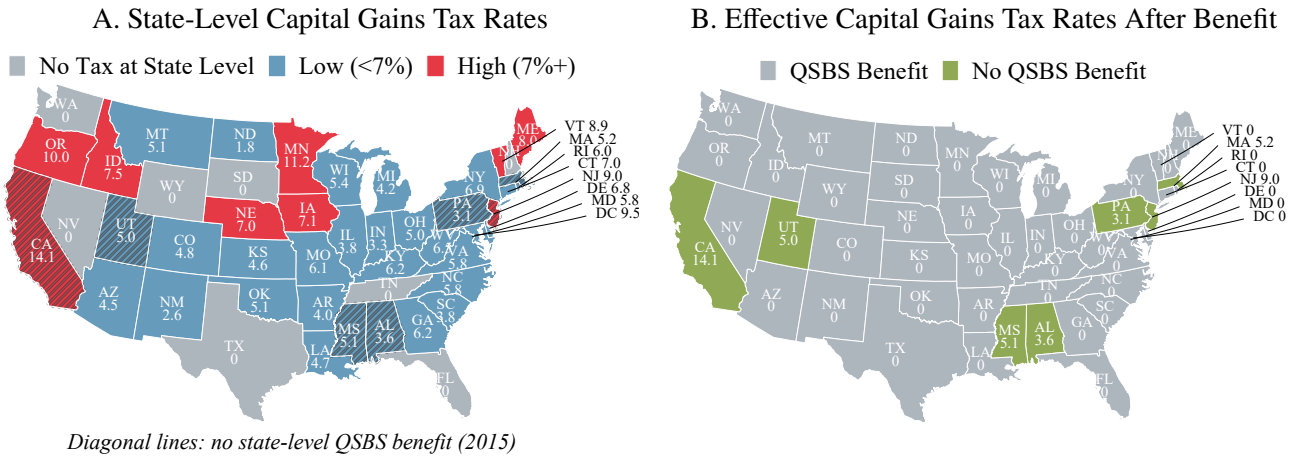
3.4 State-Level Compliance

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,[14] 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

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

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.

qualified investments, conforming states like New York and Virginia also exempt 100% of those gains from state taxes.[15] Three states have consistently opted out of offering QSBS benefits: Pennsylvania, Mississippi, and Alabama. California initially provided QSBS benefits but eliminated it in 2013.[16] QSBS-eligible investments in these non-conforming states are subject to full state capital gains taxes. Utah, Massachusetts, and New Jersey adopted conformity in 2016, 2022, and 2025 respectively.

4 Data and Variable Construction

We primarily 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,

[15] 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.

[16] 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.

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 amount exceeds $50 million in the startup's first operating 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.

We track investor–firm pairs from investment entry through exit or up to a 10-year holding period between 2004 and 2022.[17] 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.[18]

4.1 Investor and Industry Composition

The composition of investors in our sample reveals the central role of VC in early-stage finance. VC firms account for 47% of the count of investments in our sample. Angel investors represent 23%, while corporations participate in 8%. Combined, other investors (including primarily accelerators, growth equity funds, family offices, and the U.S. Government) account for the remaining 22%.

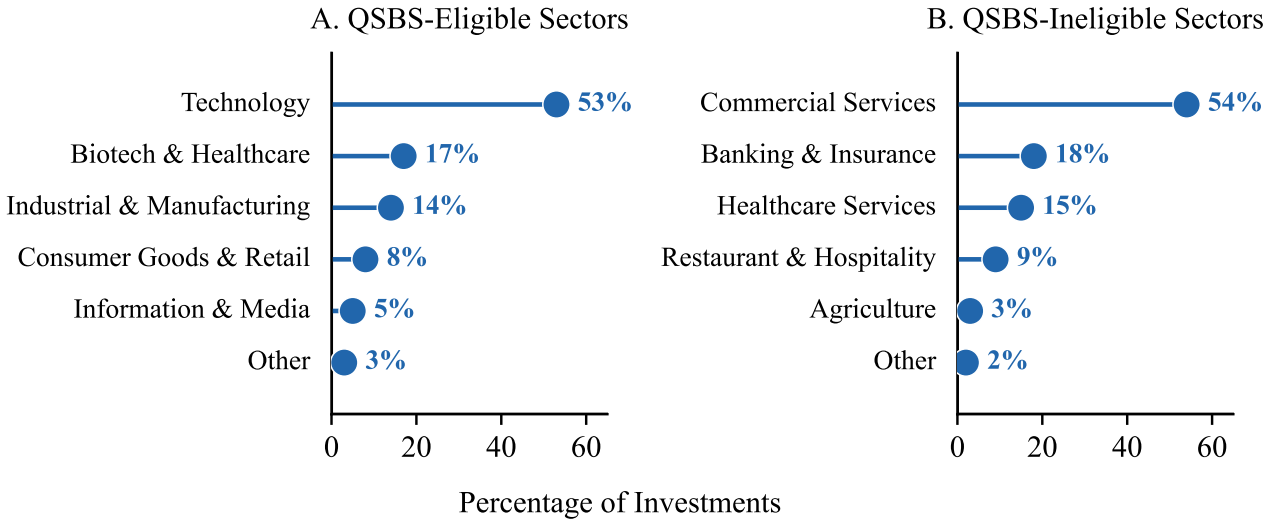
Technology companies dominate our sample of eligible investor–firm pairings, accounting for 53% of investments, as shown in Panel A of Figure 4. Within technology, business and productivity software represents the most prominent component, followed by application software and social platform software.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

Our test strategy implies that investor composition is not systematically different between

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

[18] The 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 4: Investment Composition by Industry 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.

QSBS-eligible and ineligible sectors, which could otherwise confound the effects of tax policy changes. Supporting our assumption, Figure 5 shows that investor type distributions are comparable 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.

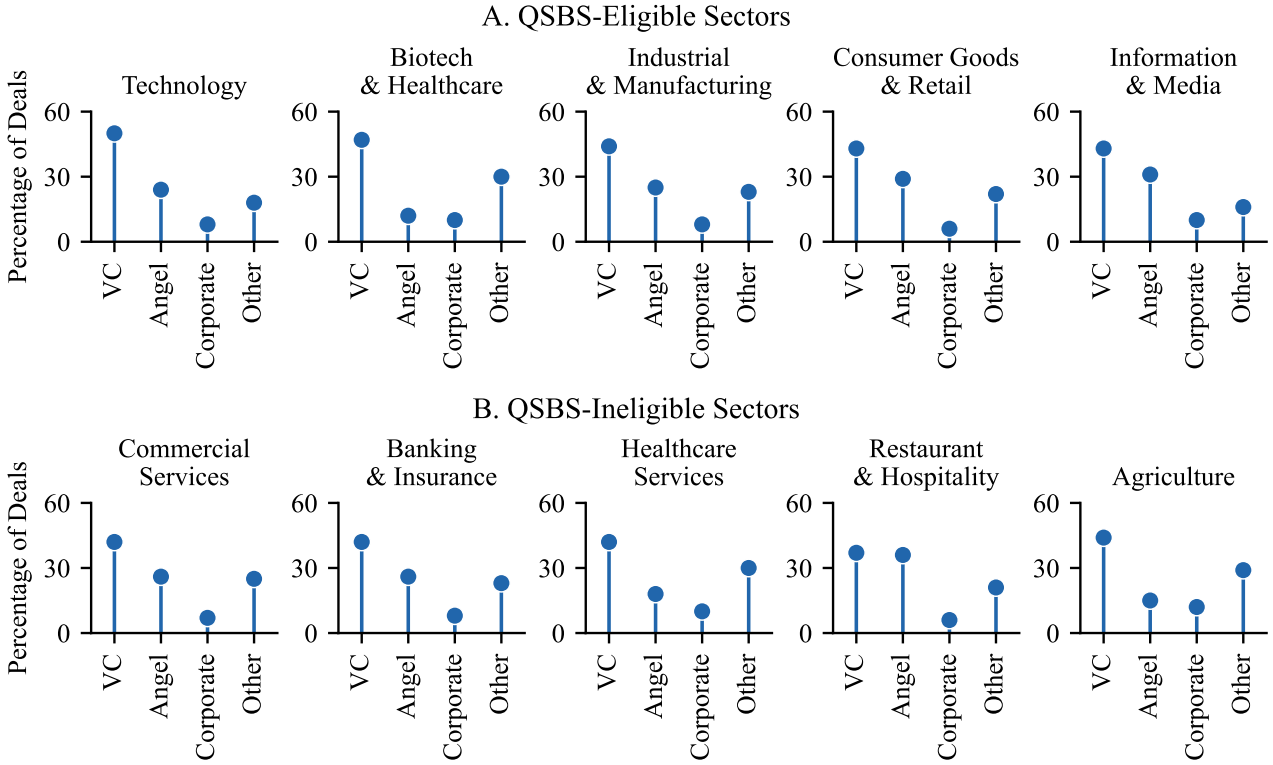
4.2 Key Variables and Summary Statistics

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. We discuss these in turn.

4.2.1 Investment Selection

We examine six investment selection variables meant to assess "risk-taking" at the investor–firm level. 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).

Figure 5: 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.

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.[19]

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 (see 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

[19]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)).

states. Geographic distance increases information asymmetries between investors and entrepreneurs while reducing the level of investor oversight (Lerner (1995); Bernstein et al. (2016)), 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 is not backed by any other financier at the time of investment. This includes companies not previously funded by VCs, angel investors, corporate investors, accelerators, private equity funds, or debt providers. Companies with financing represent lower-risk investments, having passed through screening and due diligence processes, and benefited from ongoing financier monitoring (see Kerr et al. (2014); Gompers et al. (2020); Block et al. (2024); Mayya and Huang (2025)).

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)).[20]

4.2.2 Financing and Performance Outcomes

Understanding how tax benefits affect financing and performance outcomes requires tracking investor–firm relationships over time. We construct two sets of outcome variables that capture the evolution of investments from funding through exit: (1) investment failures; and (2) valuation performance.

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

[20]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)).

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.[21]

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.[22]

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 with valuation.[23]

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.

[21] 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.

[22] 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))

[23] 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 Subsidies

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 subsidies. We employ two complementary empirical approaches in this section. First, we analyze bunching behavior at two key QSBS eligibility margins: the five-year holding period required for tax subsidy qualification and the $50 million asset threshold that determines firm eligibility. Second, we leverage regression discontinuity design (RDD) and difference-in-discontinuities analyses to examine how tax subsidies affect capital allocation decisions around the gross margin cutoff. We discuss these in turn.

5.1 Bunching Approach

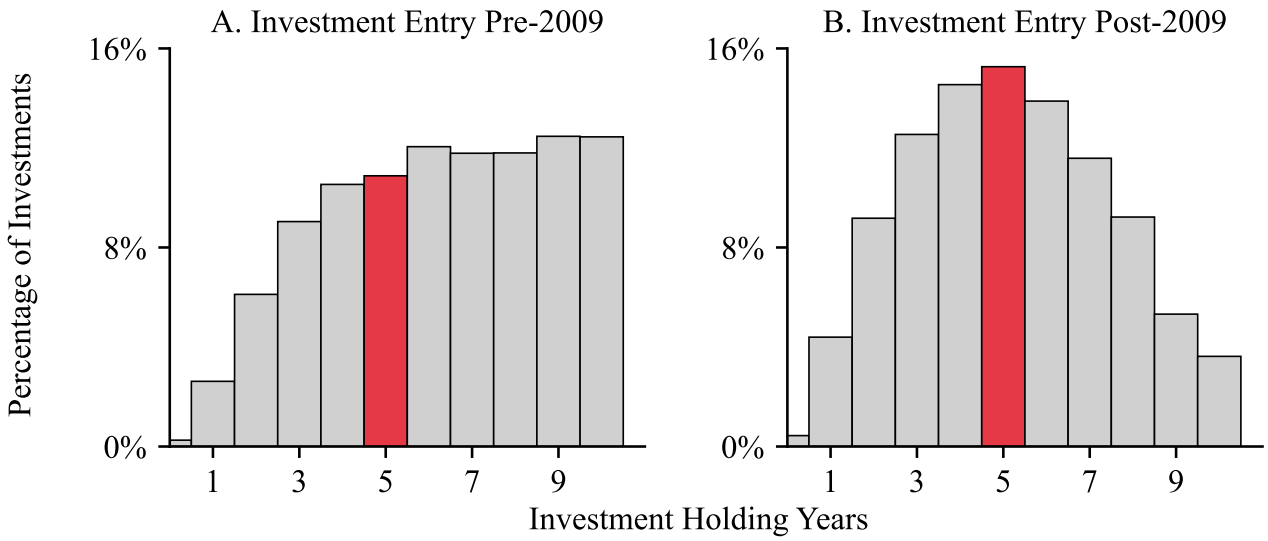
The mandatory five-year holding period for QSBS qualification creates a kink in the capital gains tax schedule—investors who hold investments for at least five years qualify for substantial tax subsidies, while those exiting just before five years receive no benefits. While it is impossible for investors to time exactly their exits from portfolio companies due to market conditions and coordination challenges among investors (Ritter (1998); Nanda and Rhodes-Kropf (2019)), we expect strategic clustering toward the five-year threshold as investors attempt to qualify for tax benefits. Panel A in Figure 6 shows no distinct clustering at five years before the 2009–2010 QSBS reform. Panel B shows that post-reform investments exhibit a salient spike at the five-year mark, while both shorter and longer holding periods become less common.[24] This pattern is consistent with altered holding preferences, with investors seeking to qualify for tax subsidies at the earliest opportunity. We formally estimate the magnitude of this bunching behavior employing techniques that quantify behavioral responses to tax subsidies.

5.1.1 Bunching at the Holding Period Threshold

We quantify investors' responsiveness to tax subsidies 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 IA3. Our bunching analysis focuses on VC and angel investments made

[24] This strategic timing is analogous to tax-motivated trading (Kaplan (1981); Constantinides (1983, 1984); Ritter (1988); Ivković et al. (2005); Sialm (2009)) and consistent with lock-in predictions for privately held businesses (Chari et al. (2005)).

Figure 6: Distribution of Holding Periods of Investments Around the QSBS Reform



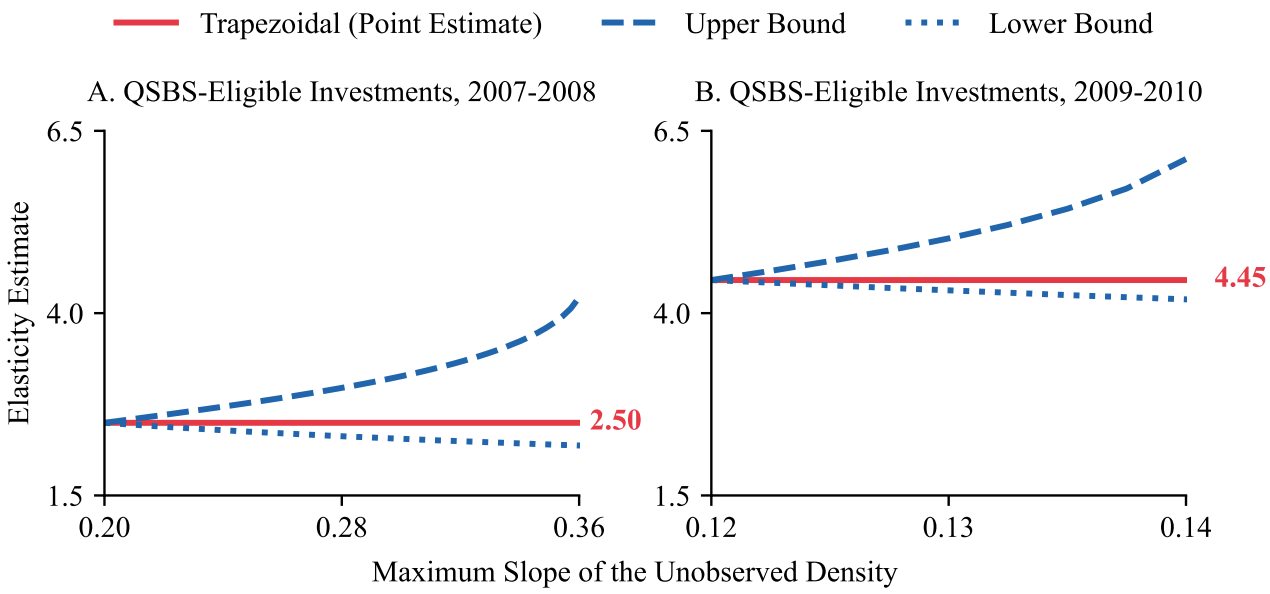
This figure shows a distribution of holding periods in QSBS-eligible sectors. Sampling considers entry years from 2004 through 2017 for investments achieving an exit (see details in the Data section). Data are from PitchBook.

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.[25] We employ three complementary estimation 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.

Figure 7 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 subsidies. 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.

[25] 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: 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.

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], 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 7), 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 at the Holding Period Threshold

We complement the bunching analysis with a difference-in-bunching test (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 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 subsidies 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.[26]

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, implying that the QSBS benefits generate a 2% 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.

[26] 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 $SE(\hat{\epsilon}_{diff}) = \sqrt{SE(\hat{\epsilon}_{treatment})^2 + SE(\hat{\epsilon}_{control})^2}$.

5.1.3 Bunching at the Asset Threshold

Having documented strategic timing at the holding-period margin, we next examine whether similar strategic behavior occurs at the asset-size threshold that determines QSBS eligibility. This threshold creates a notch in the tax schedule: portfolio companies whose gross assets exceed $50 million immediately after an investment round lose *all* QSBS benefits, creating a "dominated region" just above the threshold where rational agents would strictly prefer to locate below (Kleven and Waseem (2013)).

We proxy for gross assets using the investment amount in a given round. Under IRC Section 1202, gross assets equal cash plus the adjusted tax basis of other property. Startups typically lack tangible assets, with their market value resting primarily on intangible assets such as knowledge and human capital that do not appear on the balance sheet (Hall and Lerner (2010)). Because R&D expenditures are expensed rather than capitalized under U.S. GAAP, and internally generated intangibles carry no tax basis, early-stage firms' gross assets for QSBS purposes consist primarily of cash from recent fundraising.

Figure IA9 displays the distribution around the threshold, separately for pre-reform (Panel A) and post-reform (Panel B) periods. Both distributions decline as deal size increases, consistent with the staged nature of VC investing where smaller early-round investments are more common than larger late-stage deals. While Panel B shows a slight increase in mass in the bin just below the threshold, the distribution exhibits no sharp discontinuity at the $50 million cutoff, even when tax subsidies became available.

We formally test for bunching at this notch using Kleven and Waseem (2013)'s methodology, fitting a polynomial to the observed distribution while excluding bins near the threshold to estimate the counterfactual density.[27] Our sample matches the holding period analysis: VC and angel investments in QSBS-eligible sectors with entry years 2007–2010, expanded to include deal sizes from $25 million to $75 million around the asset cutoff.[28] Table IA6 reports results across four specifications varying bin width ($2.5M and $5M) and sample range (from $25 million to $75 million, and from $35 million to $65 million). Panels A and B show that elasticity estimates are economically small and statistically insignificant across all specifications in both periods. Notably, pre-2009 elasticities are slightly negative, indicating fewer firms near the threshold than the counterfactual predicts—the opposite of bunching. Post-2009

[27] The holding period threshold is a kink (investors bunch at the earliest qualification point), while the asset threshold is a notch (firms exceeding $50M lose all benefits, creating a dominated region). The Kleven and Waseem (2013) polynomial approach is standard for notch settings, while Bertanha et al. (2023) provides partial identification bounds suitable for kinks.

[28] As in our holding period bunching analysis, we employ a cubic polynomial and use a capital gains tax rate of $\tau = 0.20$.

elasticities remain near zero, suggesting no behavioral response to enhanced tax benefits. The difference-in-bunching estimates in Panel C, ranging from 0.001 to 0.003, are also statistically insignificant.

5.2 Regression Discontinuity Approach

Having established that investors and companies do not strategically manipulate deal sizes around the $50 million threshold—supporting the continuity assumption required for valid RDD inference—, we exploit this sharp discontinuity to examine how tax subsidies affect capital allocation. We employ two complementary discontinuity-based approaches to identify the causal effect of QSBS eligibility on forward funding amounts—defined as the cumulative funding a startup receives in the five years following the initial investment. First, we implement an RDD that compares forward funding amounts just below and above the threshold within specific time periods. Second, we extend this analysis with a difference-in-discontinuities framework (cf. Grembi et al. (2016); Bennedsen et al. (2022)) 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 the same sample from our bunching tests at the asset threshold: investments ranging from $25 million to $75 million in QSBS-eligible sectors by VCs and angels.[29] This sample restricts to eligible sectors only, as the threshold is relevant only for investments that would otherwise qualify for the tax benefits, and to investor types who may claim QSBS benefits. As we discuss below, we employ data-driven methods to set 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 asset 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

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

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

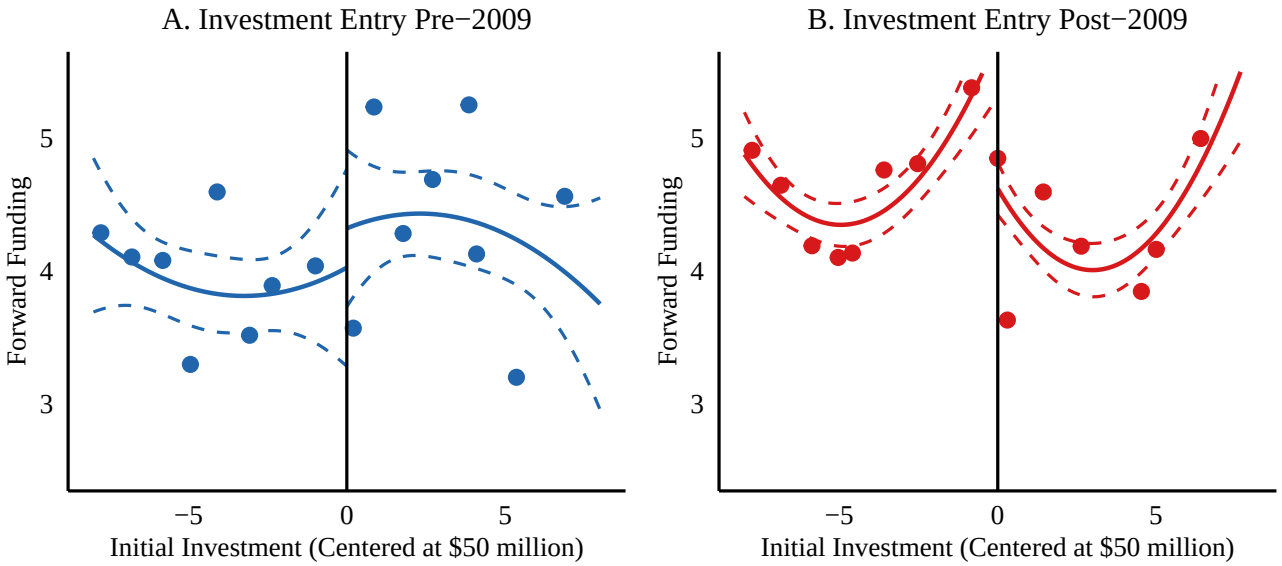
$$\begin{aligned}\text{Forward Funding}_f =& \alpha + \beta \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} + \sum_{p=1}^{P} \gamma_p \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \delta_p \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} \cdot (\text{Initial Investment}_f - 50)^p + \epsilon_{i,f}\end{aligned} \tag{19}$$

where i indexes investors and f indexes portfolio companies. The dependent variable Forward Funding is the natural logarithm of cumulative dollars raised by portfolio company f from VC and angel investors 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 $\mathbb{1}\{\text{Initial Investment}_f > 50\}$ 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 to ensure robustness of our estimates. We estimate this specification both with and without industry fixed effects to verify that our results are not driven by systematic differences in sector composition around the threshold. Standard errors are clustered at the investor level to account for correlation across multiple investments made by the same investor. 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.[30]

Figure 8 illustrates our RDD approach, plotting the relationship between initial investment size and five-year forward funding. 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 subsidies influence the amount of funding that investors provide to startups.

[30] 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.

Figure 8: 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.

Table 3 presents our RDD results across different polynomial specifications. For the pre-2009 period (Panel A), we find no statistically significant discontinuity in forward funding across all specifications, with point estimates ranging from −0.27 to +0.16 across specifications. In contrast, for the post-2009 period (Panel B), we observe negative and statistically significant discontinuities across all specifications. Without industry controls (odd-numbered columns), point estimates range from −0.40 to −1.01, while specifications with industry fixed effects (even-numbered columns) show consistent negative discontinuities ranging from −0.40 to −0.69. These results indicate that investments just above the threshold receive 33% to 64% less forward funding than those just below the threshold after the reform.[31] Notably, stable results with industry fixed effects confirm that our findings are not driven by industry composition. The optimal bandwidths range from 2.04 to 10.48.

PLACE TABLE 3 ABOUT HERE

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

5.2.2 Difference-in-Discontinuities Analysis

We complement the RDD analysis with a difference-in-discontinuities design that 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 trends between pre-2009 and post-2009 periods that affect all firms regardless of size. Using the same sample of investments ranging from \$25 million to \$75 million in QSBS-eligible sectors, as well as a narrower bandwidth from \$35 million to \$65 million to test robustness, we estimate:

$$\begin{aligned}\text{Forward Funding}_f =& \alpha + \beta \cdot [\mathbb{1}\{\text{Initial Investment}_f > 50\} \times \mathbb{1}\{\text{Post-2009}\}_f] \\ &+ \gamma_1 \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} + \gamma_2 \cdot \mathbb{1}\{\text{Post-2009}\}_f \\ &+ \sum_{p=1}^{P} \delta_p \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \theta_p \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \lambda_p \cdot \mathbb{1}\{\text{Post-2009}\}_f \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \mu_p \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} \cdot \mathbb{1}\{\text{Post-2009}\}_f \cdot (\text{Initial Investment}_f - 50)^p + \epsilon_{i,f}\end{aligned} \tag{20}$$

where i indexes investors and f indexes portfolio companies. The dependent variable remains the natural logarithm of forward funding raised by portfolio company f from VC and angel investors in the five calendar years after the focal deal. The specification includes indicators for exceeding the \$50 million threshold ($\mathbb{1}\{\text{Initial Investment}_f > 50\}$) and for the post-2009 period ($\mathbb{1}\{\text{Post-2009}\}_f$), 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. We estimate this specification both with and without industry fixed effects to ensure our results are not driven by systematic differences in sector composition around the threshold. Standard errors are clustered at the investor level to account for correlation across

multiple investments made by the same investor. This approach filters out both fixed discontinuities at the threshold unrelated to the reform and common time trends affecting all investment sizes.

Table 4 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 ($25 to $75 million) shown in Panel A, estimates range from -0.39 to -1.58 across specifications with and without industry controls, implying decreases in forward funding of 32% to 79% for investments exceeding the threshold after the reform. The narrower bandwidth sample ($35 to $65 million) in Panel B yields even stronger effects, with estimates ranging from -0.96 to -1.65, representing reductions of 62% to 81% in forward funding. These results corroborate our RDD findings that investors allocate significantly more capital to tax-advantaged investments.

PLACE TABLE 4 ABOUT HERE

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. We discuss these steps in turn.

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:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Post-2009}\}_{i,f}] \\ &+ \beta_2 \cdot \mathbb{1}\{\text{Eligible Sector}\}_f + \beta_3 \cdot \mathbb{1}\{\text{Post-2009}\}_{i,f} \\ &+ \alpha_{i,j} + \gamma_{j,t} + \delta_{s_i,t} + \theta_{j,s_f} + \epsilon_{i,f,t} \end{aligned} \tag{21}$$

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

We employ four sets of fixed effects to control for confounding factors. Investor-by-industry fixed effects ($\alpha_{i,j}$) absorb time-invariant investor specialization and preferences within specific sectors. Industry-by-year fixed effects ($\gamma_{j,t}$) capture time-varying sector-specific trends, including technological shocks and changing market conditions. Investor state-by-year fixed effects ($\delta_{s_i,t}$) control for regional economic shocks and time-varying local investment climates. Industry-by-firm state fixed effects (θ_{j,s_f}) account for geographic clustering patterns of specific industries. Standard-error clustering at the investor level accounts for potential correlation in investment decisions 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:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \beta_2 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t}] \\ &+ \beta_3 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \beta_4 \cdot [\mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \beta_5 \cdot \mathbb{1}\{\text{Eligible Sector}\}_f + \beta_6 \cdot \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} + \beta_7 \cdot \mathbb{1}\{\text{Entry Post-2009}\}_{i,f} \\ &+ \alpha_{i,f} + \delta_t + \theta_h + \epsilon_{i,f,t} \end{aligned} \tag{22}$$

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 capital calls from LPs. 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 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 5 indicate that after the reform, investments in QSBS-eligible sectors become 47% more likely to take place during the pre-commercial stage. Put differently, the QSBS reform increased the likelihood of pre-commercial stage investing by 1.8 percentage points from a baseline rate of 3.8%. 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 81% their pre-commercial stage investments. Angel and corporate investors exhibit no increase in interest for investments at the pre-commercial stage.

PLACE TABLE 5 ABOUT HERE

Tax subsidies 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 three times. 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. Angel investors show no shifts toward debt-carrying companies, while corporate investors become less likely to back this type of companies.

Geographic distance serves as another proxy for risk-taking—distance is often associated with risks arising from information asymmetries (Van Nieuwerburgh and Veldkamp (2009)). Column (3) in Panel B shows that post-2009, VCs hike investments across state boundaries by 9% (+0.04 relative to a mean of 0.47). 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 startups (Lerner (1995); Chen et al. (2010)). Consistent with 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.[32] Specifically, VCs become 8% more likely to invest in these

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

new industries in QSBS-eligible sectors following the reform (+0.05 relative to a mean of 0.63) 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 58% more 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, private equity, or debt providers. This shift toward first funding represents increased risk-taking as financial backing provides quality signals and validation that come from prior screening and due diligence processes. 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 subsidies significantly alter the number of investors participating in funding rounds. Panel B reveals that VC investments in QSBS-eligible sectors post-reform become 16% less likely to involve multiple (five or more) investors (–0.07 relative to a mean of 0.46).[33] 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.

Our baseline specification addresses potential confounds through saturated fixed effects that control for investor-specific sector expertise, time-varying industry trends, and geographic selection patterns. Table IA7 demonstrates robustness across several alternative fixed effects structures, ranging from simple additive controls (Investor + Industry) to models with three-way interactions (Industry×Year×InvState) and city-level geographic variation. Table IA8 further confirms stability across clustering schemes, including single clustering (investor, company, interactions with industry and year), and two-way clustering (investor and company, investor×industry and company, investor and firm state). Across all specifications, VC coefficient estimates remain stable in sign, magnitude, and statistical significance, while angel and corporate investors consistently show null effects.

Collectively, the results from this section overwhelmingly show that tax subsidies shape risk-taking through the selection of inherently riskier ventures, with effects driven exclusively by VC investors. These differential responses confirm Prediction 2 from our conceptual framework: VCs'

[33] Examining the continuous measure of syndicate (not reported), VCs reduce the number of co-investors by 17% (−0.99 relative to a mean of 5.9 investors, $t = -6.0$). Angel and corporate investors show no significant changes in syndicate size.

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 IA8 plots dynamic difference-in-differences estimates, showing coefficients in pre-reform years that are statistically indistinguishable from zero (supporting the implicit parallel trends test 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 6 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 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 6 ABOUT HERE

Tax-subsidized VC investments also show signs 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. These findings are robust when clustering standard errors at the investor-firm level rather than the investor level, accounting for correlation within specific investment relationships over time (see Table IA10).[34]

8.2 Valuation

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 sharp contrast, Columns (5) and (6) show that angel-backed companies experience significant valuation declines of $209–$399 million when tax benefits apply, while Columns (7) and (8) show that corporate investors have negative but statistically insignificant effects.

PLACE TABLE 7 ABOUT HERE

Panel B of Table 7 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. Table IA11 presents examples of unicorns in our sample, including Uber, Lyft, WhatsApp, and Warby Parker. In sharp contrast, Columns (5) and (6) show that angel-backed investments have a decreasingprobability 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.[35]

[34] Failure results are also stable under logit and probit models (see Columns (1) and (2) in Table IA9).
[35] Unicorn results are stable under logit and probit models (see Columns (3) and (4) in Table IA9).

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. These findings remain robust under alternative clustering at the investor-firm level (see Table IA12).

8.3 Within-Vertical Comparisons: Matched Sample Analysis

One could be concerned that our results are driven by heterogeneity across industries classified as eligible and ineligible by the QSBS program. To allay such concerns, we examine whether our results persist when comparing firms *within product verticals* as classified by PitchBook. To wit, product verticals are market-oriented classifications that group companies based on the specific customer segments they serve and problems they solve, rather than traditional industry codes. Unlike standard industrial classifications (e.g., SIC or NAICS codes) that categorize firms by production methods or outputs, verticals cut across multiple traditional industries by focusing on shared market applications. Critically, because QSBS eligibility is determined by the *nature of business activities* rather than market-oriented verticals,[36] individual verticals contain both QSBS-eligible and ineligible firms. This enables within-vertical comparisons that hold constant market dynamics, customer demand, and competitive pressures while isolating variation in tax treatment. This approach complements our main triple-difference specification by ruling out alternative explanations based on differences in growth potential, technological trajectories, or expertise requirements across sectors.

The vertical Technology, Media, and Telecommunications (TMT)—the dominant vertical in our sample—illustrates this cross-industry-cutting structure of the QSBS elegibility criteria. Within TMT, eligible technology companies such as Uber (ridesharing software), Dropbox (cloud storage), and Zoom (video conferencing) coexist with ineligible service-based firms such as SoFi (online lending), Kickstarter (crowdfunding platform), and Lemonade (insurance). Similarly, the EdTech vertical com-

[36] IRC Section 1202(e)(3) defines qualified businesses by excluding specific "trades or businesses"—including services (health, law, consulting, financial services), banking and insurance, farming, and hospitality. These exclusions are based on the *type of business activity conducted* rather than the customer segments or market applications that define product verticals.

bines eligible educational software platforms such as Duolingo and Coursera with ineligible training service providers such as Udacity and Lambda School (coding bootcamps). FoodTech includes eligible food technology and manufacturing companies such as Beyond Meat and Impossible Foods alongside ineligible delivery service platforms such as Grubhub and DoorDash. Together, these three verticals represent 60% of firms with vertical classifications in our sample.

We start by examining risk-taking and valuation responses across TMT, EdTech, and FoodTech. Table 8 presents results from our baseline triple-difference specification estimated independently for each of these three verticals. Panel A examines business failure measures, while Panel B examines valuation outcomes. The results reveal considerable heterogeneity across verticals. For out-of-business rates, Column (1) shows the TMT vertical experiences a 92% increase (+0.022 relative to a mean of 0.024), Column (3) shows EdTech exhibits a 175% increase, and Column (5) shows FoodTech experiences a 71% increase. For funding gaps of five or more years, TMT investments experience a 158% increase (Column 2), with EdTech and FoodTech (Columns 4 and 6) showing positive but statistically insignificant effects.

PLACE TABLE 8 ABOUT HERE

Panel B reveals striking complementary valuation patterns. Valuation effects in dollar terms show a 53% increase for TMT (Column 1), a 2.4-fold increase for EdTech (Column 3), and a 5.5-fold increase for FoodTech (Column 5). The unicorn probability effects are even more pronounced: Column (2) shows TMT experiences a 188% increase (+0.077 relative to a mean of 0.041), while Columns (4) and (6) show EdTech and FoodTech experience 11-fold and 12-fold increases, respectively. These patterns are consistent with tax subsidies inducing VCs to pursue higher-risk, higher-reward strategies—taking on elevated failure risk in exchange for substantially increased upside potential when investments succeed. The particularly pronounced effects in more specialized verticals (EdTech and FoodTech) may reflect their clearer technology-versus-service distinctions.

We extend this analysis by constructing matched samples that compare eligible and ineligible firms within *all* verticals simultaneously. Our sample spans 59 distinct product verticals. We employ Coarsened Exact Matching (CEM) following Blackwell et al. (2009) and Aneja et al. (2025). CEM creates strata—unique combinations of matching dimensions such as vertical, state, and investment entry year—and retains only those containing both eligible and ineligible investments. Observations

within each stratum receive weights inversely proportional to their group size, ensuring that eligible and ineligible firms contribute equally to comparisons regardless of their relative abundance in any particular market segment. Unlike propensity score matching, CEM requires no functional form assumptions and achieves exact balance on all matching dimensions.

We implement two progressively stringent matching specifications. First, we match on vertical and investment entry year, creating 428 strata across vertical–year combinations and retaining 371,991 observations (90% retention). Second, we implement full matching on vertical, portfolio company state, and investment entry year, creating 1,241 strata and retaining 297,133 observations (72% retention). Table 9 presents results across both matching specifications examining both failures and valuations. The specification maintains our triple-difference structure with investor–firm, year, and holding period fixed effects, now weighting observations by CEM weights to account for the matching procedure.

PLACE TABLE 9 ABOUT HERE

Panel A examines business failure measures. Columns (1) and (2) show that when matching on vertical and entry year, VC investments qualifying for tax benefits experience a 94% increase in out-of-business rates (+0.016 relative to a mean of 0.017), with nearly identical estimates when adding investor state to the matching criteria. These align closely with our main specification's coefficient of 0.012 reported in Table 6. For funding gaps, Columns (3) and (4) show a 127% increase rising to a 228% increase with full matching. Panel B reveals complementary risk-return patterns. Valuation effects in dollar terms show a 54% increase when matching on vertical and entry year (Column 1) and a 73% increase with full matching (Column 2). For unicorn probability, Columns (3) and (4) show that matching on vertical and entry year yields a 104% increase, while full matching produces a 107% increase.

The within-vertical testing variation strengthens our interpretation of the results by ruling out alternative explanations based on systematic selection into particular market segments or business models and heterogeneity across standard industrial classifications. It provides added evidence that tax subsidies induce VCs to pursue higher-risk, higher-reward investment strategies.

8.4 Supply Versus Demand: Pre-2009 Founded Firms

Another potential concern is that our results could reflect changes in the *supply* of QSBS-eligible startups—with riskier firms disproportionately founded in eligible sectors after 2009—rather than investor *demand* for risk. We conduct a robustness test restricting the sample to firms founded before 2009, holding the startup pool fixed. Of the 35 thousand portfolio companies in our main sample, 12 thousand were founded before 2009 (approximately one-third of the total). Any change in how investors treat these pre-existing firms after the reform reflects pure demand-side behavior, as the founding decisions for these firms could not have been influenced by QSBS incentives.

Table IA13 presents failure results for pre-2009 founded firms. The VC-specific patterns remain robust: Columns (3) and (4) of Panel A show that tax-qualifying VC investments experience significantly higher out-of-business rates (+0.010 for all firms, +0.026 for exited firms), while Panel B shows elevated funding gaps (+0.057 and +0.045, respectively). Notably, angel and corporate investors continue to show no significant effects. Table IA14 reveals complementary valuation patterns. Column (4) of Panel A shows that among exited VC-backed firms, tax-qualifying investments achieve valuations $251 million higher—a 138% increase relative to the sample mean. Similarly, Column (4) of Panel B shows that exited VC-backed investments are over three times more likely to achieve unicorn status (+0.156 relative to a mean of 0.047). Again, angel and corporate investors exhibit no comparable positive effects.

These results show that our findings reflect genuine shifts in VC risk appetite rather than compositional changes in the startup population. VCs take more risk with the *same pool of firms* when tax benefits become available, ruling out supply-side explanations for our main results.

8.5 Endogenous Holding Periods: Predicted Holding Analysis

A related concern is that holding periods themselves may be manipulated—investors may strategically extend holdings to qualify for tax benefits, potentially confounding our treatment effect. To address this, we conduct a robustness test replacing actual holding periods with *predicted* holding periods estimated using only pre-2009 investment characteristics, before the QSBS enhancement made strategic holding

behavior tax-motivated. We first estimate a prediction model on pre-2009 investments:

$$\mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f} = \gamma_0 + \mathbf{X}'_{i,f}\boldsymbol{\gamma} + \nu_{i,f} \tag{23}$$

where $\mathbf{X}_{i,f}$ includes deal size, firm age at investment, investor type, industry classification, firm state, investor state, employee counts, and investor historical holding patterns (overall, by industry, and by state). All variables are sourced from PitchBook, except employee counts which are obtained from Revelio Labs.[37] We then apply these coefficients out-of-sample to generate predicted holding $\mathbb{1}\{\widehat{\text{Holding Years}} \geq 5\}_{i,f}$ for all investments. This approach isolates variation in expected holding duration driven by fundamental investment characteristics rather than tax-motivated behavior.

Using this predicted measure, we estimate:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\widehat{\text{Holding Years}} \geq 5\}_{i,f} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \text{two-way interactions} + \text{constituent terms} + \alpha_i + \phi_f + \delta_t + \epsilon_{i,f,t} \end{aligned} \tag{24}$$

where $Y_{i,f,t}$ denotes our outcome measures (business failure and unicorn status), α_i denotes investor fixed effects, ϕ_f denotes firm fixed effects, and δ_t denotes year fixed effects. We employ separate investor and firm fixed effects rather than investor–firm pair fixed effects because the predicted holding measure is time-invariant within each investor–firm pair. We omit holding period fixed effects since the specification instruments for holding duration—including actual holding period controls would condition on the outcome of the first-stage prediction. Standard errors are clustered at the investor level.

Table IA15 presents results. The VC-specific patterns from our main specification persist: Column (2) of Panel A shows that VCs exhibit a statistically significant increase in portfolio company failure rates when predicted holding interacts with QSBS eligibility post-2009, while angel and corporate investors show no comparable effects (Columns 3 and 4). The magnitude of the VC coefficient (0.003) is attenuated relative to our baseline estimate using actual holding (0.012 in Table 6), as expected when replacing an observed variable with a noisy proxy. Panel B examines unicorn status; the VC coefficient remains positive but loses statistical significance, consistent with classical measurement error attenuating

[37] We match PitchBook portfolio companies to Revelio Labs sequentially on LinkedIn profile URLs, website domains, and fuzzy company names (Jaccard similarity > 0.8). When multiple matches arise, we retain the highest-similarity match, with ties broken by validating on country, state, and founding year.

estimates toward zero. Importantly, the qualitative pattern—significant effects concentrated exclusively among VCs—is preserved. That our results survive instrumenting holding periods with pre-determined characteristics provides additional assurance that strategic timing does not drive the main findings.

8.6 Return Distribution Analysis

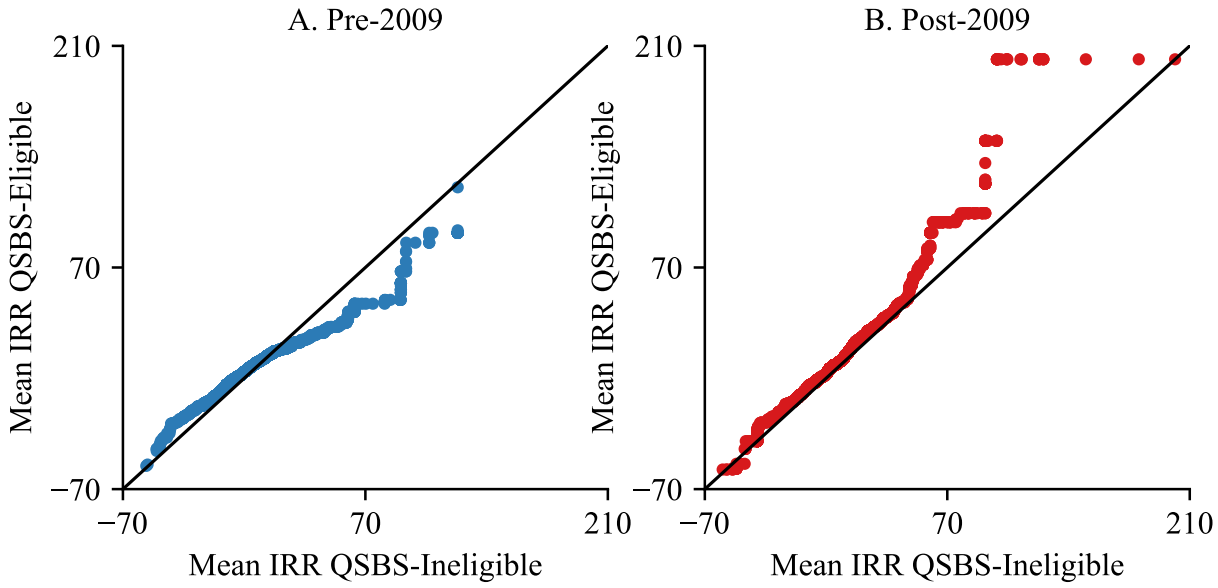
Having established that tax subsidies increase both failure rates and extreme positive outcomes (unicorns) specifically for VC firms, we examine whether these effects reflect a fundamental change in the shape of return distributions to LPs. Using investor-firm-year level data, we construct mean IRR measures for each VC firm-year combination and compare distributions between investments meeting QSBS criteria (eligible sector $\times$ holding period $\geq$ 5 years) in the pre-2009 period when benefits were minimal *versus* the post-2009 period when substantial tax benefits became available, relative to non-qualifying investments in both periods.

Figure 9 reveals striking evidence of distributional changes. Panel A (pre-2009) shows dots that track the diagonal at lower quantiles but fall noticeably below the diagonal at higher quantiles, indicating QSBS-qualifying investments had lower returns in the upper tail when tax benefits were minimal. In sharp contrast, Panel B (post-2009) exhibits an opposite S-shaped deviation from the diagonal: points fall slightly below the diagonal at lower quantiles but systematically rise far above it at higher quantiles. This reversal is particularly notable: pre-reform underperformance in the upper tail transforms into post-reform outperformance. In other words, tax-advantaged VC investments show modestly worse performance in the lower tail but dramatically superior outcomes in the upper tail after 2009, suggesting tax-induced risk-taking strategies generate net benefits for diversified LPs.

9 Heterogeneity in Tax Subsidy Effects

To fully characterize our results, we study 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

Figure 9: Portfolio Return Distributions: Enhanced QSBS Tax Benefits and VC Investment Outcomes



This figure presents quantile-quantile plots comparing VC portfolio return distributions around the 2009 QSBS reform. Using mean IRR measures constructed for each VC firm-year combination, we compare QSBS-qualifying investments (defined as eligible sector × holding period ≥ 5 years) versus those not meeting both criteria, separately for each period. Each dot represents matched quantiles from both distributions, with non-qualifying investments on the x-axis and qualifying investments on the y-axis. The black diagonal line represents perfect distributional equality. Data are from PitchBook.

VC size shapes risk-taking responses to tax subsidies. Third, we examine how the composition of LPs affects VC firms' willingness to pursue tax-motivated risk-taking strategies. We discuss these in turn.

9.1 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. Critically, 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 10 show that, consistent with the economic magnitude of subsidies, risk-taking by California-based VCs was higher when the state complied with the 100% federal-level tax exemp-

tion. 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 10 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 (under 7% state-level tax *versus* above 7%; that is, 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 11 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 are consistent with Prediction 1 of our conceptual framework: larger tax subsidies lower investment thresholds further, generating proportionally stronger risk-taking responses.

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9.2 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 assets under management (AUM) 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 IA16 presents results analyzing pre-2009 and post-2009 investments separately. Before 2009, when tax benefits were minimal, Column (1) shows no baseline effect of holding QSBS-eligible investments for five or more years, nor any additional effect for larger VC firms. Post-2009, however, larger VCs exhibit significantly stronger risk-taking responses to tax subsidies. Column (2) shows a baseline 1.3 percentage point increase in portfolio company failure rates for QSBS-eligible investments, with an additional 0.4 percentage point increase (21% relative to the mean) for *each* $10 billion in AUM. Moving from the 10*th* to 90*th* percentile of VC firm size (from $24 million to $11.3 billion in AUM) is associated with a 0.45 percentage point increase in out-of-business rates in addition to the baseline 1.3 percentage point effect, representing a 24% increase relative to the mean of 0.019.

9.3 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 micro-manage investment strategies, and are less likely to panic-sell LP stakes when performance declines (Ivashina and Lerner (2019)).[38] 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

[38] 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)).

institutions combine long-term investment horizons, professional management capabilities, and substantial risk tolerance. 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 (see Andonov et al. (2018))—and exhibit greater home-state bias in their LP investments compared to private counterparts (Hochberg and Rauh (2013)).[39]

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.[40] 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)). 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 per data availability). Endowment figures are collected from the Department of Education for the same academic year. For each VC firm-year, we calculate these sophis-

[39] 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.

[40] 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." (Timms and Hoppe (2011); Ivashina and Lerner (2019)).

tication 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.

Table 12 presents results. Before 2009—when tax subsidies 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 subsidies favor such behavior.

PLACE TABLE 12 ABOUT HERE

10 Sectoral Reallocation: Capital Flows and Innovation

We conclude our study by examining whether tax subsidies change how capital is allocated *across* and *within* industries. First, we examine whether subsidies create cross-sectoral capital allocation effects, using LP contributions to VC funds as a proxy. Second, we analyze reallocation toward more innovative industries, even *within* QSBS-eligible sectors. We discuss our tests in turn.

10.1 Capital Flows and Cross-Sectoral Allocation

We have shown that QSBS-eligible firms receive renewed interest from VC investors seeking to fund riskier ventures after changes to the QSBS program. One important concern is whether this creates cross-sectoral allocation effects, with eligible companies receiving more funding at the expense of ineligible firms. A precise evaluation of potential cross-sectoral funding reallocation and any associated

distortionary effects would require a structural model incorporating equilibrium effects across multiple sectors and comprehensive data on how much capital each investor allocates to individual portfolio companies across sectors—data that are not available in our setting. However, we can examine this question indirectly by analyzing how tax subsidies affect the flow of capital from LPs to VC funds based on funds' portfolio composition using "capital calls." Our investor-firm-year framework under a triple-difference design can provide evidence that speaks to whether such reallocation effects are occurring .

Capital calls represent the actual transfers of committed capital from LPs to VC funds, which occur as GPs identify investment opportunities and request funds to deploy. Unlike committed capital, which represents a binding promise to invest, paid-in capital reflects actual cash contributions that LPs make in response to capital calls issued by fund managers. We use paid-in capital as our dependent variable to examine whether tax subsidies influence the timing and magnitude of these capital flows. Optimal asset allocation theory (Dammon et al. (2004)) predicts that tax-aware investors should tilt their portfolios toward tax-advantaged assets, with the extent of reallocation depending on both the tax benefit magnitude and the investor's total portfolio value. In our setting, this implies that LPs should increase capital contributions to funds holding tax-qualified investments, particularly when these funds represent a larger share of the LP's total VC portfolio (proxied by fund net asset value; NAV). If tax subsidies create cross-sectoral reallocation effects, we would expect to observe increased capital flows to funds with QSBS-eligible holdings and reduced flows to funds concentrated in ineligible sectors.

Results in Table 13 provide evidence consistent with reallocation effects, from QSBS-ineligible firms towards QSBS-eligible ones. The triple interaction coefficient of 0.028 in Column (1) indicates that when VC investments in eligible sectors qualify for tax benefits (i.e., are held for five or more years after the 2009 reform), these funds receive an additional $28 million in paid-in capital from LPs. This represents a 9.3% increase relative to the sample mean of $300 million. Notably, the negative coefficient of -0.027 on $\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$ suggests that funds with long-held investments in ineligible sectors experience reduced capital inflows, consistent with LP capital being reallocated toward tax-advantaged opportunities. Column (2) shows that these patterns persist even after controlling for fund NAV. The persistence of differential capital flows even with NAV control suggests that the reallocation occurs within LPs' existing commitments rather than through expanded overall funding.[41]

[41] Consistent with this interpretation, we find no differential capital call patterns between eligible and ineligible sectors

PLACE TABLE 13 ABOUT HERE

10.2 Innovation Transfer Within and Across Sectors

We finally examine whether tax subsidies generate systematic reallocation toward more innovative industries. We focus on innovation intensity, which we measure using Kogan et al. (2017)'s innovation scores.[42] Those authors analyze patents of 15,787 firms between 1950 and 2010 to create measures of scientific (θ_{cw}) and commercial (θ_{sm}) value of innovation.[43] Higher innovation scores indicate more scientifically important and commercially valuable innovations, respectively. These industry-level innovation measures are publicly available in Kogan et al. (2017)'s Online Appendix. We manually map PitchBook industry classifications to the authors' industry sectors and assign the corresponding innovation measures to each investment in our sample.

We construct an investor–sector eligibility–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. We then estimate the following linear model:

$$\begin{aligned}\theta_{i,s,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_s \times \mathbb{1}\{\text{Post-2009}\}_t] \\ &+ \beta_2 \cdot \mathbb{1}\{\text{Eligible Sector}\}_s + \beta_3 \cdot \mathbb{1}\{\text{Post-2009}\}_t \\ &+ \alpha_i + \epsilon_{i,s,t}\end{aligned} \tag{25}$$

where $\theta_{i,t,s}$ represents investor i's average innovation measure (computed separately for scientific innovation θ_{cw} and commercial innovation θ_{sm}) for sector eligibility type $s \in \{\text{eligible}, \text{ineligible}\}$ in year t. The coefficient of interest is β_1, which captures the differential change in innovation targeting for eligible sectors relative to ineligible sectors following the 2009 reform. Investor fixed effects (α_i)

at the time of initial investment selection using a difference-in-differences approach with the same specification as our investment selection analysis (DiD coefficient of −0.003, $t = -0.50$; not reported). This specification includes investor fixed effects, entry year fixed effects, and state–industry fixed effects, with standard errors clustered at the investor level.

[42] 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)).

[43] θ_{cw} captures scientific importance by weighting patents by their subsequent citations in academic literature and patent filings. θ_{sm} measures commercial value by weighting patents according to stock market reactions upon patent grants.

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 14 point to a pattern of innovation reallocation. Columns (1) and (2) show the estimates for scientific (θ_{cw}) and commercial (θ_{sm}) innovation, respectively. The interaction coefficients reveal that VCs increase their targeting of innovative industries in QSBS-eligible sectors *relative to* ineligible sectors post-2009, with both scientific value (θ_{cw}) and commercial value (θ_{sm}) measures increasing by 21% relative to the sample mean (of 5.9 and 5.7, respectively). The negative coefficient on $\mathbb{1}\{\text{Post}\}$ suggests a general shift away from innovative companies in ineligible sectors after 2009. These results suggest that tax subsidies prompt an "innovation transfer" across sectors: VCs concentrate their most innovative investments in eligible sectors while reducing innovation-intensive investments elsewhere. Panel B shows that angel investors, in contrast, exhibit no significant change for innovation targeting, with interaction coefficients that are statistically indistinguishable from zero.

PLACE TABLE 14 ABOUT HERE

11 Concluding Remarks

This paper examines whether tax subsidies prompt investors to fund riskier ventures. It does so empirically examining the evolution of a salient tax subsidy program in the United States: the QSBS. Our analysis yields several findings. First, tax subsidies 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 subsidies may work effectively through VC-based investment. Second, tax policy can help overcome financing frictions by encouraging VC investors to fund riskier ventures that could 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 subsidies, and their broader welfare implications.

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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
$\mathbb{1}\{\text{Holding Years} \geq 5\}$	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
$\mathbb{1}\{\text{Post-2009}\}$	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
$\mathbb{1}\{\text{Eligible Sector}\}$	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												
$\mathbb{1}\{\text{Out of Business}\}$	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
$\mathbb{1}\{\text{Five Years Without Funding}\}$	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
$\mathbb{1}\{\text{Unicorn}\}$	0.048	0.213	0.000	0.000	0.000	277,908	0.050	0.219	0.000	0.000	0.000	136,610

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. 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 percentage point 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 VC and angel 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:	Linear		Quadratic		Cubic	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pre-2009						
$\mathbb{1}$\{Initial Investment>50\}	−0.100	0.162	−0.124	−0.079	−0.263	−0.273
	(−0.29)	(0.42)	(−0.26)	(−0.17)	(−0.48)	(−0.46)
Observations	1,083	1,083	1,083	1,083	1,083	1,083
Bandwidth	3.79	2.87	6.26	6.00	9.15	8.37
Panel B: Post-2009						
$\mathbb{1}$\{Initial Investment>50\}	−0.403***	−0.689***	−0.401***	−0.403***	−1.009***	−0.683***
	(−2.77)	(−5.24)	(−2.84)	(−2.73)	(−7.10)	(−4.79)
Observations	4,243	4,243	4,243	4,243	4,243	4,243
Bandwidth	2.04	3.87	5.11	3.79	10.48	9.13
Industry Fixed Effects		✓		✓		✓

This table presents regression discontinuity design (RDD) estimates of the effect of the $50 million investment-size threshold on forward funding, with and without industry fixed effects. 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. Panel A shows results for the pre-2009 period, while Panel B shows results for the post-2009 period. Each pair of columns compares results without and with industry fixed effects for linear, quadratic, and cubic polynomial specifications using a uniform kernel. Industry fixed effects control for systematic differences across mapped industry categories (Tech, Biotech, Industrial, Consumer, Media, Other). The full sample includes investments within the $25–75 million range (i.e., −$25M to +$25M 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: Difference-in-Discontinuities Estimates: Funding Responses to the $50 Million Threshold

Dependent Variable:	Linear		Quadratic		Cubic	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Bandwidth $25 to $75 million						
$\mathbb{1}\{\text{Investment}>50\} \times \mathbb{1}\{\text{Post-2009}\}$	-0.388^{*}	-0.413^{**}	-1.220^{***}	-1.248^{***}	-1.518^{***}	-1.578^{***}
	(-1.83)	(-2.00)	(-4.49)	(-4.71)	(-3.85)	(-3.97)
Observations	5,326	5,326	5,326	5,326	5,326	5,326
Adjusted R^2	0.062	0.076	0.068	0.081	0.067	0.081
Panel B: Bandwidth $35 to $65 million						
$\mathbb{1}\{\text{Investment}>50\} \times \mathbb{1}\{\text{Post-2009}\}$	-0.962^{***}	-0.977^{***}	-1.638^{***}	-1.645^{***}	-1.295^{***}	-1.157^{**}
	(-3.89)	(-4.11)	(-4.26)	(-4.29)	(-2.69)	(-2.30)
Observations	2,535	2,535	2,535	2,535	2,535	2,535
Adjusted R^2	0.032	0.053	0.041	0.060	0.047	0.064
Industry Fixed Effects		✓		✓		✓

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, with and without industry fixed effects. 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. Panel A shows results for the 25–75 million bandwidth, while Panel B shows results for the 35–65 million bandwidth. Each pair of columns compares results without and with industry fixed effects for linear, quadratic, and cubic polynomial specifications. Industry fixed effects control for systematic differences across mapped industry categories (Tech, Biotech, Industrial, Consumer, Media, Other). $\mathbb{1}\{\text{Investment}>50\} \times \mathbb{1}\{\text{Post-2009}\}$ 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 5: Impact of QSBS Tax Benefits on Investment Selection

	Development	Cap. Structure	Proximity	Industry	Certification	Syndication
Dependent Variable:	𝟙{Pre-Commercial}	𝟙{Has Debt}	𝟙{Diff. State}	𝟙{New Industry}	𝟙{First Funding}	𝟙{Multi-Investor}
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All Investors						
𝟙{Eligible} × 𝟙{Post}	0.018***	0.012**	0.023	0.054***	0.003	−0.048***
	(2.76)	(2.57)	(1.43)	(2.95)	(0.46)	(−3.15)
Observations	113,103	113,103	103,804	47,585	113,103	113,103
Adjusted R^2	0.10	0.03	0.44	0.47	0.28	0.29
Mean Dependent Variable	0.038	0.005	0.506	0.669	0.064	0.463
Panel B: Venture Capital						
𝟙{Eligible} × 𝟙{Post}	0.025***	0.018**	0.043*	0.048*	0.018**	−0.073***
	(3.47)	(2.43)	(1.91)	(1.88)	(2.51)	(−3.49)
Observations	55,626	55,626	51,238	25,990	55,626	55,626
Adjusted R^2	0.09	0.02	0.42	0.46	0.06	0.21
Mean Dependent Variable	0.031	0.006	0.469	0.628	0.031	0.455
Panel C: Angel						
𝟙{Eligible} × 𝟙{Post}	0.003	−0.000	−0.033	0.046	0.008	0.013
	(0.24)	(−0.17)	(−0.77)	(0.69)	(0.38)	(0.23)
Observations	23,132	23,132	21,817	5,979	23,132	23,132
Adjusted R^2	0.07	0.06	0.44	0.27	0.06	0.24
Mean Dependent Variable	0.024	0.003	0.443	0.857	0.030	0.711
Panel D: Corporate						
𝟙{Eligible} × 𝟙{Post}	−0.020	−0.012	−0.072	0.123	−0.007	0.002
	(−0.87)	(−1.45)	(−1.00)	(1.64)	(−0.26)	(0.02)
Observations	7,262	7,262	5,739	3,959	7,262	7,262
Adjusted R^2	0.10	0.00	0.48	0.47	0.21	0.13
Mean Dependent Variable	0.040	0.006	0.620	0.653	0.088	0.337
Investor×Industry FE	✓	✓	✓	✓	✓	✓
Investor State×Year FE	✓	✓	✓	✓	✓	✓
Industry×Year FE	✓	✓	✓	✓	✓	✓
Industry×Firm State 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, private equity, or 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). 𝟙{Eligible} indicates QSBS-eligible sectors, and 𝟙{Post} is an indicator for investments made after 2009. Single terms are included but not reported for brevity. Fixed effects include investor×industry, investor state×year, industry×year, and industry×firm state. For investors headquartered 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 6: Impact of QSBS Tax Benefits on Portfolio Company Failure: Triple-Difference Regressions

	All Investors		VCs		Angels		Corporates	
	All Firms	Exited	All Firms	Exited	All Firms	Exited	All Firms	Exited
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(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 7: Impact of QSBS Tax Benefits on Portfolio Company Valuations: Triple-Difference Regressions

	All Investors		VCs		Angels		Corporates	
	All Firms	Exited	All Firms	Exited	All Firms	Exited	All Firms	Exited
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(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 = $\mathbb{1}\{Unicorn\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	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 8: Impact of QSBS Tax Benefits on VC Risk-Taking and Valuation: Within-Vertical Analysis

Vertical:	Tech, Media & Telecom		EdTech		FoodTech	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Business Failure Measures						
Dependent Variable:	𝟙{Out of Business}	𝟙{Five Years Without Funding}	𝟙{Out of Business}	𝟙{Five Years Without Funding}	𝟙{Out of Business}	𝟙{Five Years Without Funding}
𝟙{Eligible} × 𝟙{Holding ≥ 5} × 𝟙{Post}	0.022***	0.084***	0.021***	0.103	0.012**	0.078
	(4.22)	(3.43)	(4.63)	(1.03)	(2.09)	(0.80)
𝟙{Eligible} × 𝟙{Holding ≥ 5}	0.002	−0.063***	0.001	−0.040	0.006**	−0.078
	(0.36)	(−2.73)	(0.85)	(−0.41)	(2.00)	(−0.83)
𝟙{Holding ≥ 5} × 𝟙{Post}	−0.047***	−0.084***	−0.024***	−0.134	−0.028***	−0.090
	(−8.63)	(−3.47)	(−4.77)	(−1.45)	(−3.12)	(−1.11)
Observations	207,391	207,391	13,622	13,622	6,844	6,844
Adjusted R^2	0.11	0.30	0.10	0.31	0.15	0.25
Mean Dependent Variable	0.024	0.053	0.012	0.066	0.017	0.021
Panel B: Valuation Measures						
Dependent Variable:	Valuation ($ billions)	𝟙{Unicorn}	Valuation ($ billions)	𝟙{Unicorn}	Valuation ($ billions)	𝟙{Unicorn}
𝟙{Eligible} × 𝟙{Holding ≥ 5} × 𝟙{Post}	0.076*	0.077**	0.403***	0.569***	1.664***	0.995***
	(1.93)	(2.56)	(3.41)	(4.76)	(4.56)	(12.20)
𝟙{Eligible} × 𝟙{Holding ≥ 5}	−0.041	−0.030	−0.097	−0.348***	−2.488***	−1.018***
	(−1.18)	(−1.16)	(−0.87)	(−3.00)	(−21.54)	(−21.83)
𝟙{Holding ≥ 5} × 𝟙{Post}	−0.027	−0.010	−0.166	−0.394***	−1.033***	−0.651***
	(−0.70)	(−0.34)	(−1.60)	(−3.38)	(−2.84)	(−6.87)
Observations	49,978	51,038	3,210	3,276	2,463	2,493
Adjusted R^2	0.41	0.30	0.44	0.33	0.32	0.34
Mean Dependent Variable	0.143	0.041	0.171	0.050	0.303	0.084
Year FE	✓	✓	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓

This table examines how VC risk-taking and valuation responses to QSBS tax benefits vary across three product verticals. Panel A examines business failure measures: out-of-business status and funding gaps of five or more years. Panel B examines valuation measures: firm valuation in billions of dollars (with the bottom and top 1% of observations trimmed to ensure outliers do not drive the results) and unicorn status (valuation exceeding $1 billion). Each pair of columns restricts the sample to VC investments in a specific vertical sector. 𝟙{Eligible} indicates QSBS-qualifying sectors within each vertical, 𝟙{Holding ≥ 5} indicates investments held five or more years, and 𝟙{Post} indicates investor entry after 2009. Regressions include all constituent terms and two-way interactions (omitted for brevity). Sample includes traditional VC firms at the investor-firm-year level. Shaded cells highlight the triple-interaction coefficient 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 9: Robustness: VC Risk-Taking and Valuation Response to QSBS Across Product Verticals

Matching Criteria:	Vertical × Entry Year	Vertical × State × Entry Year	Vertical × Entry Year	Vertical × State × Entry Year
	(1)	(2)	(3)	(4)
Panel A: Business Failure Measures				
Dependent Variable:	𝟙{Out of Business}		𝟙{Five Years Without Funding}	
𝟙{Eligible} × 𝟙{Holding ≥ 5} × 𝟙{Post}	0.016***	0.016***	0.062***	0.105***
	(3.31)	(2.85)	(3.09)	(3.59)
𝟙{Eligible} × 𝟙{Holding ≥ 5}	−0.002	−0.001	−0.044**	−0.083***
	(−0.51)	(−0.23)	(−2.31)	(−2.89)
𝟙{Holding ≥ 5} × 𝟙{Post}	−0.023***	−0.023***	−0.061***	−0.106***
	(−4.14)	(−3.63)	(−3.06)	(−3.58)
Observations	371,991	295,687	371,991	295,687
Adjusted R^2	0.15	0.15	0.30	0.30
Mean Dependent Variable	0.017	0.018	0.049	0.046
Panel B: Valuation Measures				
Dependent Variable:	Valuation ($ billions)		𝟙{Unicorn}	
𝟙{Eligible} × 𝟙{Holding ≥ 5} × 𝟙{Post}	0.098*	0.137**	0.057**	0.065**
	(1.80)	(2.07)	(2.05)	(2.15)
𝟙{Eligible} × 𝟙{Holding ≥ 5}	−0.115**	−0.113*	−0.051**	−0.044
	(−2.30)	(−1.79)	(−2.09)	(−1.64)
𝟙{Holding ≥ 5} × 𝟙{Post}	−0.000	−0.014	0.031	0.043
	(−0.00)	(−0.24)	(1.25)	(1.47)
Observations	99,775	80,287	101,839	82,038
Adjusted R^2	0.40	0.41	0.29	0.33
Mean Dependent Variable	0.182	0.187	0.055	0.061
Number of Strata	428	1,331	428	1,331
Year FE	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓
CEM Weights	✓	✓	✓	✓

This table presents triple-difference estimates comparing QSBS-eligible and ineligible investments within product verticals using matched samples. Product verticals are market-oriented classifications that span both eligible and ineligible industries (e.g., FinTech includes eligible financial software and ineligible digital banking). Panel A examines business failure measures: out-of-business status and funding gaps of five or more years. Panel B examines valuation measures: firm valuation in billions of dollars (winsorized at 1%) and unicorn status (valuation exceeding $1 billion). Columns (1)–(2) examine out-of-business and valuation outcomes, while Columns (3)–(4) examine funding gaps and unicorn status. Matching is on vertical and entry year in Columns (1) and (3), with full matching on vertical, investor state, and entry year in Columns (2) and (4). Coarsened Exact Matching (CEM) creates strata where both eligible and ineligible investments exist, with observations weighted to balance treatment and control groups within each stratum. 𝟙{Eligible} indicates QSBS-qualifying sectors, 𝟙{Holding ≥ 5} indicates investments held five or more years, and 𝟙{Post} indicates investor entry after 2009. Regressions include all constituent terms and two-way interactions (omitted for brevity). Sample includes traditional VC firms at the investor-firm-year level. Shaded cells highlight the triple-interaction coefficient 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: 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 11: Heterogeneity of VC Risk-Taking: Low- *versus* High-Capital Gain Tax Rate States

Dependent Variable:	𝟙{Out of Business}	
State-Level Capital Gain Tax Rate:	Low	High
	(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% (below median) 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% (above median). 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.

Table 12: Heterogeneity of VC Risk-Taking: Fraction of Sophisticated Limited Partners

Dependent Variable:	$\mathbb{1}\{\text{Out of Business}\}$					
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.

Table 13: Venture Capital QSBS-Eligible Holdings and Capital Calls from Limited Partners

Dependent Variable:	Paid-in Capital ($ billions)	
	(1)	(2)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.028**	0.026**
	(2.17)	(2.10)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.014	−0.011
	(−1.34)	(−1.12)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.027**	−0.025**
	(−2.09)	(−2.06)
NAV ($ billions)		0.163*
		(1.75)
Observations	102,558	98,869
Adjusted R^2	0.91	0.92
Mean Dependent Variable	0.300	0.305
Year FE	✓	✓
Holding Period FE	✓	✓
Investor × Firm FE	✓	✓
Clustered SE (Investor)	✓	✓

This table examines the relationship between VC QSBS-eligible investments and capital flows from LPs to GPs. The dependent variable is the cumulative paid-in capital to VC funds by year. The data is at the investor-firm-year level. $\mathbb{1}\{\text{Eligible}\}$ 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 the period after 2009 when QSBS benefits became available. Column (1) presents results without net asset value (NAV) controls, while Column (2) includes NAV controls. The coefficient of primary interest is the triple interaction term, shown in shaded cells, which captures the differential effect of QSBS eligibility on capital flows to VCs. *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 14: Industry Innovation in Investment Selection: Difference-in-Differences Analysis

Dependent Variable:	Scientific Innovation (θ_{cw})	Commercial Innovation (θ_{sm})
	(1)	(2)
Panel A: Venture Capital Investors		
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$	1.243***	1.179***
	(8.08)	(7.92)
$\mathbb{1}\{\text{Eligible}\}$	1.326***	1.090***
	(9.25)	(7.89)
$\mathbb{1}\{\text{Post}\}$	−0.984***	−0.924***
	(−6.59)	(−6.37)
Observations	21,040	21,040
Adjusted R^2	0.34	0.35
Mean Dependent Variable	5.882	5.695
Panel B: Angel Investors		
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$	−0.313	−0.346
	(−1.25)	(−1.39)
$\mathbb{1}\{\text{Eligible}\}$	3.080***	2.784***
	(12.49)	(11.39)
$\mathbb{1}\{\text{Post}\}$	0.462*	0.479**
	(1.94)	(2.03)
Observations	15,003	15,003
Adjusted R^2	0.25	0.23
Mean Dependent Variable	5.359	5.152
Investor FE	✓	✓
Clustered SE (Investor)	✓	✓

This table reports difference-in-differences 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. The unit of observation is investor-sector eligibility-year. $\mathbb{1}\{\text{Post-2009}\}$ indicates years after the 2009 QSBS reform, and $\mathbb{1}\{\text{Eligible}\}$ indicates QSBS-eligible sectors. The coefficient of primary interest is the interaction term (shown in shaded cells), which captures the differential effect of the post-2009 period on innovation targeting in eligible versus non-eligible sectors. 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. Data are from PitchBook and Kogan et al. (2017).

Internet Appendix to

"Tax Incentives and Venture Capital Risk-Taking"

Murillo Campello

University of Florida & NBER

Guilherme Junqueira

University of Florida

IA1 Model Details and Extensions

We provide the mathematical foundations underlying our investment threshold framework, present detailed tax sensitivity calculations, and examine robustness under alternative parameter specifications.

IA1.1 Model Equations

Common Parameters. The parameters $\beta_+ > 1$ and $\beta_- < 0$ are the "fundamental economy parameters" in the language of Pindyck (1988), common to all investor types:

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

We also define $\rho \equiv r - \mu + \eta$ for notational convenience.

IA1.1.1 Venture Capitalist Equations

Coefficient Definitions. The VC value function requires coefficients $b_1 > 0$ and $b_2 > 0$ that ensure continuity and differentiability at the hurdle rate h:

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

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

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

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

$$(1-\tau_K)\gamma\left[b_2\beta_-(X^*)^{\beta_-} + \frac{X^*}{\rho}\right] = a\,\beta_+\,(X^*)^{\beta_+}. \tag{A5}$$

Solving the smooth-pasting condition for a gives:

$$a\,(X^*)^{\beta_+} = (1-\tau_K)\gamma\left[\frac{b_2\,\beta_-}{\beta_+}\,(X^*)^{\beta_-} + \frac{X^*}{\beta_+\rho}\right]. \tag{A6}$$

Substituting into the value-matching condition:

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

Including GP capital commitment (ω) and reputation costs (φ):

$$(1-\tau_K)\gamma\left[\frac{b_2(\beta_+-\beta_-)}{\beta_+}\,(X^*)^{\beta_-} + \frac{\beta_+-1}{\beta_+\rho}\,X^* - \frac{h}{r+\eta}\right] + \frac{\alpha I}{r+\eta} - \omega I - (1-\omega)I\varphi = 0. \tag{A8}$$

IA1.1.2 Angel Investor Equations

Direct Equity Financing. For angels using direct equity, the value function is $V_{\text{Angel}}(X) = (1-\tau_K)\frac{X}{\rho}$. The investment threshold follows from the standard real options solution:

$$X^* = \frac{\beta_+}{\beta_+ - 1}\cdot\frac{\rho}{1-\tau_K}\cdot I. \tag{A9}$$

Convertible Debt Financing. For angels using convertible debt, we solve a two-stage compound option with three value functions: $V_{A,1}$ (before investing), $V_{A,2}$ (creditor with conversion option), and $V_{A,3}$ (equity holder after conversion).

The conversion threshold $\bar{X}$ is obtained from the smooth-pasting condition $V'_{A,2}(\bar{X}) = V'_{A,3}(\bar{X})$:

$$\bar{X} = \frac{\rho\cdot\frac{r-c}{r}\cdot I\cdot\beta_+}{(1-\tau_K)[1-(1-\delta)\beta_+] + \xi(\beta_+-1)}. \tag{A10}$$

The investment threshold X^* is obtained from the smooth-pasting condition $V'_{A,1}(X^*) = V'_{A,2}(X^*)$:

$$X^* = \frac{\beta_+}{\beta_+ - 1}\cdot\frac{\rho}{\xi}\cdot\frac{r-c}{r}\cdot I. \tag{A11}$$

Specifying agency costs as $\xi = \tilde{\xi}(1 - \tau_K)$, where flow costs scale with after-tax equity value at stake:

$$X^* = \frac{\beta_+}{\beta_+ - 1} \cdot \frac{\rho}{\tilde{\xi}(1 - \tau_K)} \cdot \frac{r - c}{r} \cdot I. \tag{A12}$$

Parameter Restriction. The convertible debt model requires $\tilde{\xi} > \frac{(1-\delta)\beta_+ - 1}{\beta_+ - 1}$ to ensure well-defined thresholds satisfying $X^* < \bar{X}$.

IA1.2 Angel Financing Structure Comparison

We compare investment thresholds for angel investors under convertible debt versus direct equity financing to illustrate how financing structure affects tax responsiveness. Figure IA1 presents this comparison. Both financing structures generate qualitatively similar responses to tax policy: investment thresholds decline with lower capital gains taxes, with steeper declines for higher-volatility projects. The convertible debt structure (Panel A) exhibits marginally greater tax sensitivity than direct equity (Panel B), though both remain substantially below VC responsiveness. Importantly, both angel financing structures exhibit comparable tax sensitivity because angels invest their own capital and bear full downside risk regardless of whether they use convertible notes or direct equity.

IA1.3 Alternative Parameter Choices

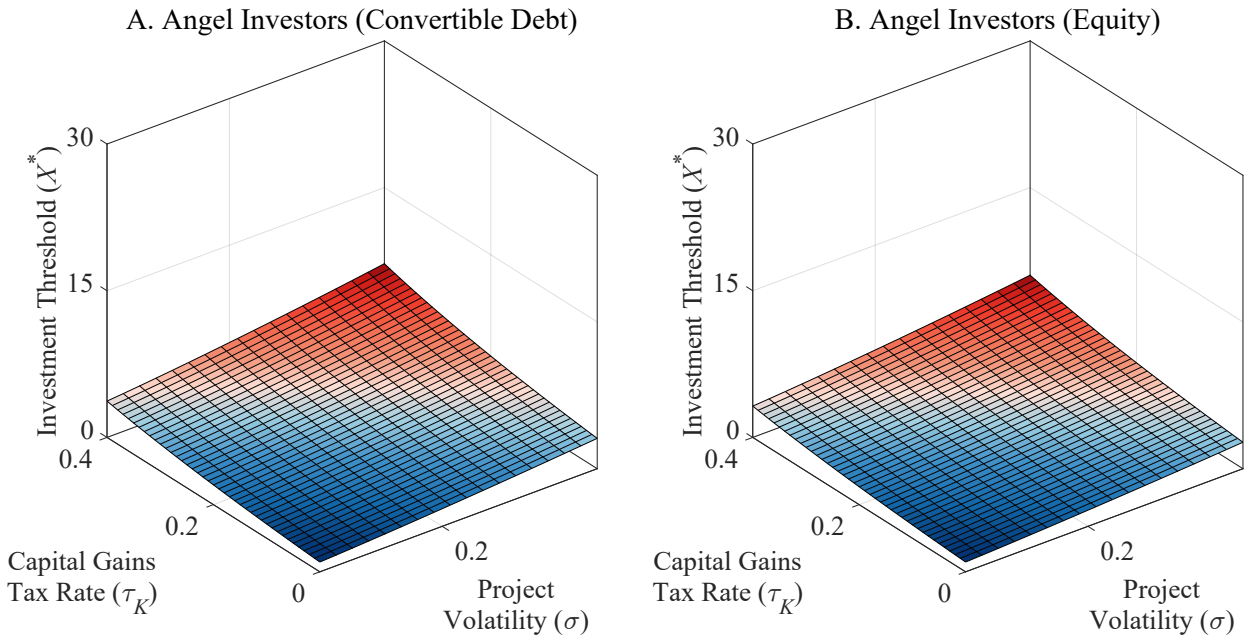
We examine how investment thresholds respond to capital gains taxes under alternative parameter calibrations that reflect the heterogeneity observed in venture capital markets. Our baseline analysis uses conservative parameter choices, but actual VC funds exhibit considerable variation in key structural features. We test four specific alternatives: higher GP capital commitment to reflect funds where GPs contribute larger personal investments,[44] zero hurdle rates to capture funds without preferred returns to limited partners,[45] higher reputation costs based on upper-bound estimates from the literature,[46] and

[44] 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%.

[45] 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%.

[46] 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.

Figure IA1: Angel Investment Thresholds: Convertible Debt versus Direct Equity Financing



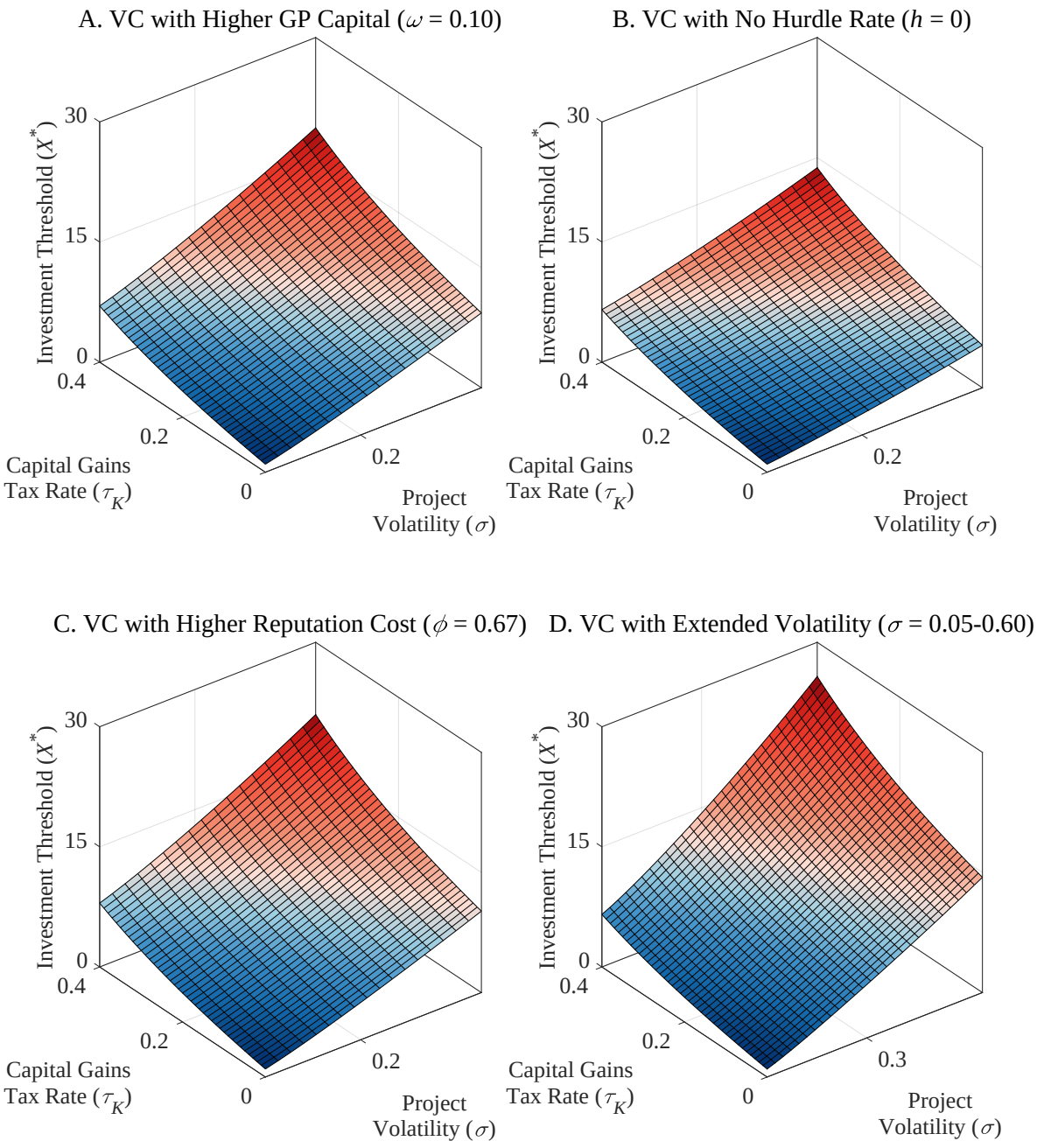
This figure shows how minimum investment thresholds (X^*) for angel investors vary with effective capital gains tax rates (τ_K) and project volatility (σ) under two financing structures. Panel A presents angels using convertible debt with parameters from Panel B of Figure 1. Panel B presents angels using direct equity financing with identical parameters, excluding the convertible-debt-specific terms (c, δ, $\tilde{\xi}$).

extended volatility ranges to encompass a broader spectrum of startup risk profiles.[47]

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. While each parameter change affects the level and curvature of investment thresholds, the fundamental relationship holds across all cases: investment thresholds decline with lower capital gains taxes, with steeper declines for riskier projects. This robustness suggests that our baseline findings reflect the underlying economics of VC compensation structures rather than specific parameter choices.

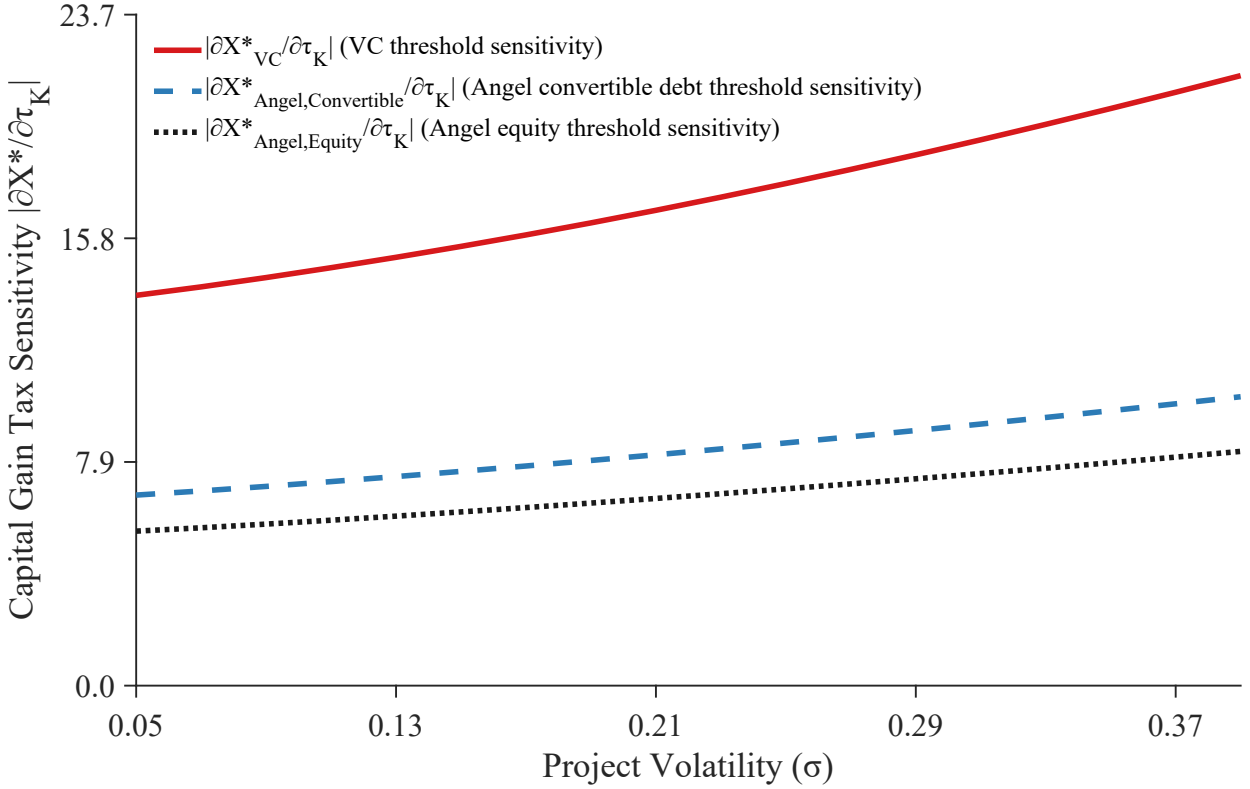
[47] In our baseline, we use top and top quartile (annualized) idiosyncratic risk measures from Ewens et al. (2013) for our project volatility range. In the extension, we expand the upper limit by 50% (from 0.40 to 0.60).

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.

Figure IA3: 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, the blue dashed line represents angel investors using convertible debt, and the black dotted line represents angel investors using direct equity financing. All other parameters follow the baseline calibration from Figure 1. Higher values indicate greater responsiveness to tax policy changes.

IA1.4 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%, then averages these derivatives to obtain a representative measure of tax responsiveness for each investor type. Figure IA3 reveals two key findings. First, VCs exhibit substantially higher tax sensitivity than angel investors, with this differential widening as project volatility increases. Second, the two angel financing structures—convertible debt and direct equity—exhibit nearly identical tax sensitivity, confirming that angels' exposure to personal capital dominates any option-like features from convertible note discounts.

IA1.5 Model 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 all investor types. We discuss each sensitivity analysis in turn.

Figure IA4 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.

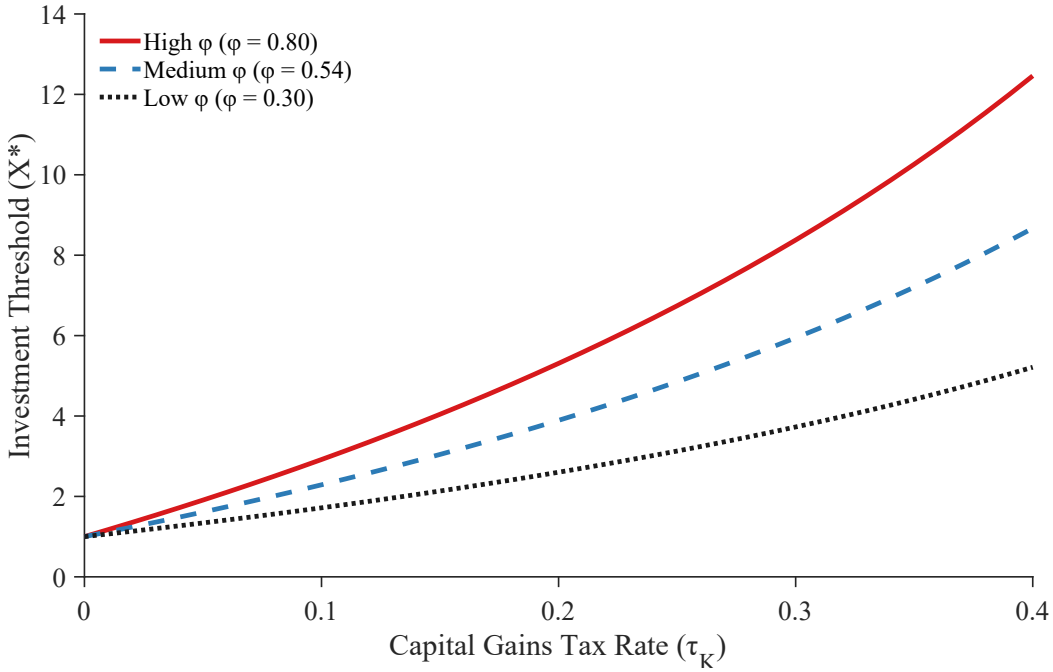
Figure IA5 presents similar results for GP personal commitment (ω), another VC-specific parameter. Panel A shows that higher GP capital contributions increase investment selectivity as fund managers have greater personal exposure to downside risk. Panel B reveals that this increased selectivity also amplifies tax responsiveness, as GPs with more personal capital at stake become more sensitive to factors that affect investment returns, including tax benefits.

Figure IA6 examines project failure rates (η), which affect all investor types. Panel A shows that as the likelihood of business failure increases, investors 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 all investor types, with VCs exhibiting the strongest sensitivity increases. This occurs because VCs' convex payoff structure creates option-like returns where tax subsidies disproportionately enhance the value of successful outcomes, while angels' linear payoffs generate only proportional responses to tax changes regardless of failure rates.

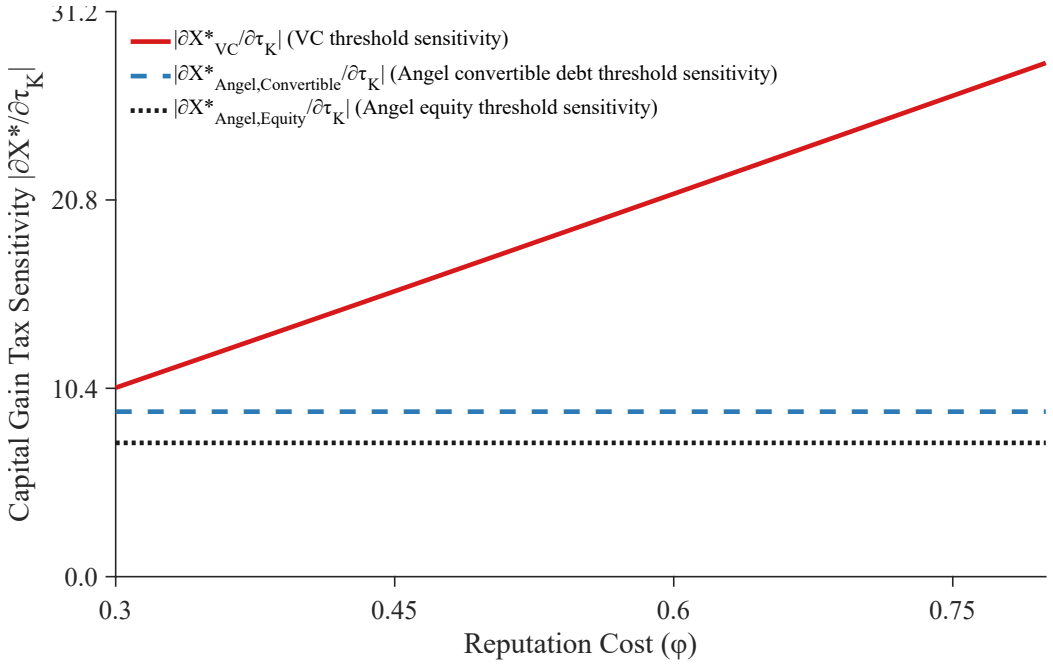
These sensitivity analyses show that factors increasing investment selectivity also amplify tax responsiveness. While potentially counterintuitive, this relationship follows directly from the mathematical structure of our model. For VC-specific parameters, we observe positive cross-partial derivatives $\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \varphi} > 0$ and $\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \omega} > 0$, while angel thresholds remain invariant. For project failure rates, $\frac{\partial^2 X^*}{\partial \tau_K \partial \eta} > 0$ holds for all investor types. Economically, investors operating at higher selectivity levels are closer to the margin of investment decisions, and are more responsive to policy changes that affect expected returns.

Figure IA4: Impact of Reputation Costs on VC Investment Thresholds and Tax Sensitivity

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



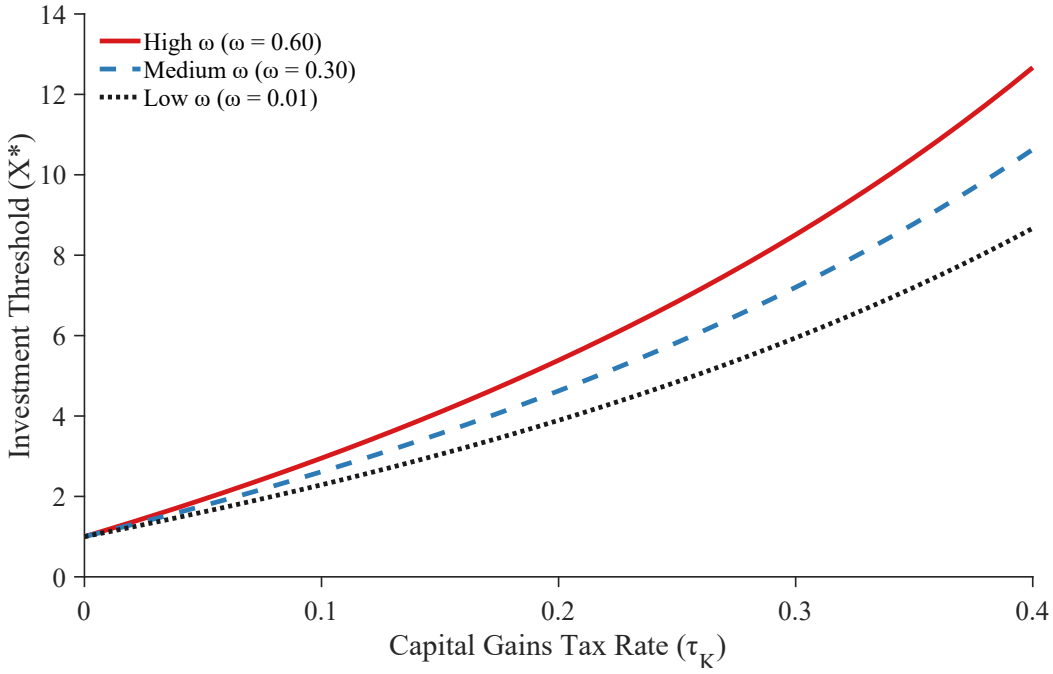
(b) Tax Sensitivity as a Function of Reputation Costs: VC *versus* Angel Investors



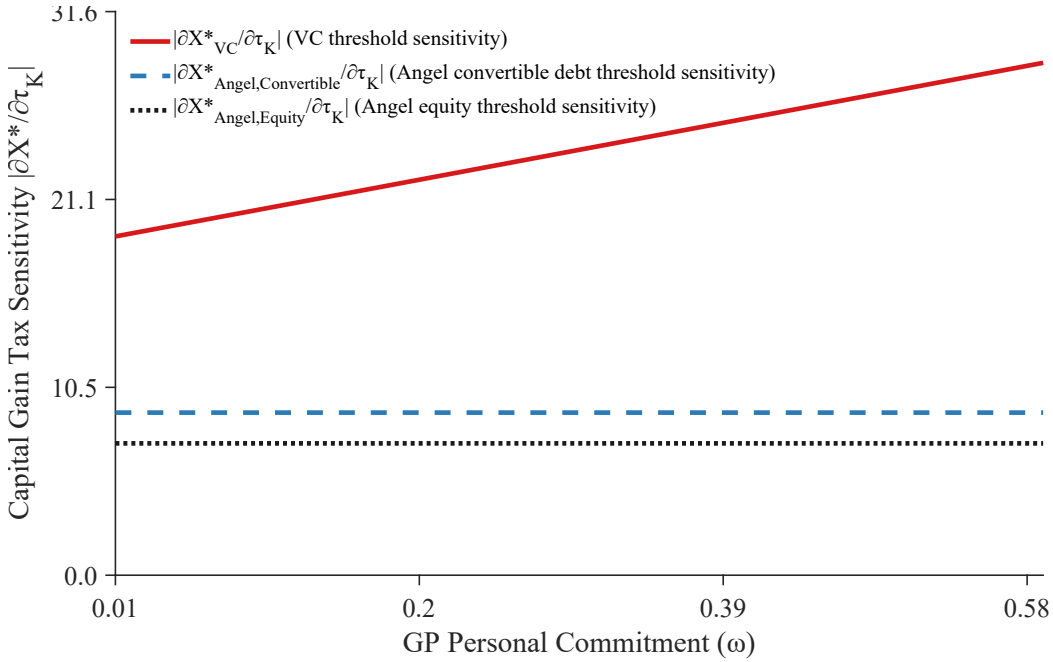
This figure examines how reputation costs (φ), a VC-specific parameter, affect investment behavior across investor types. Panel A shows minimum investment thresholds (X^*) as functions of capital gains tax rates (τ_K) for different VC reputation cost levels, with angel thresholds shown for comparison. Panel B shows how tax sensitivity, measured as $|\partial X^*/\partial \tau_K|$, changes with GP reputation costs for VCs (solid red line), angels using convertible debt (dashed blue line), and angels using direct equity (dotted black line). 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)). Angel thresholds are invariant to φ since angels invest their own capital.

Figure IA5: 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

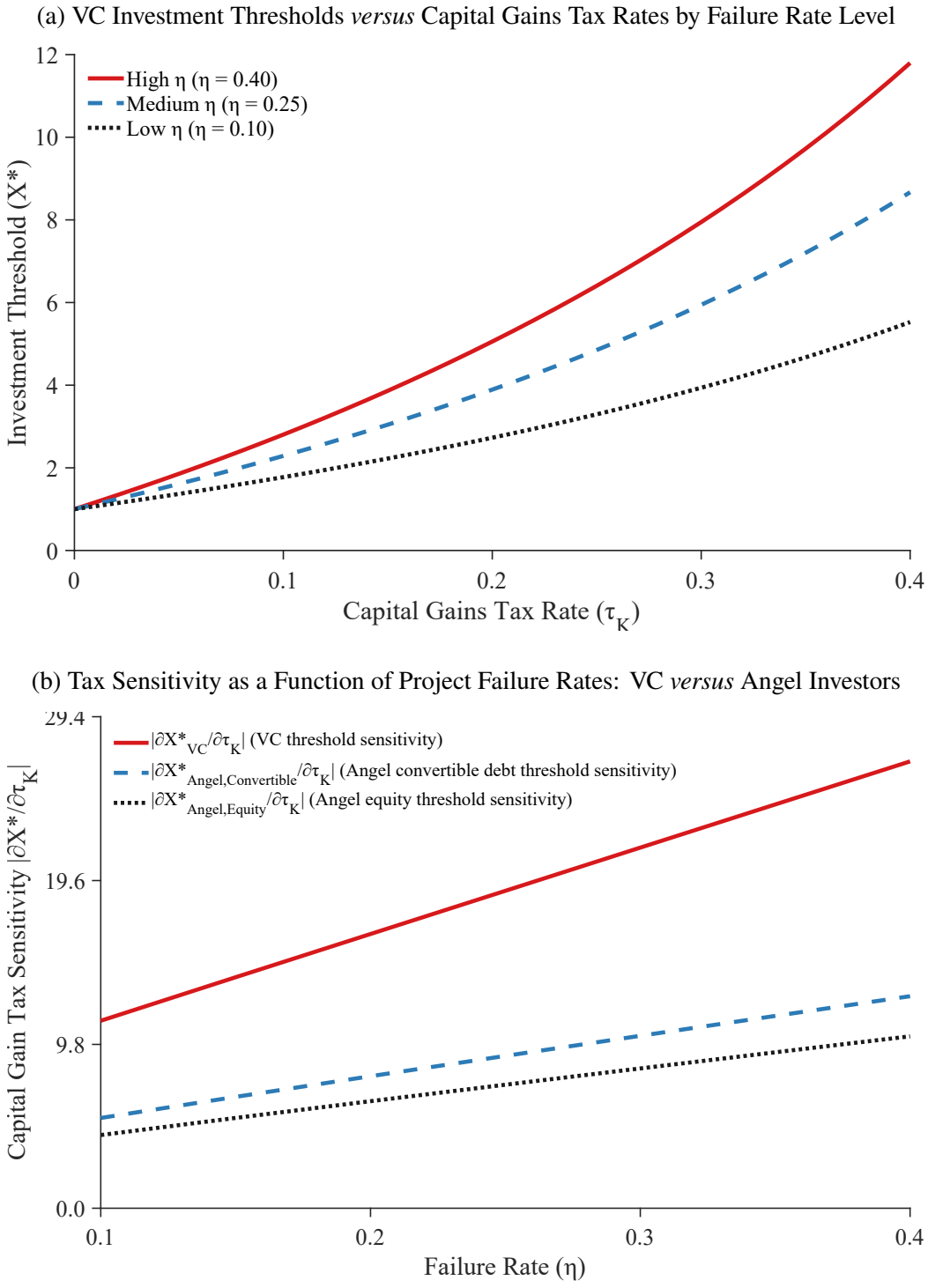


(b) Tax Sensitivity as a Function of GP Capital Commitment: VC *versus* Angel Investors



This figure analyzes how GP personal commitment (ω), a VC-specific parameter, influences investment thresholds and tax responsiveness across investor types. Panel A presents minimum investment thresholds (X^*) across different capital gains tax rates (τ_K) for varying levels of GP capital contribution, with angel thresholds shown for comparison. Panel B shows how tax sensitivity, measured as $|\partial X^*/\partial \tau_K|$, changes with GP personal commitment for VCs (solid red line), angels using convertible debt (dashed blue line), and angels using direct equity (dotted black line). 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. Angel thresholds are invariant to ω since angels invest their own capital.

Figure IA6: Impact of Project Failure Rates on Investment Thresholds and Tax Sensitivity



This figure analyzes how sudden project failure rates (η) influence investment thresholds and tax responsiveness across investor types. Panel A presents minimum investment thresholds (X^*) across different capital gains tax rates (τ_K) for varying failure rate assumptions. Panel B shows how tax sensitivity, measured as $|\partial X^*/\partial \tau_K|$, changes with project failure rates for VCs (solid red line), angels using convertible debt (dashed blue line), and angels using direct equity (dotted black 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.

IA2 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.

IA2.1 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.

IA2.1.1 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%)

IA2.1.2 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%)

IA2.2 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.

IA2.2.1 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 $\times$ 13.3%)

IA2.2.2 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 $\times$ 13.3%)

IA2.3 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

IA3 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:[48]

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

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).

[48]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):

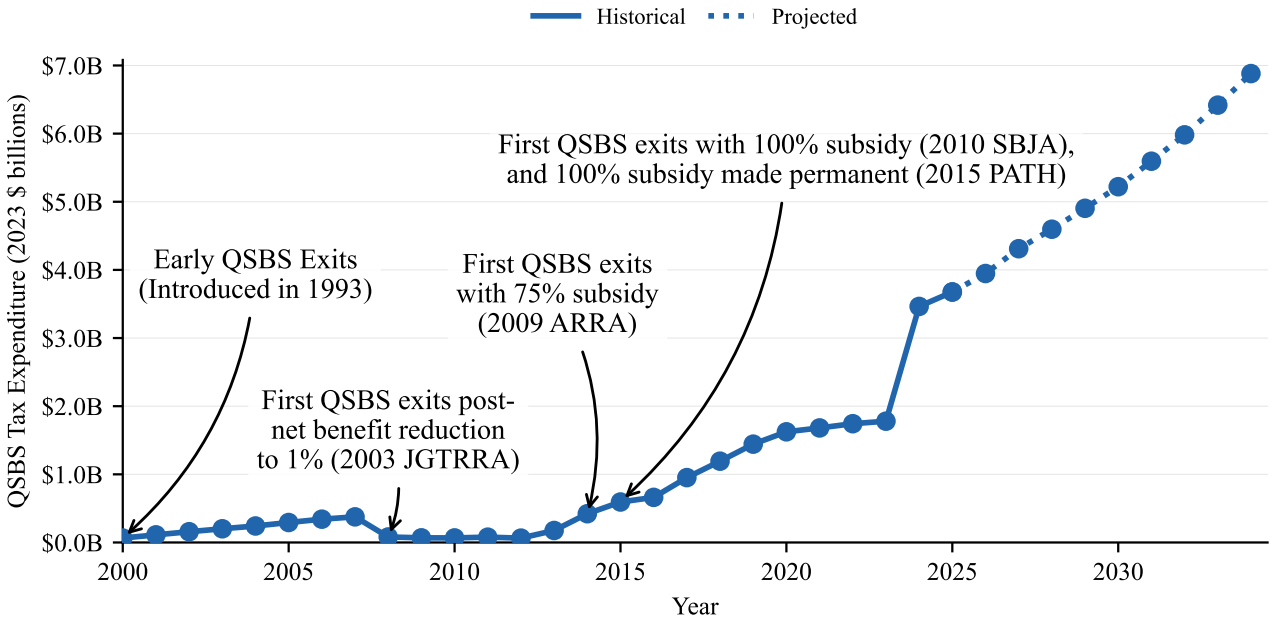
$$SE_{\text{bootstrap}}(B) = \sqrt{\frac{1}{R-1}\sum_{r=1}^{R}\left(B^{(r)} - \bar{B}\right)^2} \tag{A16}$$

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:

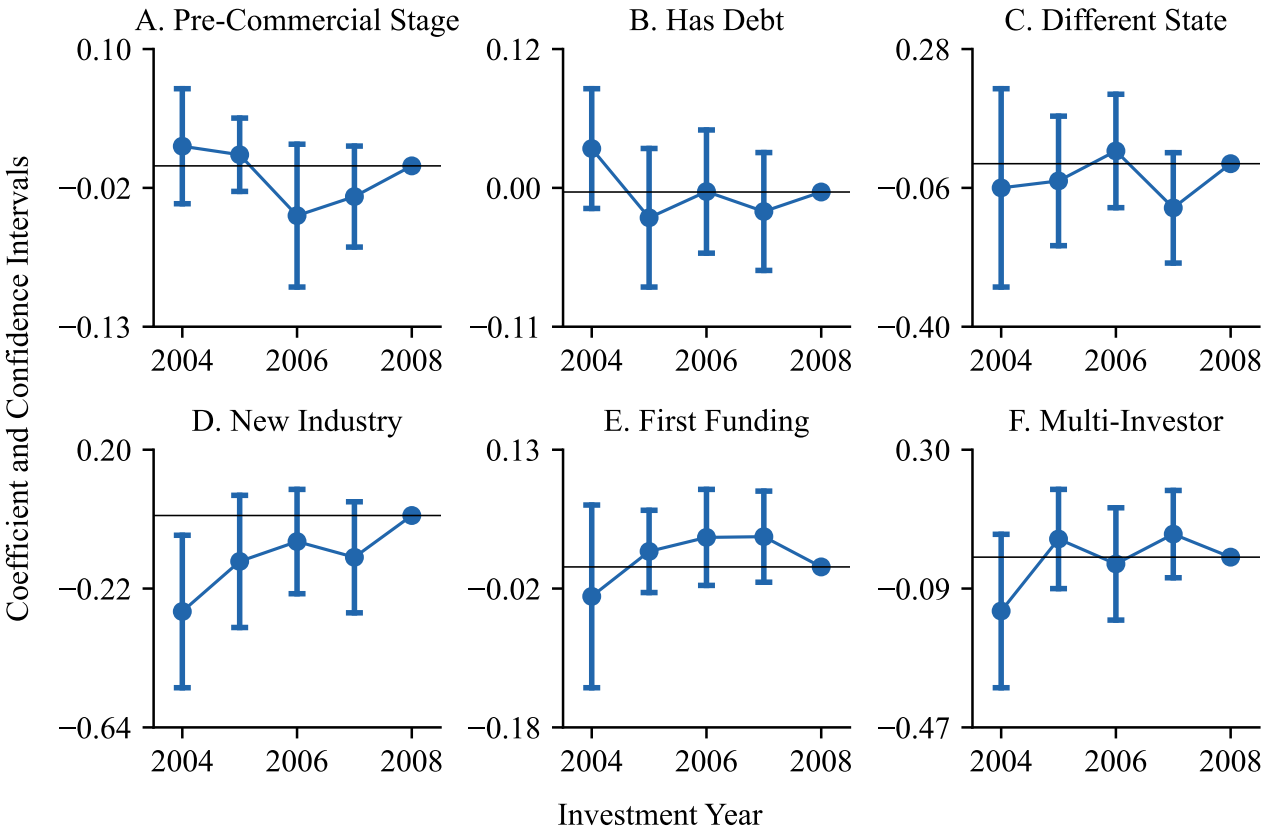
$$SE(\Delta B_i^{DB}) = \sqrt{SE(B_{\text{eligible,post}})^2 + SE(B_{\text{control}_i})^2} \tag{A17}$$

Figure IA7: Federal Tax Expenditures from the QSBS Tax Benefits



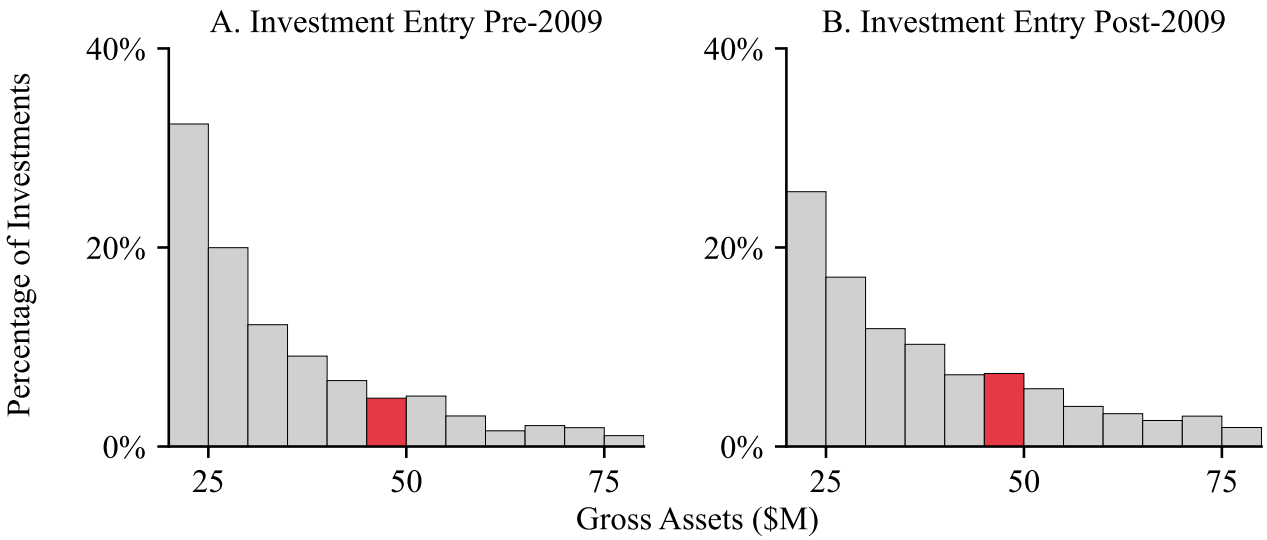
This figure illustrates the evolution of federal tax expenditures attributable to the Qualified Small Business Stock (QSBS) program from 2000 through 2034, with all values inflation-adjusted to 2023 dollars using the PCE Price Index. Federal tax expenditures reflect the government's foregone revenue 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 IA8: Dynamic Difference-in-Differences: Investment Selection by Venture Capitalists



This figure shows dynamic difference-in-difference estimates for VC investment selection indicators during the pre-period, 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–firm industry, investor state–year, firm industry–year, and firm industry–firm state) and standard errors clustered at the investor level. Confidence intervals are at the 99% level. Data are from PitchBook.

Figure IA9: Distribution of Deal Sizes Around the $50M QSBS Threshold



This figure shows the distribution of deal sizes around the $50 million gross asset threshold in QSBS-eligible sectors. Gross assets are proxied by investment amount raised in a given round. Panel A displays investments with entry year before 2009 (pre-reform), while Panel B displays investments with entry year 2009 or later (post-reform). The red bar indicates the bin containing the $50 million QSBS eligibility threshold. The sample includes investments from 2004 to 2017 in C-corporations operating in QSBS-eligible sectors. Bins are $5 million wide with right-closed boundaries. 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.
2025	New Jersey adopts QSBS conformity, effective for dispositions on or after January 1, 2026.
Ongoing	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

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	Elasticity (ϵ)	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 VC and angel 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: Bunching Estimates at $50 Million Gross Asset Threshold

	Elasticity (ϵ)			
Bin width	\$2.5M		\$5M	
Sample range	\$25–75M	\$35–65M	\$25–75M	\$35–65M
	(1)	(2)	(3)	(4)
Panel A: Potentially QSBS-Eligible Investments				
Eligible Sectors, Post-2009 Investment				
Elasticity (ϵ)	0.000	0.000	0.001	0.000
	(0.31)	(0.31)	(0.48)	(0.01)
Observations	502	244	502	244
Panel B: QSBS-Ineligible Investments				
Eligible Sectors, Pre-2009 Investment				
Elasticity (ϵ)	−0.001	−0.002	−0.002	−0.003
	(−0.64)	(−0.97)	(−0.94)	(−1.45)
Observations	623	245	623	245
Panel C: Difference-in-Bunching				
Post-2009 versus Pre-2009				
$\Delta\epsilon$	0.001	0.002	0.002	0.003
	(0.71)	(0.98)	(1.06)	(1.36)

This table presents bunching elasticity estimates at the \$50 million gross asset threshold for QSBS-eligible sectors following the methodology of Kleven and Waseem (2013). Gross assets are proxied by cumulative investment amount raised by the firm. Panel A shows results for investments by VC and angel investors in eligible sectors with investor entry after 2009, when enhanced tax benefits became available. Panel B presents the comparison group: investments in eligible sectors before 2009, when tax benefits were minimal. Panel C reports the difference-in-bunching estimate. Estimation uses a cubic (3rd-degree) polynomial to model the counterfactual density, excluding the window (\$45M, \$55M) from the polynomial fit to account for both bunching below and missing mass above the threshold. The counterfactual is iteratively adjusted to satisfy mass conservation following Chetty et al. (2011). Columns vary the bin width (\$2.5M or \$5M) and sample range (\$25–75M or \$35–65M). The signed reduced-form elasticity is $\epsilon = \text{sign}(\Delta z^*/z^*) \times (\Delta z^*/z^*)^2/(\tau/(1-\tau))$, where Δz^* is the bunching response, $z^* = \$50\text{M}$ is the threshold, and $\tau = 0.20$ is the federal capital gains tax rate. Negative elasticity values indicate fewer firms than the counterfactual predicts (i.e., no bunching response). The t-statistics in parentheses are computed from standard errors obtained via 1,000 bootstrap replications. The difference-in-bunching standard errors assume independence between pre- and post-2009 samples. The sample includes VC and angel investments in C-corporations from investment entry years 2007–2010. Data are from PitchBook.

Table IA7: Impact of QSBS Tax Benefits on Investment Selection: FE Specification Comparison

		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$\}$
	Fixed Effects	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Venture Capital							
	Baseline						
	Inv×Ind + Ind×Year + InvState×Year + Ind×FirmState	0.025***	0.018**	0.043*	0.048*	0.018**	−0.073***
	Robustness						
1	Inv + Ind	0.021***	0.010*	0.067***	0.047**	0.011**	−0.106***
2	Inv + Ind + InvState	0.021***	0.010*	0.067***	0.047**	0.011**	−0.108***
3	Inv + Ind + InvState + Year	0.023***	0.010*	0.070***	0.047**	0.012**	−0.095***
4	Inv + Ind + InvState×Year	0.023***	0.010*	0.065***	0.050**	0.014**	−0.093***
5	Inv×Ind + FirmState + Ind×Year×InvState	0.025***	0.018**	0.041*	0.052**	0.013*	−0.077***
6	Inv×Ind + FirmState + Ind×Year + InvState×Year	0.024***	0.018**	0.040*	0.046*	0.018**	−0.076***
7	Inv×Ind + FirmState + Ind×Year + InvCity×Year	0.028***	0.017**	0.046**	0.050*	0.015**	−0.074***
Panel B: Angel							
	Baseline						
	Inv×Ind + Ind×Year + InvState×Year + Ind×FirmState	0.003	−0.000	−0.033	0.046	0.008	0.013
	Robustness						
1	Inv + Ind	−0.007	−0.001	−0.039	0.001	−0.002	−0.032
2	Inv + Ind + InvState	−0.003	−0.001	−0.040	0.003	−0.003	−0.026
3	Inv + Ind + InvState + Year	−0.001	−0.001	−0.040	−0.005	−0.001	−0.024
4	Inv + Ind + InvState×Year	−0.003	−0.002	−0.031	0.004	0.001	−0.014
5	Inv×Ind + FirmState + Ind×Year×InvState	0.014	−0.001	−0.018	0.028	0.022	−0.004
6	Inv×Ind + FirmState + Ind×Year + InvState×Year	0.005	−0.001	−0.031	0.046	0.006	0.012
7	Inv×Ind + FirmState + Ind×Year + InvCity×Year	0.008	−0.002	−0.044	0.056	0.016	0.023
Panel C: Corporate							
	Baseline						
	Inv×Ind + Ind×Year + InvState×Year + Ind×FirmState	−0.020	−0.012	−0.072	0.123	−0.007	0.002
	Robustness						
1	Inv + Ind	−0.020	−0.009	−0.083	0.060	−0.044*	−0.047
2	Inv + Ind + InvState	−0.020	−0.009	−0.083	0.059	−0.044*	−0.044
3	Inv + Ind + InvState + Year	−0.020	−0.009	−0.089	0.063	−0.043*	−0.036
4	Inv + Ind + InvState×Year	−0.024	−0.007	−0.084	0.060	−0.023	−0.001
5	Inv×Ind + FirmState + Ind×Year×InvState	−0.001	−0.011	−0.089	0.091	−0.002	0.037
6	Inv×Ind + FirmState + Ind×Year + InvState×Year	−0.025	−0.013	−0.066	0.096	−0.005	0.004
7	Inv×Ind + FirmState + Ind×Year + InvCity×Year	−0.032	−0.014	−0.086	0.124*	0.019	0.009

This table presents robustness checks for the main investment selection results. Each row shows the coefficient on $\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$ from a different specification. The dependent variables include (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, private equity, or 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). $\mathbb{1}\{\text{Eligible}\}$ indicates QSBS-eligible sectors, and $\mathbb{1}\{\text{Post}\}$ is an indicator for investments made after 2009. The baseline specification (row 1) includes Investor×Industry, Industry×Year, InvState×Year, and Industry×FirmState fixed effects. Specifications 1–9 are robustness checks that progressively add complexity, from simple additive fixed effects to three-way interactions. Standard errors are clustered at the investor level. For investors headquartered 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. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Inv = Investor; Ind = Firm Industry; InvState = Investor State; FirmState = Firm State; InvCity = Investor City; Year = Entry Year. Data are from PitchBook.

Table IA8: Impact of QSBS Tax Benefits on Investment Selection: Clustering Robustness

	Dependent Variable					
Clustering	𝟙{Pre-Commercial} (1)	𝟙{Has Debt} (2)	𝟙{Diff. State} (3)	𝟙{New Industry} (4)	𝟙{First Funding} (5)	𝟙{Multi-Investor} (6)
Panel A: Venture Capital						
Baseline						
Investor	0.025***	0.018**	0.043*	0.048*	0.018**	−0.073***
Robustness						
1 Company	0.025**	0.018*	0.043*	0.048*	0.018*	−0.073**
2 Investor × Industry	0.025***	0.018**	0.043*	0.048*	0.018**	−0.073***
3 Investor × Year	0.025***	0.018**	0.043*	0.048*	0.018**	−0.073***
4 Company × Year	0.025**	0.018*	0.043*	0.048*	0.018*	−0.073**
5 Investor + Company	0.025***	0.018*	0.043*	0.048*	0.018**	−0.073**
6 Investor × Industry + Company	0.025***	0.018*	0.043*	0.048*	0.018*	−0.073**
7 Investor + Firm State	0.025***	0.018*	0.043**	0.048***	0.018*	−0.073***
Panel B: Angel						
Baseline						
Investor	0.003	−0.000	−0.033	0.046	0.008	0.013
Robustness						
1 Company	0.003	−0.000	−0.033	0.046	0.008	0.013
2 Investor × Industry	0.003	−0.000	−0.033	0.046	0.008	0.013
3 Investor × Year	0.003	−0.000	−0.033	0.046	0.008	0.013
4 Company × Year	0.003	−0.000	−0.033	0.046	0.008	0.013
5 Investor + Company	0.003	−0.000	−0.033	0.046	0.008	0.013
6 Investor × Industry + Company	0.003	−0.000	−0.033	0.046	0.008	0.013
7 Investor + Firm State	0.003	−0.000	−0.033	0.046	0.008	0.013
Panel C: Corporate						
Baseline						
Investor	−0.020	−0.012	−0.072	0.123	−0.007	0.002
Robustness						
1 Company	−0.020	−0.012	−0.072	0.123	−0.007	0.002
2 Investor × Industry	−0.020	−0.012	−0.072	0.123	−0.007	0.002
3 Investor × Year	−0.020	−0.012	−0.072	0.123	−0.007	0.002
4 Company × Year	−0.020	−0.012	−0.072	0.123	−0.007	0.002
5 Investor + Company	−0.020	−0.012	−0.072	0.123	−0.007	0.002
6 Investor × Industry + Company	−0.020	−0.012	−0.072	0.123	−0.007	0.002
7 Investor + Firm State	−0.020	−0.012	−0.072	0.123*	−0.007	0.002

This table presents robustness checks for the main investment selection results under alternative clustering schemes. Each row shows the coefficient on 𝟙{Eligible}×𝟙{Post} from a different clustering specification. 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, private equity, or 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). 𝟙{Eligible} indicates QSBS-eligible sectors, and 𝟙{Post} is an indicator for investments made after 2009. All specifications include Investor×Industry, Industry×Year, Investor State×Year, and Industry×Firm State fixed effects. The baseline specification clusters standard errors at the investor level. Robustness specifications vary the clustering dimension, including single clustering (Company, Investor×Industry, Investor×Year, Company×Year), two-way clustering (Investor & Company, Investor×Industry & Company, Investor & Firm State). For investors headquartered 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. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table IA9: Impact of QSBS Tax Benefits on Investment Outcomes: Estimation with Binary Models

	$\mathbb{1}\{\text{Out of Business}\}$		$\mathbb{1}\{\text{Unicorn}\}$	
	Logit (1)	Probit (2)	Logit (3)	Probit (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. $\mathbb{1}\{\text{Eligible}\}$ 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. 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 IA10: Impact of QSBS Benefits on Portfolio Company Failure: Alternative Clustering

	All Investors		VCs		Angels		Corporates	
	All Firms	Exited	All Firms	Exited	All Firms	Exited	All Firms	Exited
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(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
	(5.03)	(6.47)	(3.76)	(4.96)	(0.34)	(1.86)	(0.68)	(0.96)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.001	−0.004	0.002	−0.002	0.011***	0.018*	0.005	0.004
	(0.60)	(−0.84)	(0.76)	(−0.36)	(4.01)	(1.67)	(1.06)	(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**
	(−11.39)	(−12.71)	(−7.75)	(−9.06)	(−4.68)	(−4.78)	(−1.81)	(−2.30)
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
	(6.36)	(5.58)	(4.69)	(4.92)	(1.41)	(0.41)	(1.63)	(1.35)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.108***	−0.100***	−0.076***	−0.085***	−0.045	−0.010	−0.175***	−0.169***
	(−9.04)	(−7.19)	(−4.51)	(−4.53)	(−1.35)	(−0.25)	(−4.95)	(−3.94)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.083***	−0.092***	−0.088***	−0.107***	−0.065**	−0.011	−0.072*	−0.084*
	(−6.77)	(−6.28)	(−5.07)	(−5.44)	(−1.96)	(−0.27)	(−1.90)	(−1.79)
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 × Firm)	✓	✓	✓	✓	✓	✓	✓	✓

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–firm level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table IA11: 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 IA12: Impact of QSBS Benefits on Portfolio Company Valuations: Alternative Clustering

	All Investors		VCs		Angels		Corporates	
	All Firms	Exited	All Firms	Exited	All Firms	Exited	All Firms	Exited
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(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)	(0.80)	(1.57)	(2.46)	(−3.74)	(−3.33)	(−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
	(−3.72)	(−4.75)	(−4.25)	(−4.67)	(2.56)	(0.43)	(−1.51)	(−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
	(4.00)	(0.28)	(0.74)	(−1.93)	(6.68)	(3.94)	(0.35)	(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 = $\mathbb{1}\{Unicorn\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.005	0.026	0.051**	0.140***	−0.119***	−0.132	0.036	−0.102
	(0.29)	(0.83)	(2.05)	(3.05)	(−3.27)	(−1.52)	(0.53)	(−1.31)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.043***	−0.133***	−0.083***	−0.212***	0.088**	−0.031	−0.086	0.019
	(−2.83)	(−4.62)	(−3.72)	(−5.16)	(2.55)	(−0.37)	(−1.36)	(0.29)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.057***	0.021	0.016	−0.093**	0.155***	0.142*	−0.010	0.103
	(3.51)	(0.68)	(0.65)	(−2.05)	(4.49)	(1.67)	(−0.15)	(1.34)
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 × Firm)	✓	✓	✓	✓	✓	✓	✓	✓

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–firm level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table IA13: Impact of QSBS Tax Benefits on Portfolio Company Failure: Pre-2009 Founded Firms

	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*$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.008***	0.028***	0.010**	0.026**	−0.006	−0.006	0.006	0.022
	(3.03)	(4.08)	(2.40)	(2.38)	(−1.36)	(−0.35)	(0.88)	(1.39)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.000	−0.006	0.001	−0.004	0.011***	0.019*	0.004	0.001
	(0.14)	(−1.37)	(0.53)	(−0.70)	(3.92)	(1.73)	(0.92)	(0.08)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.006**	−0.023***	−0.008*	−0.024**	0.004	0.004	−0.001	−0.018
	(−2.13)	(−3.41)	(−1.74)	(−2.22)	(0.82)	(0.21)	(−0.12)	(−1.12)
Observations	338,072	181,755	146,385	85,781	59,790	25,470	38,338	22,817
Adjusted R^2	0.06	0.06	0.06	0.06	0.08	0.08	0.05	0.05
Mean Dependent Variable	0.009	0.017	0.009	0.015	0.010	0.024	0.009	0.016
Panel B: Dependent Variable $= \mathbb{1}\{$*Five Years Without Funding*$\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.025	0.019	0.057**	0.045*	−0.005	−0.015	−0.007	−0.010
	(1.59)	(1.02)	(2.50)	(1.73)	(−0.12)	(−0.31)	(−0.15)	(−0.17)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.109***	−0.103***	−0.074***	−0.078***	−0.045	−0.017	−0.170***	−0.162***
	(−8.75)	(−7.39)	(−4.40)	(−4.27)	(−1.29)	(−0.42)	(−4.50)	(−3.60)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.002	−0.008	−0.045**	−0.047*	0.018	0.015	0.044	0.046
	(−0.16)	(−0.44)	(−1.98)	(−1.79)	(0.45)	(0.30)	(0.94)	(0.82)
Observations	338,072	181,755	146,385	85,781	59,790	25,470	38,338	22,817
Adjusted R^2	0.36	0.22	0.34	0.18	0.38	0.23	0.36	0.24
Mean Dependent Variable	0.083	0.035	0.067	0.026	0.101	0.034	0.084	0.044
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, restricting the sample to firms founded before 2009. This design holds the supply of startups fixed, isolating investor demand for risk from changes in the composition of QSBS-eligible startups. Panel A examines portfolio companies that went out of business using an indicator variable equal 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, restricted to firms with founding year before 2009. Results are shown for all investors (split between all portfolio companies and those that experienced an exit) and by investor type. 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 IA14: Impact of QSBS Tax Benefits on Portfolio Company Valuations: Pre-2009 Founded Firms

	All Investors		VCs		Angels		Corporates	
	All Firms	Exited	All Firms	Exited	All Firms	Exited	All Firms	Exited
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Dependent Variable = Valuation ($ billions)								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.221***	0.025	−0.176**	0.251**	−0.421***	−0.276*	−0.297*	−0.440**
	(−4.96)	(0.34)	(−2.28)	(2.20)	(−5.60)	(−1.89)	(−1.91)	(−2.13)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.085***	−0.240***	−0.153***	−0.360***	0.125**	−0.006	−0.082	0.075
	(−3.20)	(−4.18)	(−3.78)	(−4.12)	(2.47)	(−0.05)	(−0.98)	(1.15)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.261***	−0.010	0.210***	−0.236**	0.506***	0.301**	0.290*	0.394*
	(6.05)	(−0.13)	(2.79)	(−2.11)	(7.12)	(2.14)	(1.89)	(1.92)
Observations	70,954	44,137	36,942	24,091	12,646	6,922	7,580	4,834
Adjusted R^2	0.40	0.42	0.41	0.43	0.35	0.37	0.45	0.47
Mean Dependent Variable	0.172	0.196	0.162	0.182	0.195	0.227	0.172	0.193
Panel B: Dependent Variable = $\mathbb{1}\{Unicorn\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.078***	0.060	−0.046	0.156***	−0.188***	0.018	−0.085	−0.218***
	(−3.48)	(1.63)	(−1.21)	(2.74)	(−4.10)	(0.19)	(−1.15)	(−3.32)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.038**	−0.125***	−0.076***	−0.197***	0.080**	−0.077	−0.066	0.068***
	(−2.55)	(−4.40)	(−3.49)	(−5.00)	(2.38)	(−0.89)	(−1.05)	(3.52)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.102***	−0.050	0.075**	−0.138**	0.201***	−0.056	0.088	0.203***
	(4.69)	(−1.39)	(2.02)	(−2.47)	(4.71)	(−0.59)	(1.17)	(3.03)
Observations	72,141	45,074	37,369	24,449	13,081	7,256	7,657	4,901
Adjusted R^2	0.35	0.37	0.33	0.34	0.40	0.45	0.29	0.32
Mean Dependent Variable	0.048	0.057	0.040	0.047	0.079	0.101	0.036	0.041
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, restricting the sample to firms founded before 2009. This design holds the supply of startups fixed, isolating investor demand for risk from changes in the composition of QSBS-eligible startups. 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, restricted to firms with founding year before 2009. Results are shown for all investors (split between all portfolio companies and those that experienced an exit) and by investor type. 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 IA15: Impact of QSBS Tax Benefits on Investment Outcomes: Predicted Holding Period

	All Investors (1)	VCs (2)	Angels (3)	Corporates (4)
Panel A: Dependent Variable $= \mathbb{1}\{$*Out of Business*$\}$				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\widehat{\text{Holding}} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.003	0.003**	−0.003	−0.015
	(1.38)	(2.02)	(−0.30)	(−0.81)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\widehat{\text{Holding}} \geq 5\}$	−0.002	−0.002	0.004	0.013
	(−1.22)	(−1.36)	(0.40)	(0.73)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$	−0.002	−0.003	−0.008	−0.008**
	(−0.87)	(−1.15)	(−0.71)	(−2.22)
Observations	754,566	314,056	232,731	58,933
Adjusted R^2	0.18	0.19	0.15	0.08
Mean Dependent Variable	0.013	0.012	0.014	0.011
Panel B: Dependent Variable $= \mathbb{1}\{$*Unicorn*$\}$				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\widehat{\text{Holding}} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.004	0.008	−0.038	−0.195**
	(−0.20)	(0.37)	(−0.67)	(−1.98)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\widehat{\text{Holding}} \geq 5\}$	0.003	−0.007	0.038	0.193*
	(0.12)	(−0.35)	(0.67)	(1.96)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$	−0.003	−0.019	0.053	0.060
	(−0.14)	(−0.81)	(0.85)	(1.11)
Observations	219,200	102,679	63,429	16,561
Adjusted R^2	0.42	0.41	0.39	0.25
Mean Dependent Variable	0.054	0.052	0.064	0.048
Year FE	✓	✓	✓	✓
Investor FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓

This table presents estimates of the effect of QSBS tax benefits on investment outcomes using predicted holding periods to address potential endogeneity in the five-year holding requirement. A concern with our main specification is that investors may strategically extend holding periods to qualify for tax benefits, confounding the treatment effect. To address this, we construct $\mathbb{1}\{\widehat{\text{Holding}} \geq 5\}$, a predicted indicator for holding an investment five or more years based exclusively on pre-2009 investment characteristics—before the QSBS enhancement made strategic holding behavior tax-motivated. The prediction model is estimated via OLS on pre-2009 investments using deal size, firm age at investment, investor type, industry classification, firm state, investor state, employee counts, and investor historical holding patterns (overall, by industry, and by state). We then apply these coefficients out-of-sample to generate predicted holding for all investments. Panel A examines portfolio companies that went out of business. Panel B examines the likelihood of achieving unicorn status (valuation exceeding $1 billion). $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. Regressions include all constituent terms and remaining two-way interactions (omitted for brevity). 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 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 IA16: Heterogeneity of VC Risk-Taking: VC Firm Size

Dependent Variable:	𝟙{Out of Business}	
	Pre-2009 Investments	Post-2009 Investments
	(1)	(2)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \text{AUM}$	0.002	0.004***
	(1.12)	(3.42)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.000	0.013***
	(−0.04)	(6.78)
Observations	48,919	221,857
Adjusted R^2	0.05	0.11
Mean Dependent Variable	0.006	0.019
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 AUM (assets under management), measured in tens of billions of dollars, using the latest available figure for each investor in PitchBook. 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.