Tax Incentives and Venture Capital Risk-Taking: Evidence from the QSBS Program*

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Do tax subsidies prompt investors to take on risk? We address this question by looking at investors' responses to changes to the Qualified Small Business Stock (QSBS) program, which reduces capital gains taxes on startup investing. We do so under a framework in which some startup investors — venture capitalists (VCs) — combine outside funding with incentive-based compensation, while others invest their own funds. Using bunching, triple-differences, and matching designs that exploit industry eligibility, investment vintage, and holding-period requirements, we analyze data from 158 thousand investor–firm pairings over two decades. We identify strategic investment timing, with subsidies prompting bunching at tax-eligible holding-period thresholds. Most notably, when and where tax subsidies apply, VCs shift their project selection toward riskier ventures: they invest more in pre-commercial stage startups, become more likely to provide startups with their initial capital, and invest more in startups with pre-existing debt, while becoming less likely to co-syndicate their investments. Tax-subsidized VC-backed ventures show higher failure rates, but on the flip side, attain higher valuations at exit and are more likely to reach "unicorn status." None of these patterns are observed for comparable non-VC investors in startups exposed to the same tax subsidies. Our tests further show that tax incentives lead to reallocation toward more innovative industries, yielding more impactful patents. Our study is the first to show that tax policy can shift entrepreneurial financing toward riskier, more innovative, and valuable startups.

Keywords: Tax Policy, Venture Capital, Risk-Taking, Entrepreneurial Financing, Innovation
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1 Introduction

Tax subsidies are used worldwide to promote investment in young, entrepreneurial firms — businesses that account for a significant share of job creation and productivity growth (Haltiwanger et al. (2013); Akcigit and Kerr (2018)) but face severe financing frictions (Hall and Lerner (2010)). In the U.S., the near universe of formal equity investing in startups flows through VC funds and angel investors (NVCA (2025)), investment vehicles that can mitigate funding frictions through deep pockets, intensive screening, and close monitoring. A key policy question is whether startup tax subsidies encourage those sophisticated investors to fund high-potential ventures, particularly at early stages where frictions are most severe (Poterba (1989); Rin et al. (2006)), or simply create opportunities for tax arbitrage, boosting returns to their existing strategies without expanding startup funding (Lerner (2013)).

This paper examines how tax policy affects capital allocation and risk-taking in entrepreneurial markets by showing how startup 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 venture capitalists (who combine outside capital with incentive-based compensation) and angel investors (who use their own capital)? Second, can tax incentives affect not only the level of startup funding but also investors' willingness to back riskier ventures? Third, through what mechanisms do tax incentives operate? Do they only affect startup selection? Or do they also affect how investors keep portfolio companies over time? Finally, how do tax subsidies shape the sectoral distribution, quantity, and quality of startup innovation?

We tackle these questions building on a conceptual framework in which venture capital (VC) funds combine outside capital provided by limited partners (LPs) together with incentive-based compensation given to general partners (GPs) via carried interests. This risk-sharing structure creates convex, option-like payoffs for GPs — the decision-makers in VC funds — that increase in value with venture return volatility and capital gains tax subsidies combined. Our framework yields testable predictions about taxes, investment thresholds, and risk-taking behavior. In contrast to other startup investors, such as angel investors (who primarily invest their own capital) and corporate investors (who are subject to a different tax regime), VCs significantly lower their investment thresholds when startups qualify for tax subsidies. Lower investment thresholds lead VCs to select new, marginal startups that are riskier —

ventures with higher variance in potential outcomes, including failures and successful investment exits. These effects emerge even after accounting for GPs' own capital contributions to VC funds, reputational costs associated with future fundraising, and other relevant considerations in startup investing.

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 program that provides capital gains tax benefits at both the federal and state levels, currently costing some $3 billion in annual foregone tax revenues, with projections reaching $7 billion annually by 2035 (U.S. Department of the Treasury (2026)). As we discuss below, the program provides preferential tax treatment for investments in qualifying 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 certain capital-intensive sectors where funding frictions are pronounced, while excluding service-based sectors such as hospitality and healthcare services.[1]

The American Recovery and Reinvestment Act (ARRA) of 2009 introduced a wedge in after-tax returns between QSBS-qualifying and non-qualifying investments. Before 2009, QSBS-qualifying investments held for five years faced a 14% federal capital gains tax rate — set to half of the 28% federal capital gains tax rate when the program was introduced in 1993. As 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 completely modified the basis for subsidies: it excluded 75% of the capital gains on QSBS-eligible investments from taxation. The Small Business Jobs Act (SBJA) of 2010 further boosted this benefit by *fully eliminating* capital gains taxes on QSBS-qualifying investments.

Our analysis leverages data from PitchBook, tracking VC, angel, and corporate investments in startups. Based on the QSBS eligibility criteria, we compile a testing sample by tracing 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 pairing 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 startup investment lifecycle — from initial selection through follow-on funding, valuation milestones, and exits or failure.

We start by looking at the elasticity of investors' responses to tax subsidies via bunching methods.

[1] We provide a full list of the industries qualifying for the QSBS tax program in Table IA10.

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 could 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 where QSBS benefits apply after 2009.

We then study 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 QSBS reform, while controlling for a large set of fixed effects: investor-by-industry (capturing investor specialization within specific sectors), industry-by-year (capturing sector-specific trends, including changing technological and demand conditions), investor state-by-year (capturing changing local economic conditions affecting investors, including their effective tax rates), and industry-by-firm state (capturing geographic concentration of specific industries). We show that VCs select startups bearing higher risk exposure *when* and *where* tax benefits become available. For example, in QSBS-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). Likewise, VCs become nearly twice as likely to invest in startups carrying pre-existing debt (showing willingness to accept greater financial risk), 9% more likely to invest in states away from their domicile (exposed to greater information asymmetries), 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 60% more likely to provide a startup's very first funding round, and 16% less likely to participate in investment syndicates. Angel and corporate investors, in contrast, show no changes in their startup selection criteria in QSBS-eligible sectors after 2009 along any of the aforementioned dimensions.

Next, we ask whether risk-taking through startup investment selection translates into different ultimate *investment outcomes*. 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 group comparisons; (2) the policy change that sharply 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.[2] This new set of tests provides for a more dynamic analysis of investor–firm relations as we follow various outcomes over a span of two decades. In doing so, these new tests exploit several additional data features that help identify the causal effects of tax subsidies. Investor-by-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 controls for vintage-specific shocks affecting investments initiated in different years. Standard-error clustering at the investor level accounts for correlation in the residuals across different investments made by the same investor.[3]

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 startups in eligible sectors experience a 71% higher rate of complete business failures relative to the baseline failure rate (2% of investor–firm–year observations, with failures accounting 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 of time without raising funds, a common predictor of distress in startup markets. These patterns are, again, unique to VC investors.

On the flip side, tax-advantaged investments return superior valuation outcomes among VC-backed startups. When VC investments qualify for tax subsidies, portfolio companies that achieve an exit observe 131% higher valuations. The effect on extreme valuations is striking: VC-backed startups are twice as likely to achieve unicorn status (valuations exceeding $1 billion), rising to nearly 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 more aggressively pursue "high-risk–high-return" startup investment strategies. 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 differences across industries classified

[2] A concern is that investors may strategically choose portfolio-firm holding periods. We address this by replacing actual holding periods with predicted values estimated from pre-2009 investment characteristics and patterns.

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

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. Because QSBS eligibility is determined by the "nature of business activities" (rather than market-oriented verticals), many individual verticals contain *both* eligible and ineligible firms.[4] 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 tests — ruling out alternative explanations based on differences in growth potential, demand conditions, or technological trajectories.

A further concern is that VC–angel comparisons simply reflect *who* becomes a venture capitalist — investors with particular skills and risk preferences — rather than the VC organizational structure itself. Exploiting data from 1,187 individuals who operate in both capacities — as VCs *and* as angel investors — we find that the risk-taking response emerges when they invest through their VC fund but not when they invest their own capital as angels. Another potential concern is a supply effect: that riskier firms were founded in eligible sectors after the QSBS reform. To tackle this, we restrict the analysis to firms founded before 2009, whose existence predates the QSBS reform. We find that VCs take on more risk among the same pre-existing pool of firms once the QSBS tax benefits apply — the documented effects reflect a shift in risk appetite, not the supply of eligible startups.

Most — but not all — state-level taxes conform with the federal QSBS benefits.[5] 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% exclusion) before eliminating it in 2013, when a local 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 generalize beyond California. Eligible VC-backed investments in QSBS-compliant high capital gains tax states embed stronger risk-taking effects than those in low-tax states.

[4]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.

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

We take a step further in our analysis and ask whether risk-taking responses to tax subsidies depend on VC fund characteristics. We find that larger VC funds, which 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 elite private university endowment LPs, which maintain long-term horizons and professional investment capabilities (see, e.g., Lerner et al. (2007, 2008)). We find that VCs backed by sophisticated LPs exhibit dramatically stronger risk-taking responses.

Beyond individual investment decisions, we find evidence that tax subsidies create cross-sectoral capital reallocation and shape innovation in startups. While a precise evaluation would require data that are unavailable, we examine this indirectly through "capital calls" — the actual transfers of committed capital from LPs to VC funds. We show that funds holding tax-qualified investments make significantly more capital calls, while on the flip side, funds with ineligible-sector investments experience reduced inflows. This implies that tax benefits influence not only startup selection but also capital flows across sectors inside VC funds. Critically, we find that these effects extend to systematic reallocation toward more innovative industries, even within QSBS-eligible sectors. Finally, 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. We further document that these dynamics translate into real innovation output: tax-subsidized VC-backed ventures are less likely to patent, but those that do produce more citation-impactful patents.

Our work contributes to a literature on how tax policy shapes entrepreneurship and innovation (Zwick and Mahon (2017); Akcigit et al. (2022); Lerner (2022)). Closest to our setting are studies on tax incentives targeting entrepreneurial investment. Abdulrauf et al. (2025) use individual tax return data to show that exclusions of capital gains under 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 the wealthy 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; the authors do not consider whether tax changes affect investment selection or risk-taking. Chen and Farre-Mensa (2026) report that the QSBS increased firm births and patenting counts in eligible

sectors; the authors focus on aggregate entrepreneurship outcomes rather than investor-level risk-taking incentives, behavior, and heterogeneity. 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. Among several other dimensions, we advance the literature by showing that tax policy can affect not just the level of startup investment, but fundamentally alter *how* certain types of investors — chiefly VCs — deploy capital. We show that tax subsidies encourage greater risk-taking, leading VCs to fund more experimental, valuable ventures, with effects that extend to cross-sectoral capital allocation and the innovation process.

Our work further shows how organizational structure shapes responses of specialized entrepreneurial investment to tax subsidies. Our mechanism builds on a literature documenting that VC and private equity general partners hold convex, call-option-like claims on fund profits through carried interest above a hurdle rate (Axelson et al. (2009, 2013)), with this convexity amplified by implicit pay-for-performance through future-fund flows (Chung et al. (2012)). While this literature stresses that the resulting GP–LP agency conflicts shape investment performance (Kaplan and Schoar (2005); Hochberg et al. (2007); Ewens and Rhodes-Kropf (2015)), the link between this convex contract structure and tax-policy responsiveness remains understudied. We show that VCs' distinctive organizational structure — combining outside capital with incentive-based compensation — triggers unique responses to tax benefits. Our evidence suggests that tax subsidies can expand the frontier of venture investment, ultimately enhancing the funding of more high-risk, innovative ventures, particularly at earlier stages.

The remainder of the paper proceeds as follows. Section 2 presents our conceptual framework, Sections 3 and 4 detail the institutional setting and data, and Section 5 analyzes timing responses. Sections 6 to 8 describe our empirical strategy, investment selection, and performance. Section 9 studies heterogeneity and Section 10 analyzes cross-sectoral effects and innovation. Section 11 concludes.

2 Conceptual Framework

We develop a simple conceptual framework to demonstrate 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 gains 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.[6] The investor is risk-neutral and applies the constant discount rate $r > \mu$.

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

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

The option value to fund the project is:

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

[6] 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.

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 detailed derivations 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 later 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.[7] They do so combining management fees and carried interest in their compensation structure. Upon investment, the GPs of a VC fund earn the cash flow $\alpha I + (1 - \tau_K)\gamma \max\{X - h, 0\}$, where α is the 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

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

interest compensation. The present value of this convex cash flow is:

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

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 (see 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.[8] VCs' investment threshold becomes:

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

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

[8] 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.

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:

$$V_{\text{Angel}}(X) = (1-\tau_K)\frac{X}{\rho}, \tag{8}$$

where $\rho \equiv r - \mu + \eta$.

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.[9] After conversion, the angel holds equity, with value $V_{A,3}(X)$:

$$V_{A,3}(X) = (1 - \tau_K)\frac{X}{\rho}. \tag{10}$$

Before conversion but after investing, the angel is a creditor holding a live conversion option, with value $V_{A,2}(X)$:

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

where $\bar{X}$ is the conversion threshold at which the angel optimally converts debt to equity.

The value of the option to provide the initial financing, $V_{A,1}(X)$, 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:

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

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

[9] 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)).

entrepreneurs over value-creating activities. This yields:

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

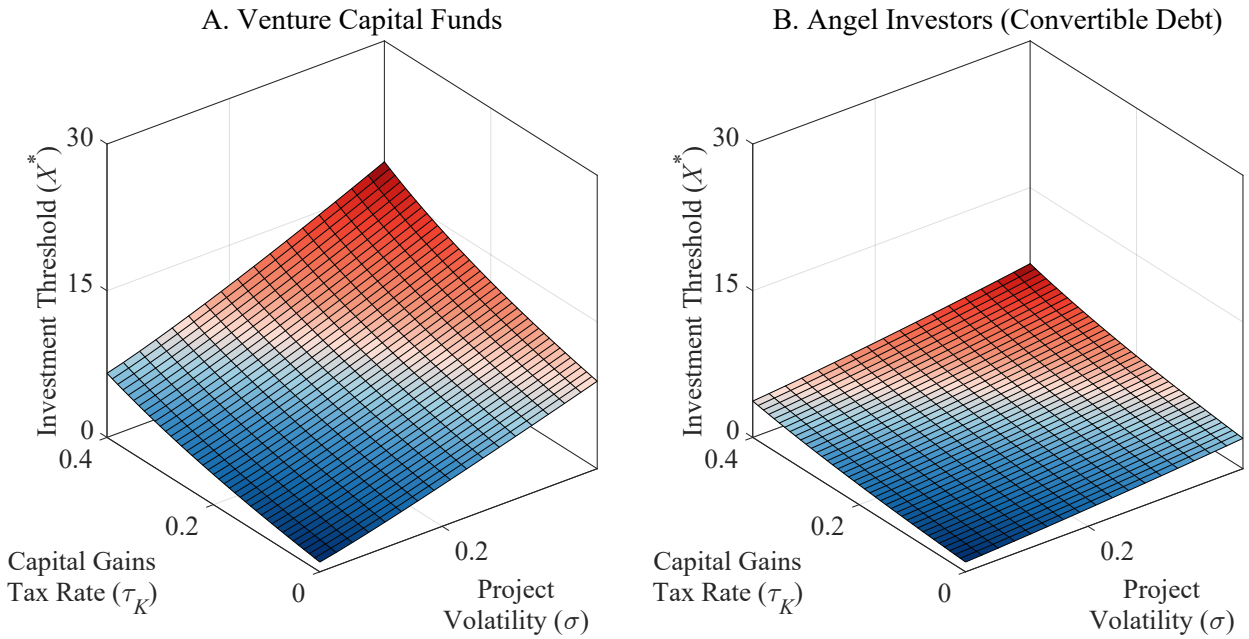
While convertible notes introduce option-like features through conversion discounts and coupon income, the terminal payoff after conversion remains linear in project outcomes — unlike VCs whose carried interest creates a convex terminal payoff. Two key distinctions drive differential tax sensitivity. First, angels invest their own capital and bear full downside risk on personal wealth, whereas VCs deploy predominantly outside capital — GPs typically commit only 1–2% of fund capital from personal resources (Robinson and Sensoy (2013)). 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 (approximately linearly) to tax changes, whereas VCs' highly 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, with all parameter choices and their sources detailed in Appendix IA1.2 (Table IA1). 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.[10] 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 much 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 com-

[10] Figure IA1 presents the corresponding comparison between angel financing structures, showing that direct equity angels are slightly 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) for VCs (Panel A) and convertible-debt angels (Panel B). The threshold X^* is the minimum project cash flow at which exercising the option to invest the fixed outlay $I = 10$ becomes optimal; a *lower* X^* therefore signals a greater willingness to fund less-proven ventures. All parameter values and their sources are reported in Table IA1 (Appendix IA1.2).

pensation. 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 IA1.3 to IA1.6.

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 by 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 Eligibility Requirements

3.1.1 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 IA10 lists all QSBS-eligible sectors.

3.1.2 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]

[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

3.2 Tax Treatment of Startup Investments

3.2.1 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.[12]

3.2.2 VC Organizational Structure and Tax Pass-Through

VC firms are organized as limited partnerships, which are pass-through entities for tax purposes under Subchapter K of the Internal Revenue Code.[13] The partnership itself pays no entity-level tax; gains and losses flow through to both LPs (fund investors) and GPs (fund managers) according to their respective economic interests. Upon a portfolio company exit, proceeds are distributed pre-tax according to the partnership agreement, and each partner separately reports its allocable share of gain on its own return. The tax character of each gain — including its eligibility as QSBS under IRC §1202 — is preserved through the partnership and inherits at the partner level.[14]

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" (usually ranging from 0% to 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

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] 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.

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

[14] IRC §702(b) preserves tax character through pass-through entities, and §1202(g) extends this principle to QSBS held by partnerships, providing that a partner's distributive share of partnership gain on QSBS retains its §1202 character at the partner level. See Viswanathan (2020); Polsky and Yale (2023) for the technical mechanism of preservation.

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.[15]

It is important to highlight the economic split between LPs and GPs (80%/20%) and the tax pass-through concept. The GP's carried interest passes through the partnership and is reported on the GP's individual return as a capital gain.[16] When the underlying portfolio company is QSBS-qualifying, that gain retains its QSBS character as it flows through, and the GP's distributive share qualifies for the §1202 exclusion. The GP's federal capital-gains tax on the carry then falls from the prevailing rate (23.8% since 2018) to zero under the full exclusion enacted by the 2010 SBJA, up to the per-issuer exclusion cap.[17] Because carried interest is granted as compensation rather than purchased stock, its tax basis is near zero, so for the carry that cap reduces to the flat $10 million amount, applied separately to each GP. A fund's carry on an issuer is therefore sheltered across its several GPs' caps — four or five at the typical fund — so the limit rarely binds.[18] Appendix IA2 quantifies the resulting GP-level benefit across a range of partner counts and fund ownership stakes — for the typical qualifying exit, the federal exemption alone raises the GP's after-tax take-home on the carry by approximately 31%. Because Subchapter K of the IRC taxes each partner's share separately, this GP-level rate reduction is independent of LP tax status: it lands on the GP whether the fund's LPs are individuals, tax-exempt institutions, or corporations — and is the channel through which QSBS reaches the GP's marginal incentive.

Each LP's tax treatment depends on the LP's status. Individual LPs (high-net-worth individuals) can qualify for QSBS benefits on eligible investments under the same SBJA mechanics as direct angel investors — up to a 100% federal capital-gains exclusion on five-year-held qualifying stock, subject to the per-issuer cap. Tax-exempt LPs — including pension funds, endowments, and foundations — do not pay taxes on their investment gains regardless of QSBS status, so QSBS provides no direct subsidy

[15] 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.

[16] When the GP itself is structured as a legal entity (e.g., an LLC, S corporation, or management company), that entity is itself a pass-through, so QSBS character continues to flow to the underlying individual partners.

[17] The GP's management fee is taxed as ordinary income and is therefore ineligible for QSBS treatment.

[18] §1202(g) conditions eligibility only on holding a partnership interest when the partnership acquired the stock, and does not distinguish capital interests from profits interests — so a GP's carried interest qualifies despite arising from a profits interest rather than purchased stock.

at the LP level. Such tax-exempt institutions supply the dominant share of capital committed to VC funds (Ivashina and Lerner (2019)). Corporate LPs are ineligible for QSBS benefits and remain subject to corporate income tax on their fund returns. Table IA11 summarizes the tax treatment of each party.

3.3 The 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 gains 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%.[19] 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.[20]

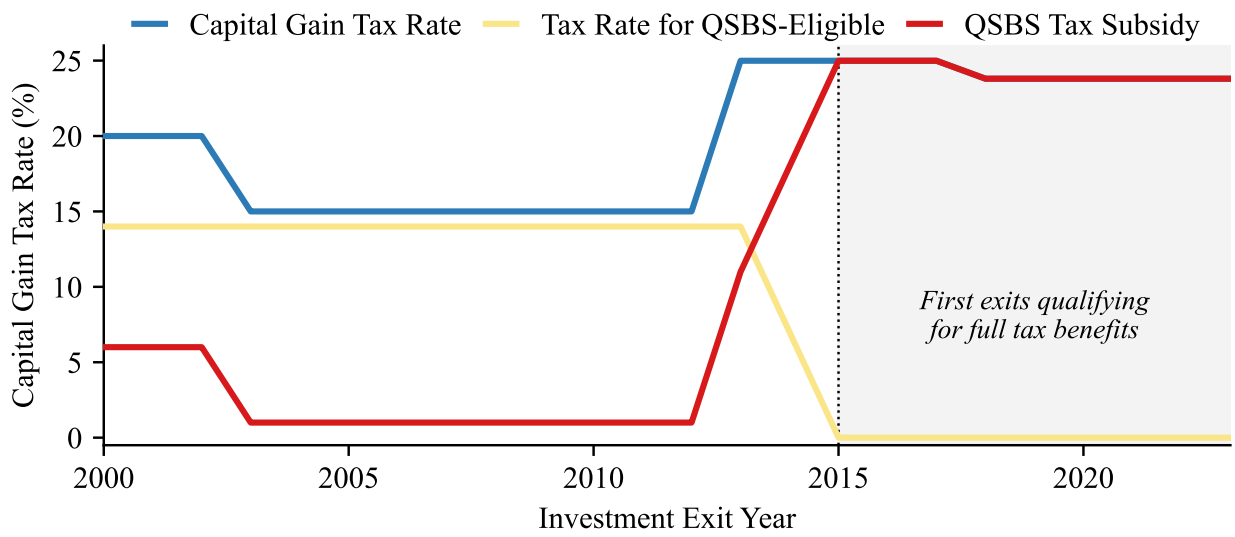
A series of reforms later revitalized the program. First, the American Recovery and Reinvestment Act (ARRA) of 2009 changed it to a model where only 25% of investment gains would be subject to taxes at the 28% capital gains tax rate. The 75% exclusion only applied to qualified stock acquired after February 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 IA9, 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 drastically expanding 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, 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 a direct investor's tax liabilities across different investment periods and jurisdictions, see Appendix IA3.

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

[20] Capital gains 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.

3.4 State-Level Compliance

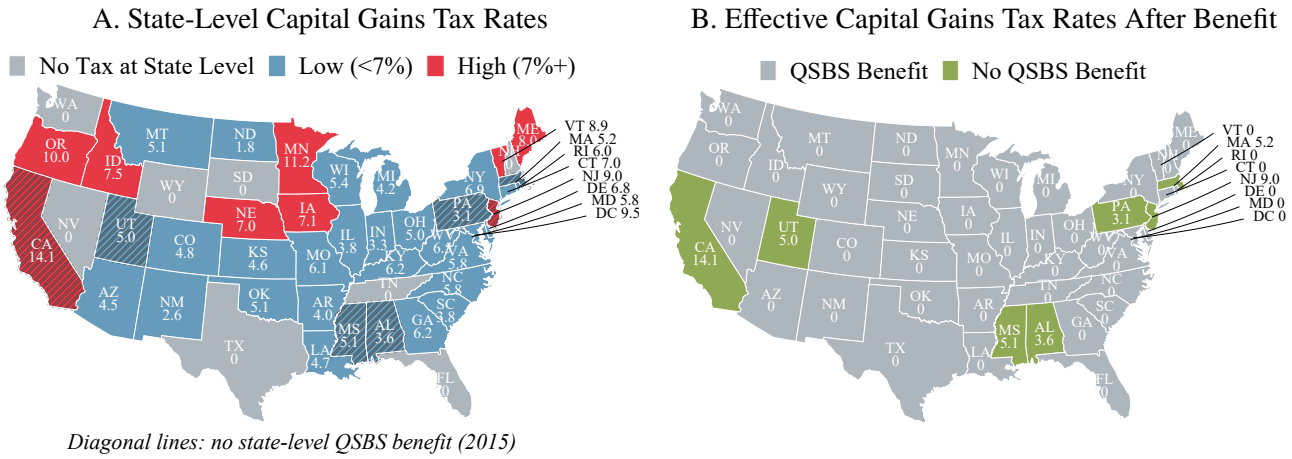
The economic value of the QSBS benefits varies across states through two channels: state-level capital gains tax rates and state conformity with federal QSBS treatment. As shown in Panel A of Figure 3, state capital gains tax rates in 2015 — the first year when both the 2009 ARRA and 2010 SBJA exclusions became effective due to the five-year holding requirement — ranged from 0% to 14.1%. Nine states have no state capital gains tax,[21] making state-level QSBS provisions irrelevant for their residents, while eleven states have a capital gains tax rate above 7%.

As Panel B of Figure 3 and Table IA9 show, most states conform with federal QSBS tax rules. This means that they provide corresponding state-level capital gains tax exemptions for qualifying investments. For example, when the federal government offers a 100% capital gains tax exclusion for qualified investments, conforming states like New York and Virginia also exempt 100% of those gains from state taxes.[22] Three states have consistently opted out of offering QSBS benefits: Pennsylvania,

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

[22] 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 gains tax rate in 2008, provided a 1.5% benefit for eligible investments exited in 2008.

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



This figure displays state-level capital gains percentage (%) 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.

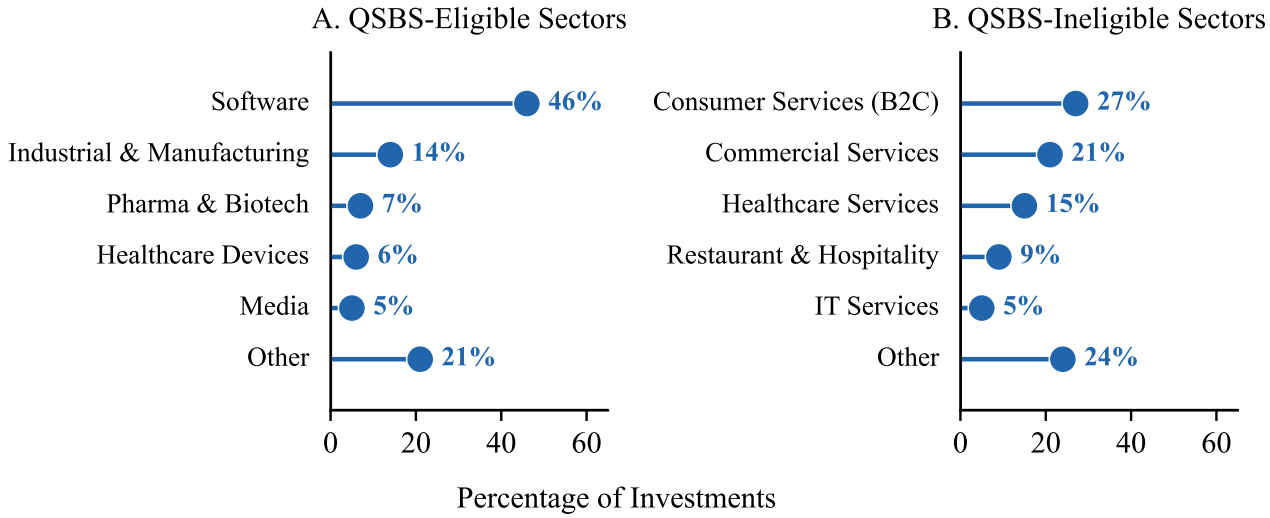
Mississippi, and Alabama. California initially provided QSBS benefits but eliminated it in 2013.[23] QSBS-eligible investments in these non-conforming states are subject to full state capital gains taxes. Utah, Massachusetts, and New Jersey adopted conformity in 2016, 2022, and 2025 respectively.

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, 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

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

Figure 4: Investment Composition by Industry Sector



This figure shows the distribution of investment counts across QSBS-eligible and ineligible sectors for investment entry from 2004 to 2017. 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 QSBS benefits. Data are from PitchBook.

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.[24] 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.[25]

4.1 Investor and Industry Composition

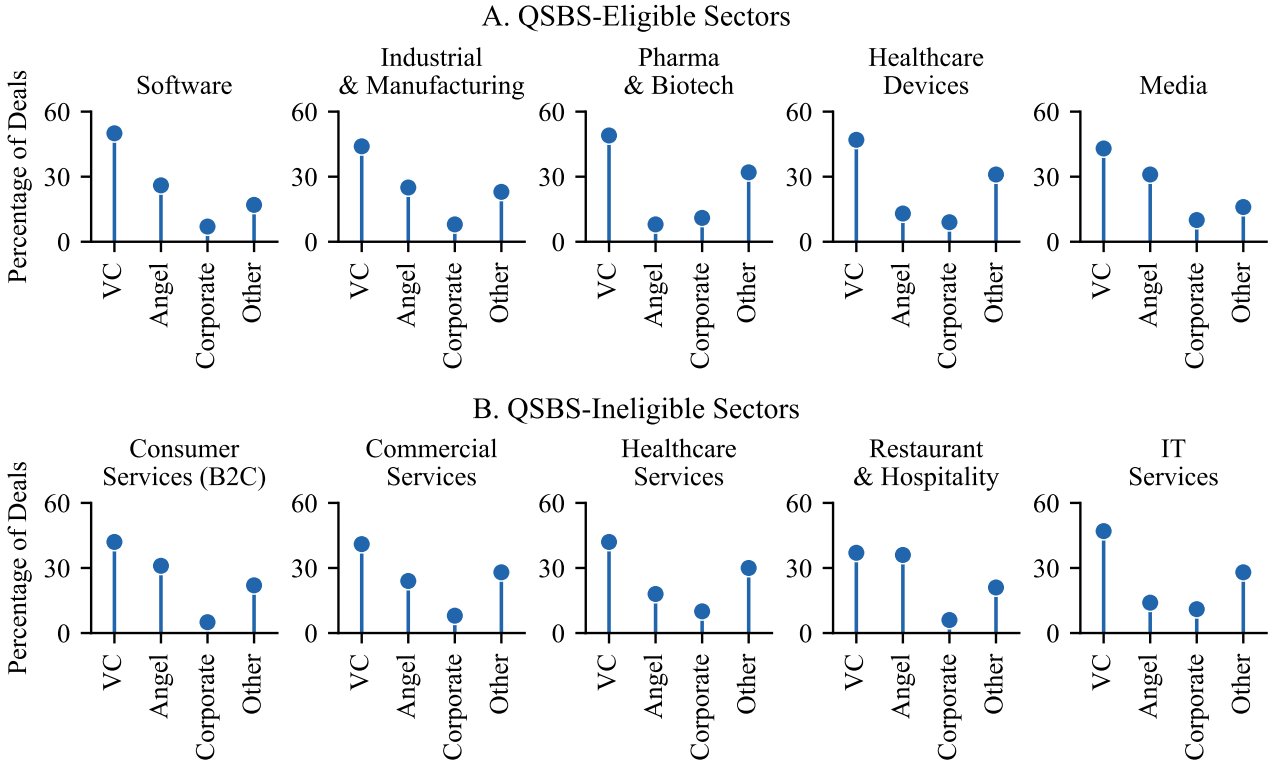
The composition of investors in our sample reveals the central role of VC in early-stage finance. VC firms account for 47% of the count of investments in our sample. Angel investors represent 23%, while corporations participate in 8%. Combined, other investors (including primarily accelerators, growth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

Software companies dominate our sample of eligible investor–firm pairings, accounting for 46%

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

[25] 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 5: Distribution of Investor Types by Industry



This figure shows the percentage distribution of investor types across different industries for investment entry from 2004 to 2017. Panel A displays QSBS-eligible sectors, while Panel B shows ineligible sectors. Data are from PitchBook.

of investments, as shown in Panel A of Figure 4. Within software, business and productivity software represents the most prominent component, followed by application software and social platform software. Industrial and manufacturing firms represent the second-largest category at 14%, followed by pharmaceuticals and biotechnology (7%), healthcare devices (6%), and information and media (5%), with other eligible sectors accounting for the remaining 21%. Among ineligible sectors shown in Panel B, consumer services represent 27% of investor–firm pairings. Commercial services (21%), healthcare services (15%), restaurant and hospitality (9%), and IT services (5%) make up most of the remaining ineligible activity, with banking, insurance, and other financial-heavy sectors grouped as "other" (24%).

Our test strategy implies that investor composition is not systematically different between QSBS-eligible and ineligible sectors, which could otherwise confound the effects of tax policy changes. Supporting our assumption, Figure 5 shows that investor type distributions are comparable across differ-

ent 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). 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.[26]

Second, we analyze capital structure via a "debt" indicator for outstanding debt at the time of investment, proxied by an indicator equal to one if the portfolio company has outstanding private debt or raised debt — e.g., term loans, revolving credit facilities, bridge loans, or venture debt — during the financing year or the prior year.[27] Such 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 startups through a "different state" indicator, equal to one if the investor and firm are headquartered in different states. Geographic distance increases information asymmetries between investors and entrepreneurs while reducing the

[26] 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)).

[27] Instruments that lack fixed payment obligations and are designed to convert into equity are not included in this analysis.

level of investor oversight (Lerner (1995); Bernstein et al. (2016)), hence 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. We also measure syndication directly as the continuous number of investors in the round. 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)).

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 initial set identifies investment distress through two measures. First, we track complete business failure through an indicator variable "out of business" based on PitchBook's designation for firms that cease operations. Second, we capture severe funding droughts through "five years without funding," an indicator that equals one when firms go five or more years without raising new capital.[28]

[28] 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.

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. These measures rely on valuations as recorded in PitchBook at the company–year level; we do not impute missing ones, so the valuation and unicorn tests are estimated on the subsample of investor–firm–years with an observed valuation. As a robustness check, we also construct an alternative valuation measure by linearly interpolating valuations between observed financing events.

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.[29]

Table IA12 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.

[29] 6,292 (17.8%) portfolio companies in our sample go out of business while just 876 (2.5% of the total) achieve unicorn status. 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 Investor Timing 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 analyze bunching behavior at the five-year holding period required for tax subsidy qualification.

5.1 Bunching Approach

The mandatory five-year holding period for QSBS qualification creates a kink in the net-of-tax return to holding — 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, liquidity, 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.[30] 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.

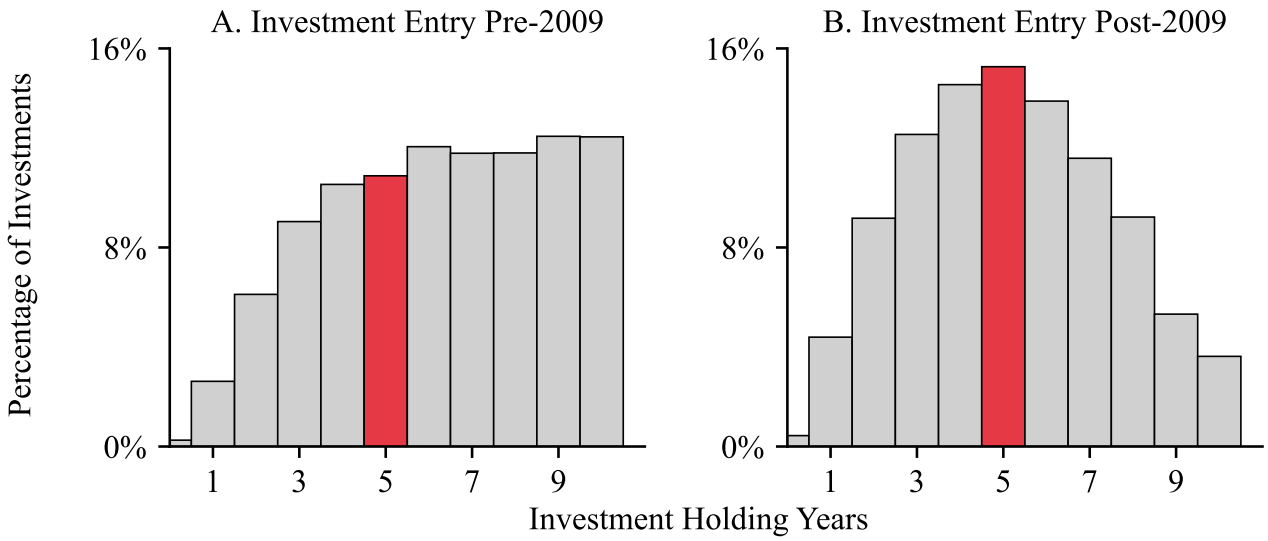
5.1.1 Bunching at the Holding Period Threshold

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 IA4. Our bunching analysis focuses on VC and angel investments made within two years before and after the QSBS policy change (i.e., between 2007 and 2010), with holding periods tracked up to ten years following initial investment.[31] We employ three complementary estimation approaches: (1) a standard trapezoidal approximation for point identification; (2) bootstrapped confi-

[30] 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)).

[31] 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 6: Distribution of Holding Periods of Investments Around the QSBS Reform



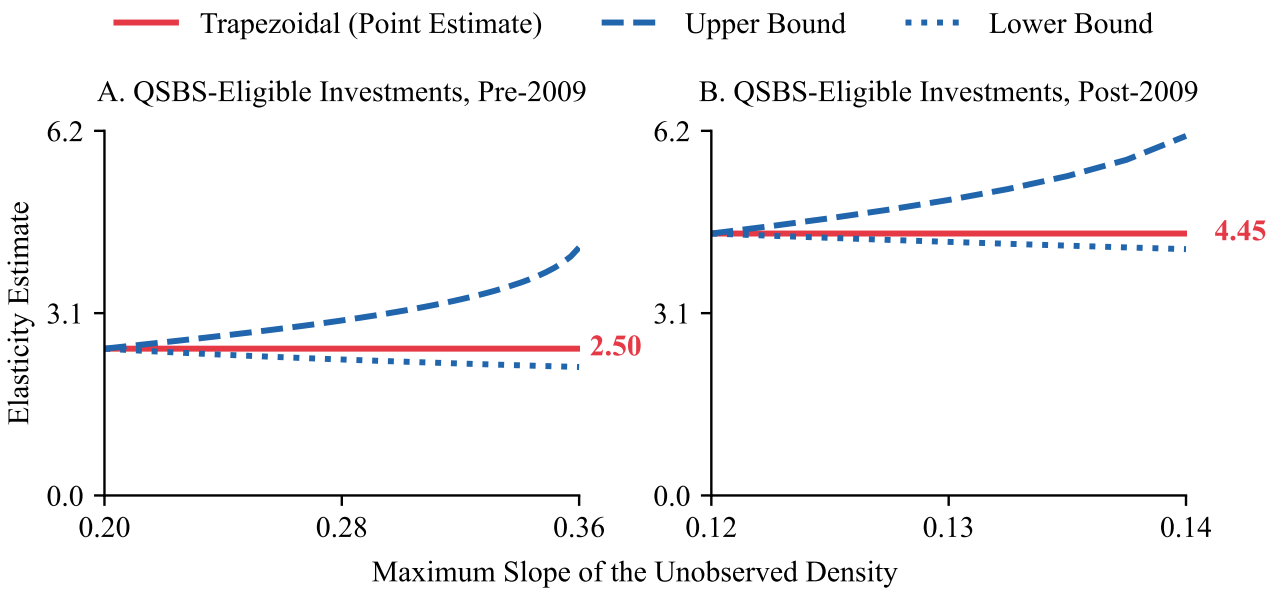
This figure shows the distribution of holding periods in QSBS-eligible sectors. Panel A displays pre-2009 investments, while Panel B displays investments with entry year 2009 or later. The sample includes investments from 2004 to 2017 in C-corporations operating in QSBS-eligible sectors, restricted to investments achieving an exit. Data are from PitchBook.

dence 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.

The statistical significance of these patterns is confirmed in Table IA13. 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

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 gains tax subsidy of 20%. Data are from PitchBook.

Table IA13 includes two additional comparison groups: ineligible sectors before the reform (elasticity of 1.72) and ineligible sectors after the reform (elasticity of 0.79), 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.[32]

Table 2 presents results. Panel A compares eligible sectors before and after the reform. Column (1) shows a statistically significant excess elasticity of 2.0, 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.

Beyond the holding-period margin, QSBS eligibility also turns on a sharp $50 million gross-asset cutoff. Notably, we find no evidence that investors and firms manipulate deal sizes around it, and we exploit the resulting discontinuity in a regression-discontinuity design showing that eligible firms just below the threshold attract substantially more follow-on funding than those just above. For sake of brevity, we chose to discuss these capital-allocation tests in Appendix IA5.

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

6 Main Empirical Tests

Our main empirical analysis proceeds in two steps. First, we examine whether and how investors alter their investment selection decisions as a function of tax subsidies. 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 investing behavior. We do so looking at deal characteristics at the time of initial investment using the following linear model:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Post-2009}\}_{i,f}] \\ &+ \beta_2 \cdot \mathbb{1}\{\text{Eligible Sector}\}_f + \beta_3 \cdot \mathbb{1}\{\text{Post-2009}\}_{i,f} \\ &+ \alpha_{i,j} + \gamma_{j,t} + \delta_{s_i,t} + \theta_{j,s_f} + \epsilon_{i,f,t} \end{aligned} \tag{19}$$

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-à-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, including tax regimes. 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 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-differences 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:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \beta_2 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t}] \\ &+ \beta_3 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \beta_4 \cdot [\mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \beta_5 \cdot \mathbb{1}\{\text{Eligible Sector}\}_f + \beta_6 \cdot \mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f,t} + \beta_7 \cdot \mathbb{1}\{\text{Entry Post-2009}\}_{i,f} \\ &+ \alpha_{i,f} + \delta_t + \theta_h + \epsilon_{i,f,t} \end{aligned} \tag{20}$$

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 a 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 from 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 innate 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)).

One natural concern with our triple-differences test is that holding periods can be manipulated — investors may strategically extend holdings to qualify for tax benefits, potentially confounding estimated treatment effects. To address this, in subsequent tests we replace *actual holding* periods with *predicted holding* periods that are estimated using only pre-2009 investment characteristics; that is, before the QSBS enhancement made strategic holding behavior tax-motivated.

Finally, 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 3 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), Panels B through D, 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 3 ABOUT HERE

Tax subsidies also prompt VCs to fund companies with greater financial risk. Column (2) in Panel B shows that after 2009 VCs nearly double their propensity to invest in QSBS-eligible firms with pre-existing debt. Debt increases firm sensitivity to market conditions — especially among early-stage firms with limited cash flows — and introduces fixed payment obligations that can potentially constrain future investment flexibility. Angel and corporate investors show no statistically significant shifts in their propensity to back debt-carrying portfolio companies.

As discussed before, geographic distance serves as another proxy for risk-taking. 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.

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.[33] Specifically, VCs become 8% more likely to invest in these 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 60% 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). This pattern is robust to measuring syndication as the continuous number of co-

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

investors per round (Table IA14): VCs reduce the number of co-investors by 17% — an effect of similar magnitude and significance under a Poisson count specification, and one that is absent among angel- and corporate-backed rounds. 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.

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 IA15 demonstrates robustness across several alternative fixed effects structures, ranging from simple additive controls (e.g., investor and industry) to models with three-way interactions (e.g., industry $\times$ year $\times$ investor state), including city-level geographic variation. Table IA16 further confirms stability across clustering schemes, including single clustering (e.g., investor, company, interactions with industry and year), and two-way clustering (e.g., investor and company, investor $\times$ 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 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' 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 IA10 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-differences 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 4 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-differences estimate thus represents the incremental increase in failure probability of VC-backed ventures specifically attributable to QSBS tax qualification beyond these underlying differences.

PLACE TABLE 4 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)), so that 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 IA17).[34]

We further confirm that the angel null reflects genuine insensitivity rather than VC–angel crowding-out. The concern is that, in a two-sided matching market (Sørensen (2007)), VCs drawn to

[34] Failure results are also stable under logit and probit models (see Columns (1) and (2) in Table IA18).

newly attractive QSBS-eligible deals displace angels into a selected, less responsive residual sample — a spillover that can confound standard difference-in-differences comparisons (Berg et al. (2021)). Restricting to local markets where VC penetration is too low for such displacement to occur, the angel triple-difference remains statistically null while VCs continue to respond (Table IA19).

8.2 Valuation

We next examine how tax benefits affect firm valuations. Panel A of Table 5 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. These valuation results are robust to using linearly interpolated valuation measures, with qualitatively similar patterns across investor types and economically comparable magnitudes (see Table IA20).

PLACE TABLE 5 ABOUT HERE

Panel B of Table 5 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 nearly four times as likely among investments that achieve an exit. Table IA21 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 decreasing probability of achieving unicorn status, though this negative effect becomes statistically insignificant among exits. Corporate investments, reported in Columns (7) and (8), show no statistically significant effects on unicorn probability in either specification.[35]

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

[35] Unicorn results are stable under logit and probit models (see Columns (3) and (4) in Table IA18).

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 IA22).

8.3 Within-Vertical Comparisons: A 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-differences 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 eligibility 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 combines 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

[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.

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 6 presents results from our baseline triple-differences 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 6 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. That the response emerges among eligible firms with limited cloud computing exposure — for example, within FoodTech, food manufacturers rather than online delivery platforms — also corroborates that our results are distinct from the "spray-and-pray" shift in VC investing that followed the emergence of Amazon Web Services (AWS), which lowered experimentation costs only for businesses with a strong online presence (Ewens et al. (2018)).[37]

[37]The defining features of spray-and-pray investing — small initial checks, light governance, and quick abandonment after the first round — do not describe our setting. To wit, our estimates are identified from eligible, post-2009 investments held five or more years, and eligible-sector VC contracts do not become lighter after the reform — if anything, they carry more downside protection (see Table IA23). The timing is also inconsistent: AWS dates to early 2006, three years before the QSBS reform, yet the dynamic estimates in Figure IA10 show no differential movement in eligible sectors over 2006–2008.

We extend this analysis by constructing matched samples that compare eligible and ineligible firms within all verticals in our sample, which 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 1,331 strata and retaining 295,687 observations (79% retention). Table 7 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 7 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 4. 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: Firms Founded Pre-2009

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.[38] 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, some 12 thousand were founded before 2009. 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 8 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 IA24 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.

PLACE TABLE 8 ABOUT HERE

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. A magnitude bound exercise in Appendix IA6 reinforces this conclusion: sizing the marginal pool by the 10% firm-birth response that Chen and Farre-Mensa (2026) document for the QSBS expansion, composition alone

[38] Chen and Farre-Mensa (2026) report an increase in firm births in eligible sectors after 2009; however, they do not look at those firms' risk profile.

could explain our VC effects only if QSBS-induced entrants failed at 22 to 46 times the inframarginal rate and reached unicorn status at 27 to 62 times the inframarginal rate — a multiple that, among exited firms, implies a unicorn probability above one, an impossibility.

8.5 Vehicle versus Investor Selection: Dual-Capacity Investors

A further concern is that our VC-versus-angel contrast reflects *who* becomes a venture capitalist rather than the organizational structure of the VC vehicle itself. If more risk-tolerant or differently skilled individuals select into VC while more conservative individuals invest as angels, the divergent responses we document could stem from investor selection rather than from the convex, carried-interest incentives at the center of our framework. We address this concern by exploiting investors who appear in our sample in *both* capacities — as venture capitalists *and* as personal angel investors. We identify 1,187 such "dual-capacity" individuals.[39] For these investors, we re-estimate our baseline triple-difference (Equation (20)) *separately* on their VC-vehicle deals and their personal angel deals.

Table IA25 reports the failure measures. Because the VC and angel columns are drawn from the same population of dual-capacity investors, any difference between them reflects the investment vehicle rather than the kind of person who invests through it; the investor × firm fixed effects absorb, within each column, every trait that is constant within an investor–company pair. The split is sharp. As VCs, these individuals' QSBS-eligible investments held five or more years become more likely to go out of business — an effect that is imprecise across all firms (+0.004) but, among those that reach a terminal outcome, amounts to a 97% increase (+0.034 relative to a mean of 0.035) — and 198% more likely to endure five-year funding droughts, an effect that remains positive and significant among exits. As angels, the *same* investors show no significant effect on either measure in either sample; their full-sample out-of-business coefficient even runs *negative*.

Table IA26 shows that, as VCs, these individuals' tax-qualifying investments are far more likely to reach unicorn status — more than three times as likely across all firms, rising to more than four times among those that exit — and attain higher valuations, an 88% gain relative to the mean across

[39] We match each uniquely named personal-angel entity in PitchBook to an individual holding a primary VC affiliation or a senior decision-making title at a VC firm, linking the two by standardized name, and keeping unambiguous matches. Prominent examples include Marc Andreessen, Reid Hoffman, and Peter Thiel.

all firms (approximately $161 million), with a comparable but statistically insignificant point estimate among exits. As angels, the same investors capture no such premium and, if anything, move in the *opposite* direction: their valuations are negative throughout — significantly so among exits, lower by $445 million — while their unicorn coefficients are indistinguishable from zero. Read across the two tables, the VC vehicle generates both more write-offs *and* more home runs, whereas the angel vehicle generates neither. These results corroborate the interpretation that tax-induced risk-taking is driven by the VC organizational structure rather than investor identity or skill, and they mirror the fat-tailed, variance-increasing pattern of our main estimates.

8.6 Endogenous Holding Periods: Predicted Holding Analysis

As discussed above, one concern with our prior test is that holding periods are manipulable — investors may strategically extend holdings to qualify for tax benefits. To address this, in this section we replace actual holding periods with predicted holding periods estimated using only pre-2009 investment characteristics. To do so, we first estimate a prediction model on pre-2009 investments:

$$\mathbb{1}\{\text{Holding Years} \geq 5\}_{i,f} = \gamma_0 + \mathbf{X}'_{i,f}\boldsymbol{\gamma} + \nu_{i,f} \tag{21}$$

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.[40] 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:

$$\begin{aligned} Y_{i,f,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_f \times \mathbb{1}\{\widehat{\text{Holding Years}} \geq 5\}_{i,f} \times \mathbb{1}\{\text{Entry Post-2009}\}_{i,f}] \\ &+ \text{two-way interactions} + \text{constituent terms} + \alpha_i + \phi_f + \delta_t + \epsilon_{i,f,t} \end{aligned} \tag{22}$$

[40] 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.

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.

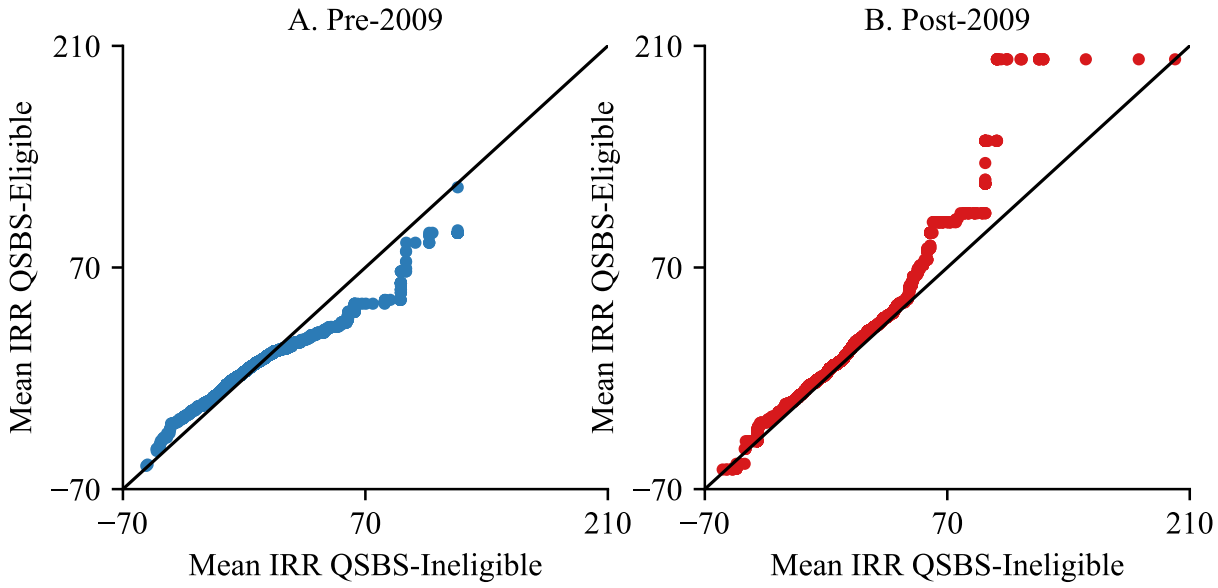
Table IA27 presents results. The VC-specific patterns from our main specification persist: Column (2) of Panel A shows that VCs exhibit a statistically significant increase in portfolio company failure rates when predicted holding interacts with QSBS eligibility post-2009, while angel and corporate investors 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 4), 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 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.

8.7 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 × holding period ≥ 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 8 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

Figure 8: 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.

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 more 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 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 study 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 gains tax rate in California ranged from 11.2% to 14.1% between 2009 and 2012. Nevertheless, California suddenly eliminated its QSBS exclusion in 2013 after a court ruling that made any investment ineligible to state-level QSBS benefits (maintaining only federal-level benefits available).

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

PLACE TABLE 9 ABOUT HERE

We extend our heterogeneity analysis to a broader setting by examining all states that comply with the QSBS program, comparing states with *low* capital gains tax rates to those with *high* rates: under 7% *versus* above 7% state-level tax rate; where 7% is the 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 10 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%

increase 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.

PLACE TABLE 10 ABOUT HERE

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 command higher carried interest fees (Robinson and Sensoy (2013); Gompers and Lerner (1999)), which according to our conceptual framework should 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 IA28 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 four key channels. First, they main-

tain 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)).[41] 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. Fourth, sophisticated LPs are substantially more diversified across alternative-asset classes than less sophisticated LPs.[42] This diversification positions them to capture the idiosyncratic-risk premium that GPs' concentrated, undiversifiable stakes generate in equilibrium VC returns (Ewens et al. 2013). QSBS amplifies this channel at the GP's tax-incentive margin by raising the after-tax payoff to high-variance bets.

University endowments of elite private institutions represent the most sophisticated LPs in the VC ecosystem. They are by far the best-performing LPs (Lerner et al. (2007)), with Yale achieving 77% annual returns from its VC investments over the last two decades (Ivashina and Lerner (2019)). These institutions combine long-term investment horizons, professional management capabilities, and substantial risk tolerance. 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)).[43]

[41] 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)).

[42] Dimmock et al. (2024) document that allocations to alternative assets — including VC — increase monotonically with endowment size: the smallest (largest) decile of endowments holds an average of 1.1 (86.5) alternative-asset funds.

[43] 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 subse-

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.[44] 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 affect 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 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 sophistication fractions across all active funds, defined as funds within ten years of their vintage year. We test whether VC firms with higher fractions of sophisticated LPs exhibit stronger risk-taking responses to tax subsidies (proxied by portfolio company failure rates) by interacting these measures with the tax treatment indicators in our baseline specifications. We analyze pre- and post-2009 investments separately.

Table 11 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 com-

quently changed its investment benchmarks to reduce Chinese exposure from 67% to 50% of emerging market investments.

[44] 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)).

pany 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 11 ABOUT HERE

10 Cross-Sectoral Effects and Innovation Outcomes

We conclude our study by examining whether tax subsidies change how startup capital is allocated *across* and *within* industries, and whether these shifts translate into measurable innovation output. First, we examine whether subsidies create cross-sectoral capital allocation effects. Second, we analyze reallocation toward more innovative industries, even *within* QSBS-eligible sectors. Third, we test whether tax-subsidized ventures produce different patenting outcomes in terms of both quantity and quality.

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 question 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. We can, nonetheless, 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.

We estimate the same triple-differences specification used in our investment performance analysis (Equation (20)), with paid-in capital (in billions of dollars) as the dependent variable. Results in Table 12 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 (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 size (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.[45]

PLACE TABLE 12 ABOUT HERE

[45]Consistent with this interpretation, we find no differential capital call patterns between eligible and ineligible sectors at the time of initial investment selection using a difference-in-differences approach with the same specification as our investment selection analysis (untabulated). This specification includes investor fixed effects, entry year fixed effects, and state $\times$ industry fixed effects, with standard errors clustered at the investor level.

10.2 Innovation Targeting

We also 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.[46] 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.[47] 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 Internet 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:

$$\begin{aligned}\theta_{i,s,t} =& \beta_0 + \beta_1 \cdot [\mathbb{1}\{\text{Eligible Sector}\}_s \times \mathbb{1}\{\text{Post-2009}\}_t] \\ &+ \beta_2 \cdot \mathbb{1}\{\text{Eligible Sector}\}_s + \beta_3 \cdot \mathbb{1}\{\text{Post-2009}\}_t \\ &+ \alpha_i + \epsilon_{i,s,t}\end{aligned} \tag{23}$$

where $\theta_{i,s,t}$ 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) 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 13 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

[46] 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)).

[47] 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.

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 QSBS-eligible sectors while reducing innovation-intensive investments elsewhere. Panel B shows that angel investors, in contrast, exhibit no significant change in innovation targeting, with interaction coefficients that are statistically indistinguishable from zero.

PLACE TABLE 13 ABOUT HERE

10.3 Innovation Outcomes

Our analysis of innovation targeting documents that VCs redirect their most innovative investments toward QSBS-eligible sectors. We now ask whether this reallocation translates into measurable innovation output — specifically, whether tax-subsidized VC-backed ventures produce different patenting outcomes. We estimate the same triple-differences specification used in our investment performance analysis (Equation (20)), with patent-based innovation measures as the dependent variable.

We construct patent outcomes by matching PitchBook portfolio companies to USPTO patent records. Using the universe of disambiguated USPTO assignees, we implement a two-stage matching procedure: exact matching on standardized company names (including legal names, trade names, and former names), followed by fuzzy matching using token-sort similarity with state-level blocking for unmatched firms. Matches are validated using geographic proximity and founding-year plausibility, retaining only high-confidence matches (adjusted score ≥ 95). We then build an assignee–year panel from USPTO data, tracking annual patent grants and forward citations received within five years of grant.

We examine two complementary innovation measures. First, we track whether portfolio companies receive any patent grant in a given year through a "patent issue" indicator, capturing the extensive margin of innovation output. Second, conditional on patenting, we measure "citation-weighted patents" — patents granted weighted by their forward citation count within five years — capturing the quality and scientific impact of innovation (Hall et al. (2005); Lerner et al. (2011)).

Table 14 presents results. Column (1) shows that when VC investments qualify for tax benefits, portfolio companies become 16% *less* likely to receive a patent grant in a given year (−0.022 relative to a mean of 0.140). This reduction in the extensive margin of patenting is consistent with VCs' shift toward pre-commercial stage ventures documented in Section 7 — firms at earlier development phases that are less likely to have reached the patenting stage — and parallels the higher failure rates reported in Section 8. Angel-backed investments show no comparable decline (Column 2).

PLACE TABLE 14 ABOUT HERE

Nonetheless, the quality dimension tells a strikingly different story. Column (3) reveals that among VC-backed firms that do patent, tax-qualifying investments produce patents with dramatically *higher* citation impact — an increase of 65 citation-weighted patents, representing a 196% gain relative to the sample mean (33.5). This mirrors the unicorn result: just as tax-subsidized VC investments are more likely to achieve exceptional valuations, the ventures that succeed in patenting produce disproportionately impactful innovation. Angel-backed investments show no change in citation-weighted patents.

Taken together, these patterns suggest that the variance-increasing dynamics we document for financial outcomes extend to real innovation output — tax subsidies induce VCs to fund ventures that fail more often but generate breakthrough patents when they succeed. The concentration of these effects exclusively among VCs reinforces that investor organizational structure and incentives shape how tax policy transmits to innovation. To the extent that breakthrough patents generate knowledge spillovers whose social returns exceed private returns (Bloom et al. (2013)), these results point to a channel through which tax subsidies to VC investment may shape the broader innovation process — not only by redirecting capital toward innovative sectors, but by altering the *nature* of the innovations that eventually emerge.

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 in the United States: the QSBS program. Our analysis yields several findings. First, tax subsidies significantly shape VC investments in startup companies. When and where tax subsidies become available, VCs strategically shift toward riskier ventures: they

become more likely to invest 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 startup 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 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 picture. 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. The resulting increase in return dispersion favors well-diversified investors, and the concentration of higher-impact patents among tax-subsidized ventures suggests that the additional risk-taking may generate innovation spillovers beyond the private returns captured by investors and portfolio companies.

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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 investor–portfolio company 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	Observations 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 the 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: 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***	0.023***	0.023	0.054***	0.004	−0.048***
	(2.76)	(3.13)	(1.43)	(2.95)	(0.53)	(−3.15)
Observations	113,103	113,103	103,804	47,585	113,103	113,103
Adjusted R^2	0.10	0.13	0.44	0.47	0.29	0.29
Mean Dependent Variable	0.038	0.018	0.506	0.669	0.064	0.463
Panel B: Venture Capital						
𝟙{Eligible} × 𝟙{Post}	0.025***	0.023**	0.043*	0.048*	0.018**	−0.073***
	(3.47)	(2.28)	(1.91)	(1.88)	(2.57)	(−3.49)
Observations	55,626	55,626	51,238	25,990	55,626	55,626
Adjusted R^2	0.09	0.17	0.42	0.46	0.06	0.21
Mean Dependent Variable	0.031	0.025	0.469	0.628	0.030	0.455
Panel C: Angel						
𝟙{Eligible} × 𝟙{Post}	0.003	−0.007	−0.033	0.046	0.008	0.013
	(0.24)	(−0.39)	(−0.77)	(0.69)	(0.36)	(0.23)
Observations	23,132	23,132	21,817	5,979	23,132	23,132
Adjusted R^2	0.07	0.00	0.44	0.27	0.06	0.24
Mean Dependent Variable	0.024	0.011	0.443	0.857	0.029	0.711
Panel D: Corporate						
𝟙{Eligible} × 𝟙{Post}	−0.020	0.044	−0.072	0.123	−0.004	0.002
	(−0.87)	(0.95)	(−1.00)	(1.64)	(−0.15)	(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	0.017	0.620	0.653	0.088	0.337
Investor × Industry FE	✓	✓	✓	✓	✓	✓
Industry × Year FE	✓	✓	✓	✓	✓	✓
Investor State × 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) Has debt, an indicator equal to one if the firm has outstanding private debt or raised debt (excluding convertibles and SAFEs) in the financing year or prior year; (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 any form of debt (including private debt) at the time of the initial investment; and (6) Multi-Investor, with an indicator for deals with five or more investors (above the sample median). 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 are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 4: 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 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. 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 5: Impact of QSBS Tax Benefits on Portfolio Company Valuations: Triple-Difference Regressions

	All Investors		VCs		Angels		Corporates	
	All Firms (1)	Exited (2)	All Firms (3)	Exited (4)	All Firms (5)	Exited (6)	All Firms (7)	Exited (8)
Panel A: Dependent Variable = Valuation ($ billions)								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.001	0.052	0.072	0.243**	−0.209***	−0.399***	−0.013	−0.101
	(−0.04)	(0.79)	(1.52)	(2.39)	(−3.93)	(−3.41)	(−0.12)	(−0.46)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.101***	−0.277***	−0.176***	−0.416***	0.131***	0.046	−0.149	−0.085
	(−3.67)	(−4.72)	(−4.21)	(−4.62)	(2.62)	(0.44)	(−1.46)	(−0.44)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.117***	0.018	0.033	−0.188*	0.357***	0.459***	0.038	0.090
	(3.92)	(0.28)	(0.72)	(−1.89)	(7.03)	(3.95)	(0.36)	(0.41)
Observations	234,019	108,908	109,866	54,192	66,978	27,946	18,768	9,632
Adjusted R^2	0.36	0.40	0.38	0.41	0.34	0.36	0.39	0.42
Mean Dependent Variable	0.180	0.190	0.181	0.185	0.184	0.192	0.186	0.196
Panel B: Dependent Variable = $\mathbb{1}\{Unicorn\}$								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	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 6: 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 vertical is examined across two columns corresponding to different outcome measures. 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). The 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 7: 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
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., FoodTech includes eligible food manufacturers and ineligible food-delivery platforms). 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 (trimmed 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, portfolio company 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). The 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 8: Impact of QSBS Tax Benefits on Portfolio Company Failure: 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 $= \mathbb{1}\{$*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 9: Heterogeneity of VC Risk-Taking: California Before *versus* After QSBS Subsidy Elimination

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

This table presents a case study of California-based VC investors and the effect of QSBS eligibility changes that occurred in the state in 2013. Before 2013, QSBS investments made by California taxpayers were eligible for a 50% capital gain subsidy at the state level. Starting in 2013, the state-level QSBS subsidy became unavailable for these investments. Column (1) focuses on investments by California-based investors during the QSBS-eligible period (2009–2012 entry years), while Column (2) focuses on investments made by California-based investors after the state eliminated QSBS benefits (2014–2017 entry years). The transition year 2013 is excluded from both periods. In both cases, we compare outcomes to the pre-sample window (2004–2008 entry years). The dependent variable is an indicator for portfolio company closure. $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The sample is at the investor–firm–year level and includes traditional VC firms in California only. Shaded cells highlight the coefficients of primary interest. *t*-statistics based on standard errors clustered at the investor level are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook.

Table 10: Heterogeneity of VC Risk-Taking: Low- *versus* High-Capital Gain Tax Rate States

Dependent Variable:	$\mathbb{1}\{\text{Out of Business}\}$	
State-Level Capital Gains 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 the QSBS exemption over the sample window (entries through 2017, tracked to 2022); as such, it does not include Pennsylvania, New Jersey, Mississippi, Alabama, or Massachusetts (which conformed only in 2022, after the entry window), and includes California only up to the 2012 entry year and Utah only after the 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 11: 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). The sample includes traditional VC firms at the investor–firm–year 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 12: 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 are 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 13: 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 ineligible 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).

Table 14: Tax Subsidies and Innovation Outcomes

Dependent Variable:	𝟙{Patent Issue}		Citation-Weighted Patents	
Investor Type:	VC	Angel	VC	Angel
	(1)	(2)	(3)	(4)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	-0.022^{**}	-0.018	65.486^{**}	0.627
	(-1.98)	(-0.97)	(2.09)	(0.03)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.057^{***}	0.035^{*}	-75.566^{**}	-4.722
	(5.48)	(1.91)	(-2.42)	(-0.25)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.002	0.010	-39.086	16.783
	(0.21)	(0.49)	(-1.29)	(0.72)
Observations	412,453	302,134	50,168	20,247
Adjusted R^2	0.44	0.36	0.37	0.42
Mean Dependent Variable	0.140	0.082	33.489	24.578
Year FE	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓

This table examines how QSBS tax subsidies affect innovation outcomes across investor types. The dependent variable in Columns (1)–(2) is an indicator equal to one if the portfolio company is granted a patent in a given year. The dependent variable in Columns (3)–(4) is citation-weighted patents, calculated as patents granted weighted by their forward citation count within five years. $\mathbb{1}\{\text{Eligible}\}$ 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. Citation-weighted patent regressions are estimated on the subsample of firm-years with at least one patent. 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 USPTO.

Internet Appendix to

"Tax Incentives and Venture Capital Risk-Taking: Evidence from the QSBS Program"

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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:

$$\beta_\pm = \frac{1}{2} - \frac{\mu}{\sigma^2} \pm \sqrt{\left(\frac{1}{2} - \frac{\mu}{\sigma^2}\right)^2 + \frac{2(r+\eta)}{\sigma^2}}. \tag{IA1}$$

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:

$$b_1 = \frac{r - \beta_-\mu + \eta}{(r+\eta)\,\rho\,(\beta_+ - \beta_-)}\, h^{1-\beta_+}, \tag{IA2}$$

$$b_2 = \frac{r - \beta_+\mu + \eta}{(r+\eta)\,\rho\,(\beta_+ - \beta_-)}\, h^{1-\beta_-}. \tag{IA3}$$

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:

$$(1-\tau_K)\gamma\left[b_2(X^*)^{\beta_-} + \frac{X^*}{\rho} - \frac{h}{r+\eta}\right] + \frac{\alpha I}{r+\eta} - I = a\,(X^*)^{\beta_+}, \tag{IA4}$$

$$(1-\tau_K)\gamma\left[b_2\beta_-(X^*)^{\beta_-} + \frac{X^*}{\rho}\right] = a\,\beta_+\,(X^*)^{\beta_+}. \tag{IA5}$$

Solving the smooth-pasting condition for a gives:

$$a\,(X^*)^{\beta_+} = (1-\tau_K)\gamma\left[\frac{b_2\,\beta_-}{\beta_+}\,(X^*)^{\beta_-} + \frac{X^*}{\beta_+\rho}\right]. \tag{IA6}$$

Substituting into the value-matching condition:

$$(1-\tau_K)\gamma\left[\frac{b_2(\beta_+-\beta_-)}{\beta_+}(X^*)^{\beta_-}+\frac{\beta_+-1}{\beta_+\rho}X^*-\frac{h}{r+\eta}\right]+\frac{\alpha I}{r+\eta}-I=0. \tag{IA7}$$

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

$$(1-\tau_K)\gamma\left[\frac{b_2(\beta_+-\beta_-)}{\beta_+}(X^*)^{\beta_-}+\frac{\beta_+-1}{\beta_+\rho}X^*-\frac{h}{r+\eta}\right]+\frac{\alpha I}{r+\eta}-\omega I-(1-\omega)I\varphi=0. \tag{IA8}$$

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:

$$X^*=\frac{\beta_+}{\beta_+-1}\cdot\frac{\rho}{1-\tau_K}\cdot I. \tag{IA9}$$

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 $V'_{A,2}(\bar{X})=V'_{A,3}(\bar{X})$:

$$\bar{X}=\frac{\rho\cdot\frac{r-c}{r}\cdot I\cdot\beta_+}{(1-\tau_K)[1-(1-\delta)\beta_+]+\xi(\beta_+-1)}. \tag{IA10}$$

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

$$X^*=\frac{\beta_+}{\beta_+-1}\cdot\frac{\rho}{\xi}\cdot\frac{r-c}{r}\cdot I. \tag{IA11}$$

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

$$X^*=\frac{\beta_+}{\beta_+-1}\cdot\frac{\rho}{\tilde{\xi}(1-\tau_K)}\cdot\frac{r-c}{r}\cdot I. \tag{IA12}$$

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 Calibration

We calibrate the model to values drawn from the VC and entrepreneurial-finance literature; Table IA1 collects the baseline parameters, their values, and their sources. They fall into three groups. The first governs project dynamics and discounting and is common to all investors: a discount rate $r = 0.07$ and drift $\mu = 0.03$ are standard for risky venture cash flows, the failure intensity $\eta = 1/4$ implies a four-year expected project life (Hall and Woodward (2010)), and the volatility range $\sigma \in [0.05, 0.40]$ spans the annualized idiosyncratic-risk estimates of Ewens et al. (2013); investment size I is a normalization. The second describes the VC compensation contract — a 2% management fee, 20% carried interest, and an 8% hurdle (Metrick and Yasuda (2010)), a 1% GP capital commitment (Robinson and Sensoy (2013)), and a reputation cost $\varphi = 0.54$ that captures the career-pay equivalent of the carry on an average fund, scaled by the stronger fundraising penalty for poor performance (Chung et al. (2012); Harris et al. (2023); Metrick and Yasuda (2010); Barber and Yasuda (2017); Table IA1 lists its four constituent factors). The third describes the angel convertible note: a 7% coupon, a 30% conversion discount ($\delta = 0.70$), and an agency-cost intensity $\tilde{\xi} = 0.30$ reflecting the weak control rights typical of note financing (Loutskina and Chaplinsky (2023); Nanda et al. (2012)). Fees and coupons are stated net of a 37% ordinary-income tax. The robustness of our conclusions to these choices is examined in Appendices IA1.4 and IA1.6.

IA1.3 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.

IA1.4 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

Table IA1: Baseline Model Calibration

Parameter	Symbol	Value	Source / rationale
Panel A: Project dynamics and discounting (all investors)			
Discount rate	r	0.07	Standard for venture cash flows (Cochrane (2005))
Drift rate	μ	0.03	Standard
Failure intensity	η	0.25	Four-year expected project life (Hall and Woodward (2010))
Project volatility	σ	0.05–0.40	Idiosyncratic-risk range (Ewens et al. (2013))
Investment size	I	10	Normalization
Panel B: VC compensation			
Management fee (after tax)	α	0.0126	2% gross fee $\times$ (1 − 0.37)
Carried interest	γ	0.20	Industry standard (Metrick and Yasuda (2010))
Hurdle rate	h	0.08	Metrick and Yasuda (2010)
GP capital commitment	ω	0.01	Median GP stake (Robinson and Sensoy (2013))
Reputation cost	φ	0.54	$= 2.36 \times 0.20 \times 0.35 \times 3.25$, where:
(i) Avg. VC fund MOIC		2.36	Mean multiple of invested capital (Harris et al. (2023))
(ii) Carried interest		0.20	GP profit share, as γ above (Metrick and Yasuda (2010))
(iii) Indirect/direct pay		0.35	Future-fundraising vs. carry incentive (Chung et al. (2012))
(iv) Fundraising convexity		3.25	(2.3−1)/(4.5−4.1), VC hazard ratios (Barber and Yasuda (2017))
Panel C: Angel convertible debt			
Coupon (after tax)	c	0.0441	7% gross coupon $\times$ (1 − 0.37)
Conversion payment	δ	0.70	30% conversion discount (Loutskina and Chaplinsky (2023))
Agency-cost intensity	$\tilde{\xi}$	0.30	Weak control rights (Nanda et al. (2012))

Baseline parameter values for the calibrated model underlying Figure 1. Management fee and angel coupon are net of a 37% ordinary-income tax. Reputation cost factor (iv) measures the convexity of GP fundraising in performance: from the venture follow-on fundraising hazard ratios of Barber and Yasuda (2017) (Table 3: 4.5, 4.1, and 2.3 times the bottom-quartile baseline for top-, second-, and third-quartile funds), the gain from escaping the bottom quartile, 2.3 − 1, is 3.25 times the gain from rising from the second to the top quartile, 4.5 − 4.1 — so avoiding poor performance matters far more than achieving exceptional performance. Alternative calibrations are examined in Appendices IA1.4 and IA1.6.

contribute larger personal investments,[48] zero hurdle rates to capture funds without preferred returns to limited partners,[49] higher reputation costs based on upper-bound estimates from the literature,[50] and extended volatility ranges to encompass a broader spectrum of startup risk profiles.[51]

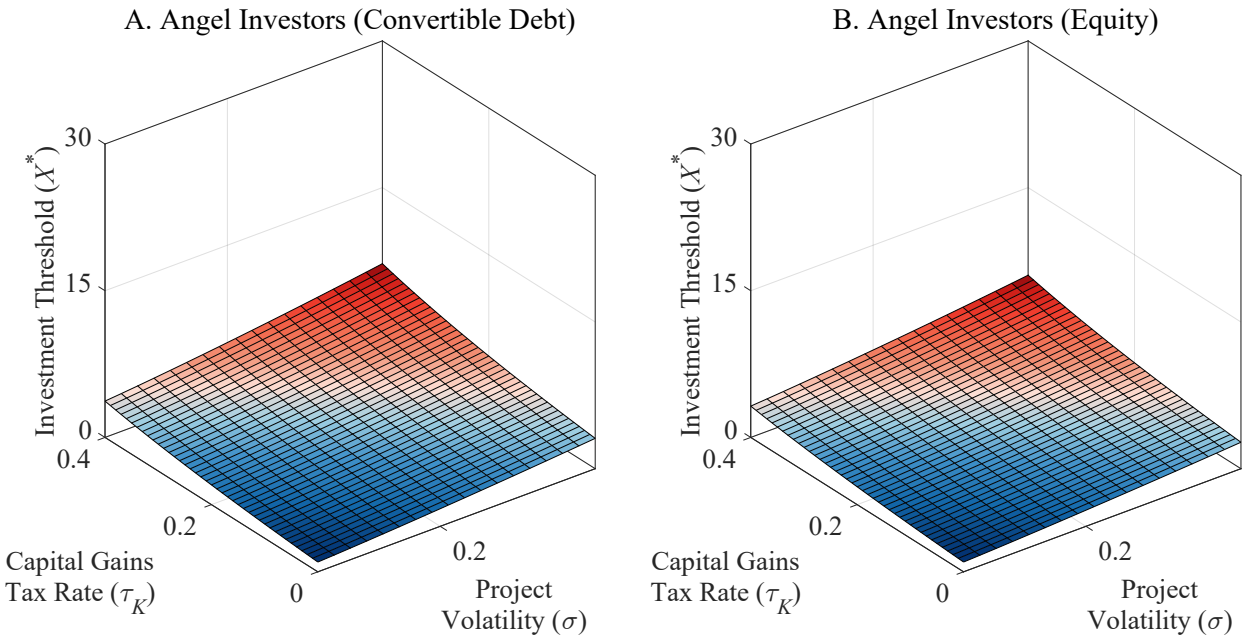
[48] Robinson and Sensoy (2013) document that 56% of VC funds have GP contribution of 1%, but 26% have contribution higher than 1% (and 18% lower than 1%). The median (mean) is 1.78% (1%) with standard deviation 5.09%.

[49] 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%.

[50] 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.

[51] 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).

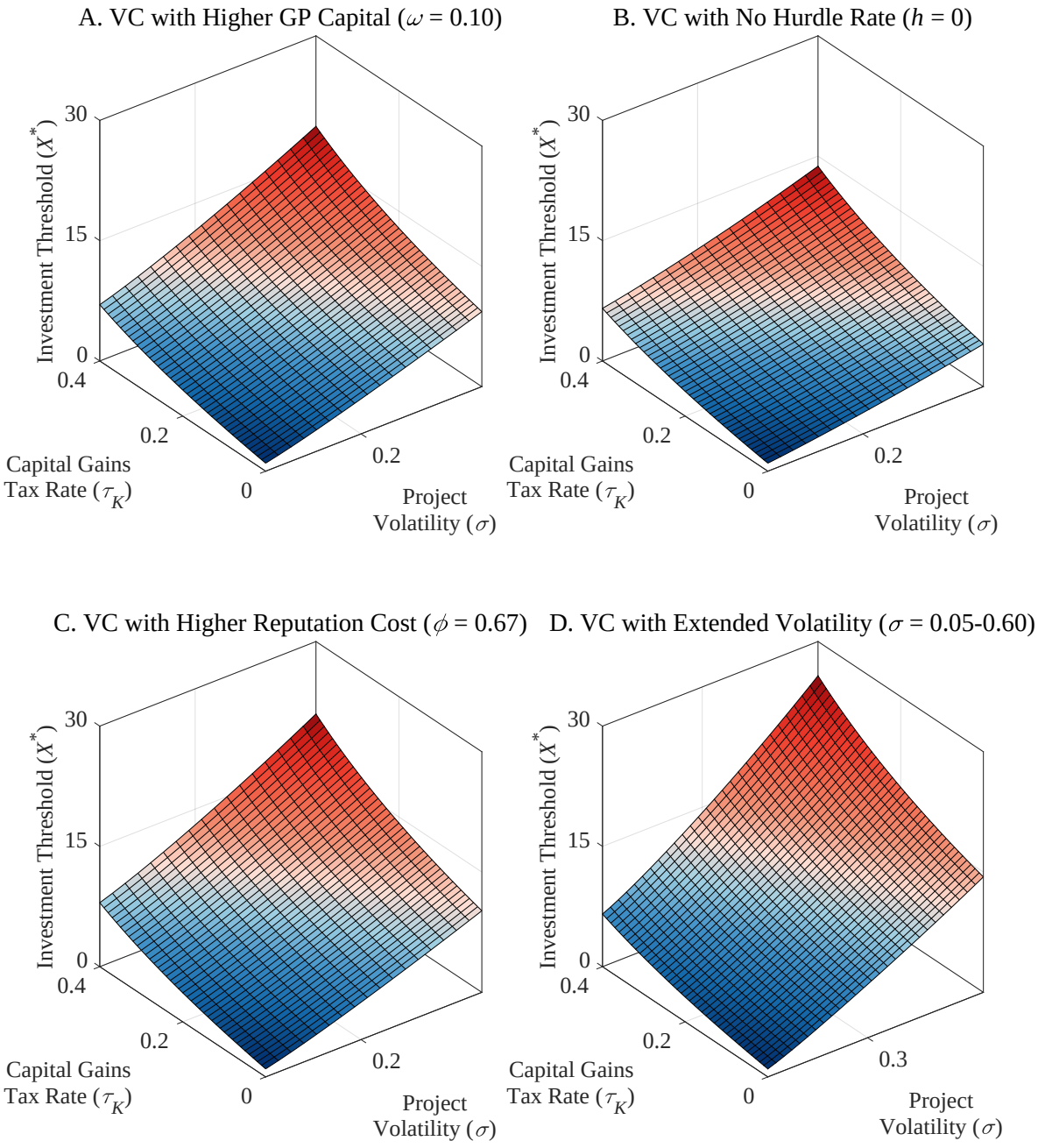
Figure IA1: Angel Investment Thresholds: Convertible Debt versus Direct Equity Financing



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, $\tilde{\xi}$).

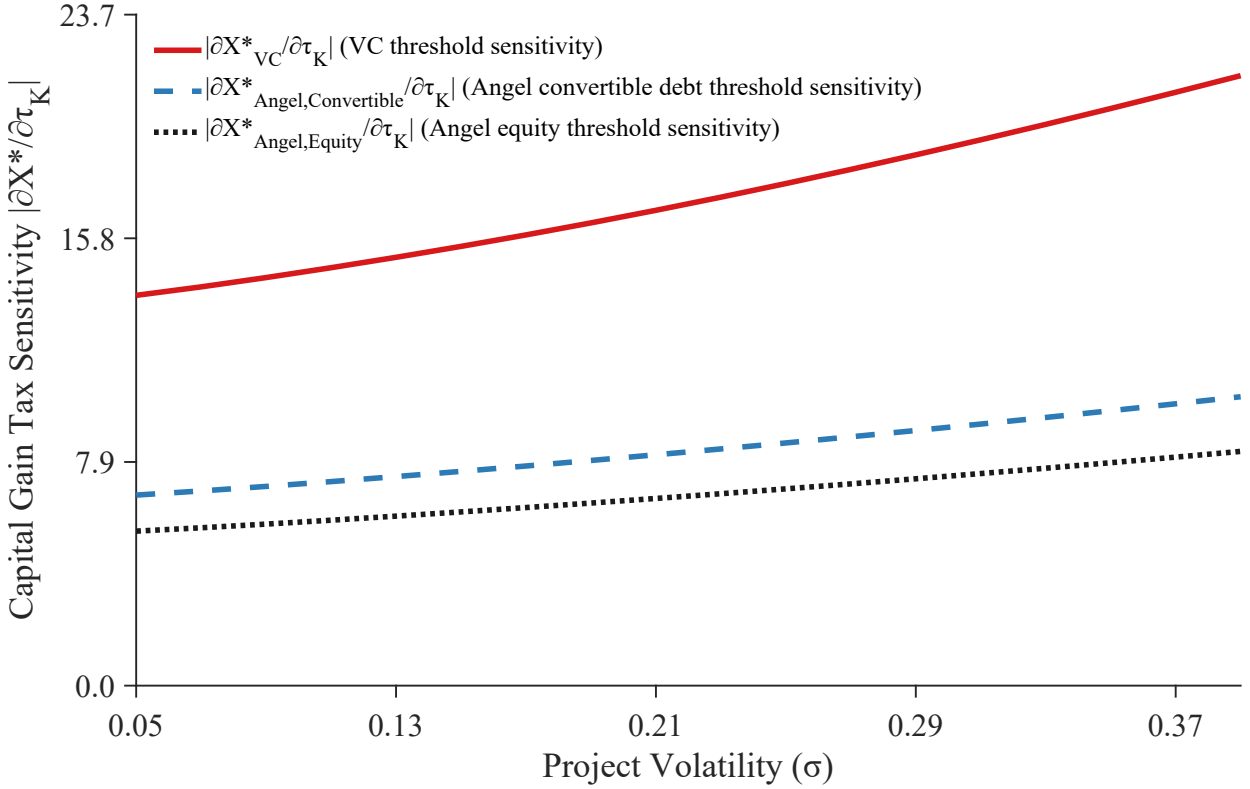
Figure IA2 presents these four alternative specifications. Panel A increases GP capital commitment to 10%, Panel B eliminates hurdle rates, Panel C raises reputation costs to 0.67, and Panel D extends project volatility to 0.60. While each parameter change affects the level and curvature of investment 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.

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 raises the indirect-to-direct pay-for-performance ratio from 0.35 to 0.44 (Chung et al. (2012)), yielding $\varphi = 0.67$ 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.

IA1.5 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.

IA1.6 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.

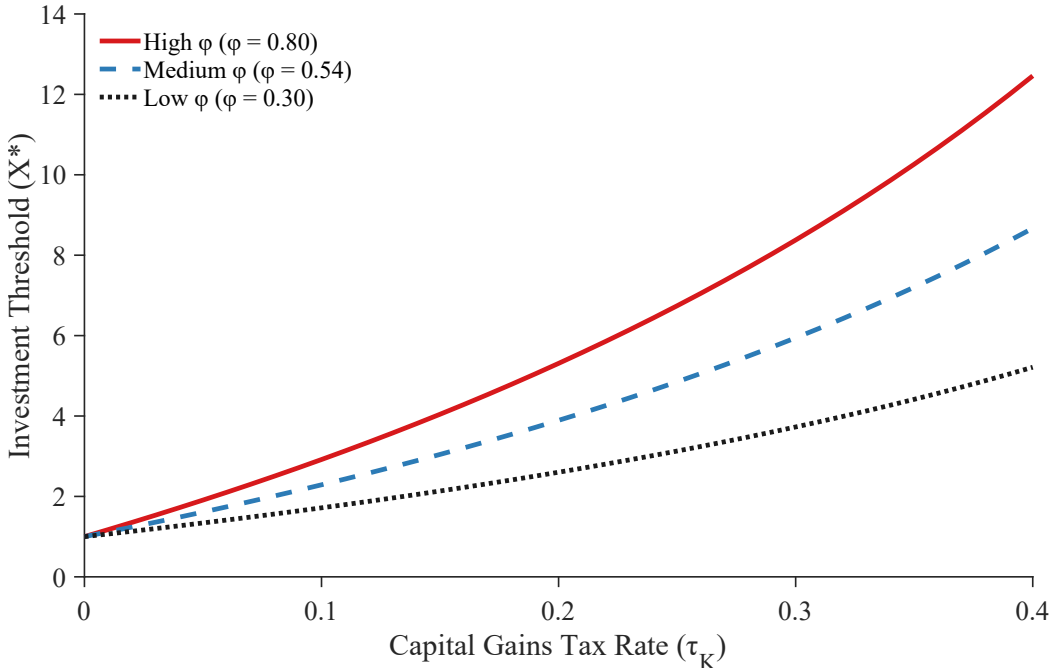
Figure IA5 presents similar results for GP personal commitment (ω), another VC-specific parameter. Panel A shows that higher GP capital contributions increase investment selectivity as fund managers have greater personal exposure to downside risk. Panel B reveals that this increased selectivity also 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.

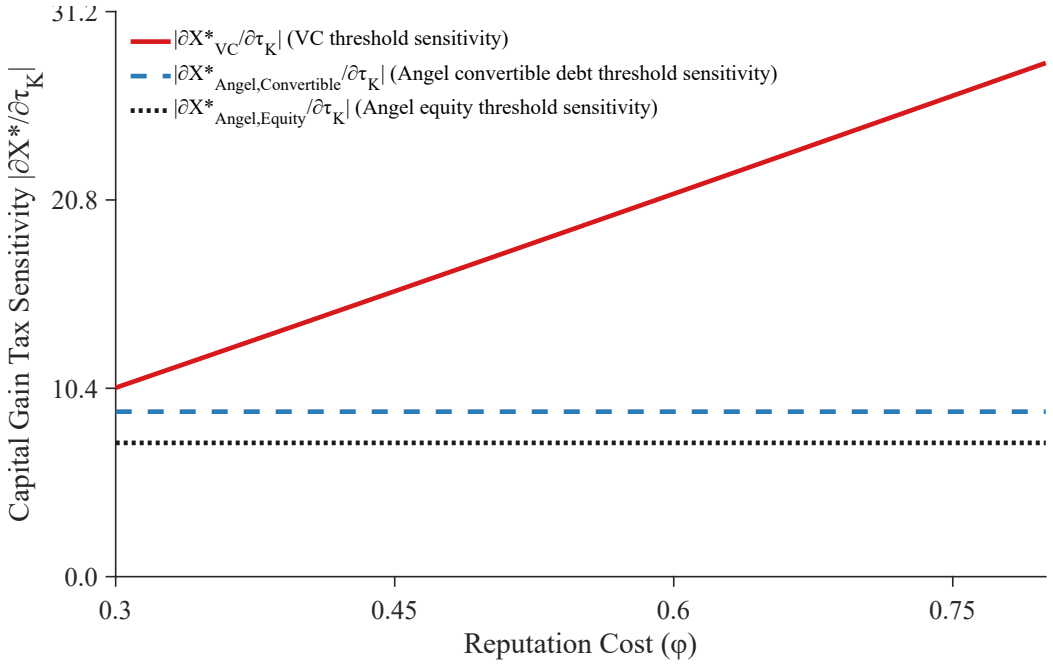
These sensitivity analyses show that factors increasing investment selectivity also amplify tax responsiveness. While potentially counterintuitive, this relationship follows directly from the mathematical structure of our model. For VC-specific parameters, we observe positive cross-partial derivatives $\frac{\partial^2 X^*_{VC}}{\partial \tau_K \partial \varphi} > 0$ 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



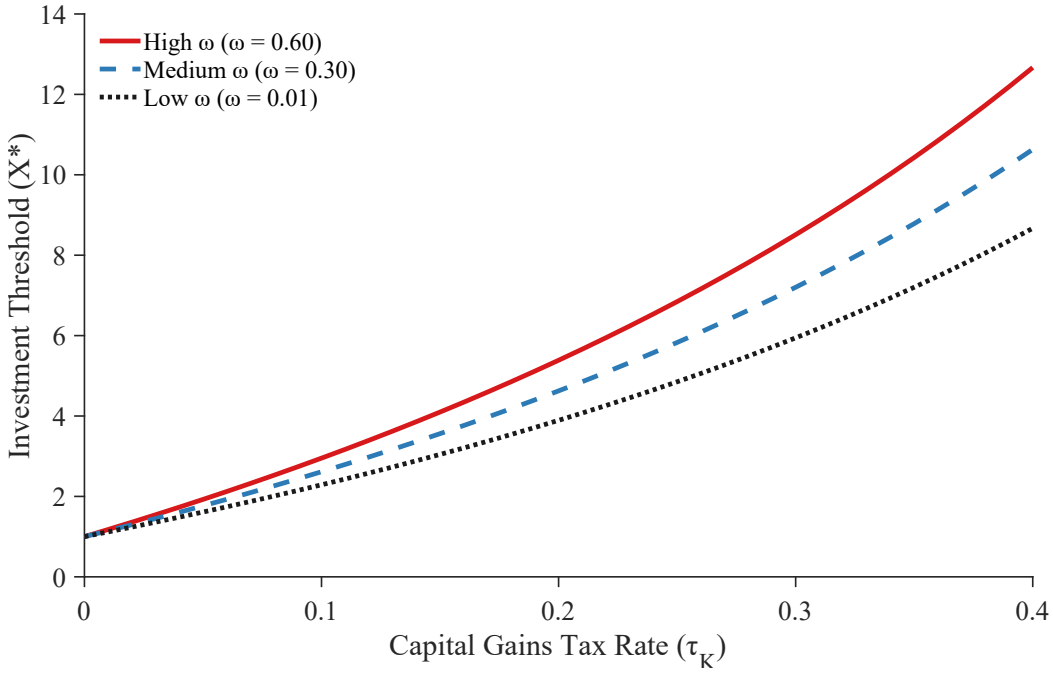
(b) Tax Sensitivity as a Function of Reputation Costs: VC *versus* Angel Investors



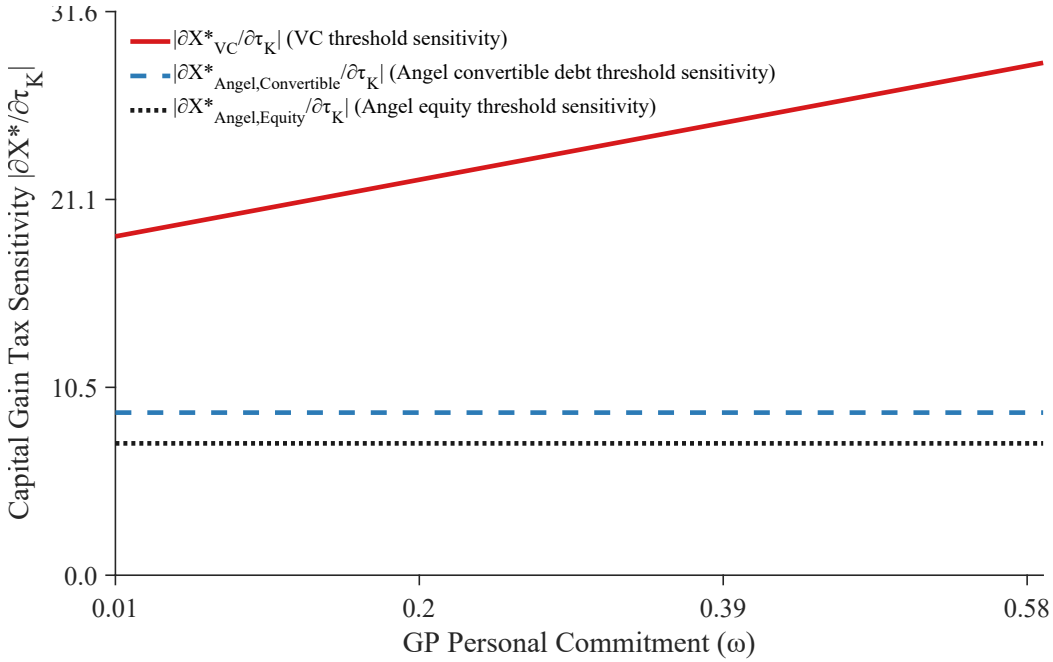
This figure examines how reputation costs (φ), a VC-specific parameter, affect investment behavior across investor types. Panel A shows minimum investment thresholds (X^*) as functions of capital gains tax rates (τ_K) for different VC reputation cost levels, with angel thresholds shown for comparison. 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

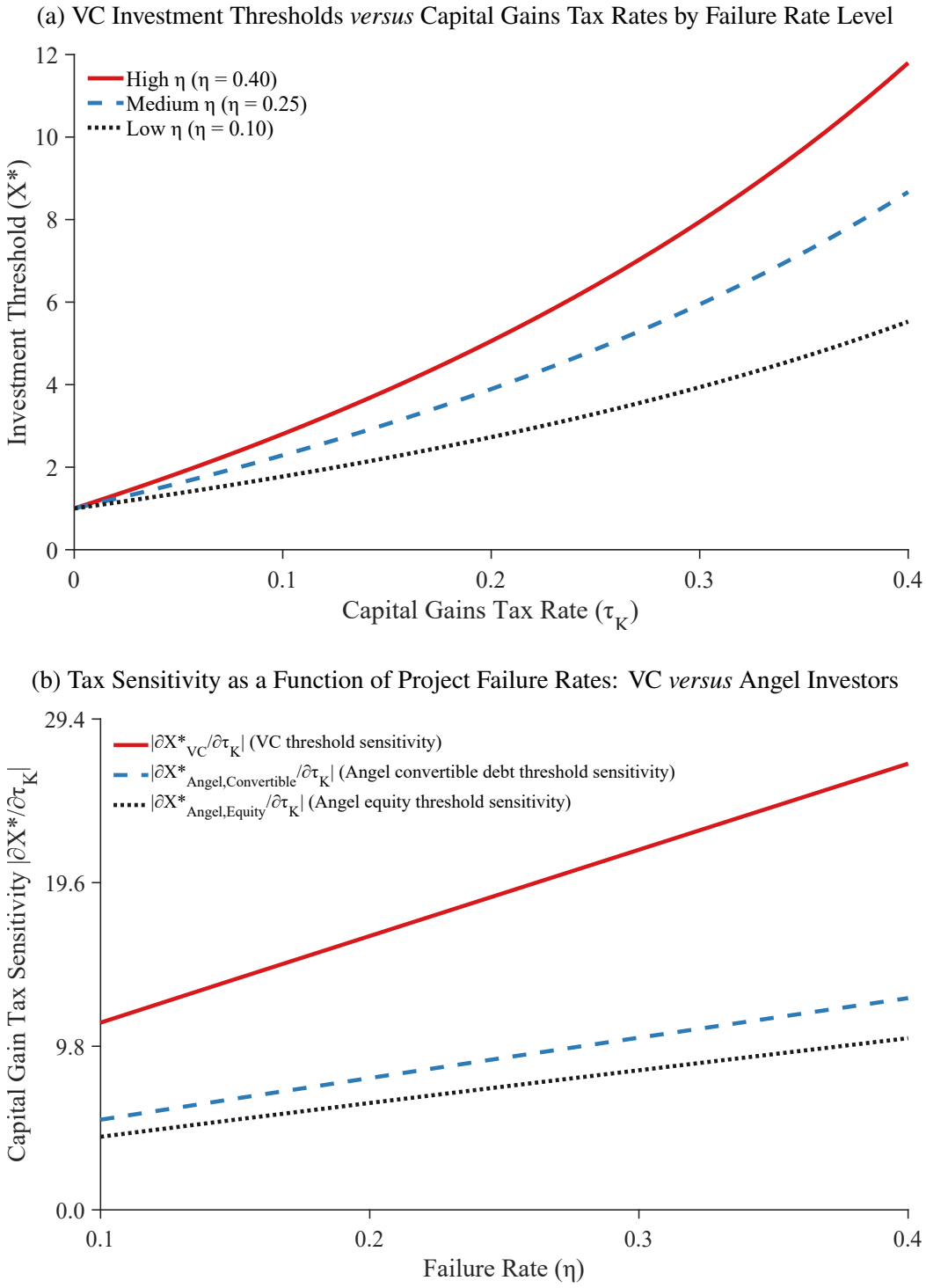


(b) Tax Sensitivity as a Function of GP Capital Commitment: VC *versus* Angel Investors



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 Quantifying the GP Tax Benefit

How large is the QSBS subsidy to the general partner who decides which ventures to fund? Absent QSBS, a GP's carried interest on a qualifying exit would be taxed as a long-term capital gain (e.g., at 25% federal rate for investments exited between 2013 and 2017, and 23.8% post-2017). We quantify the subsidy on a single qualifying exit as a function of the carry it generates for the GPs — the exit value, scaled by the fund's ownership stake and the conventional 20% carried-interest rate — and the number of general partners in the fund, across whom a $10 million capital gain tax exclusion applies separately per QSBS-qualifying investment.[52]

We anchor this quantification to the exits in our sample. Among QSBS-qualifying, VC-backed companies, the median exit is valued at $457 million and the mean at $1.89 billion. Our initial analysis sets a VC fund's ownership stake at portfolio company exit to 10% (Barry et al. (1990)),[53] across 1 to 10 GPs sharing the carried interest fee.[54] The 10% stake and the 20% carried-interest rate together turn the median and mean exits into approximately $9 million and $38 million of carry for the fund's GPs.

Table IA2 reports the resulting tax saving across exit sizes and partner counts. Panel A gives the federal tax avoided in dollars; Panel B expresses it as a share of the deal's carry. At the median exit, the fund's approximately $9 million of carry stays within the $10-million-per-partner exclusion however it is divided, so QSBS shelters the full 23.8% — about $2 million of federal tax. At the mean exit, the $38 million of carry remains within the combined exclusion once it is split across four or more GPs, again sheltering the full rate (approximately $9 million). Panel B shows that the 23.8% share holds across the empirically relevant range and erodes only in the bottom-left corner, where a very large exit's carry concentrates on one or two partners — at a $10 billion exit taken by a single GP, the $10 million exclusion shelters only a sliver of the $200 million carry, and the sheltered share falls to 1.2%. Because the typical fund has four or five partners and the typical qualifying exit is a fraction of that scale, the realized subsidy sits at or near the full 23.8% of carry, a 31% increase in the partners' take-home pay on the deal (the 23.8% sheltered share over the 76.2% of carry the partners would otherwise keep after tax).

[52] §1202's per-issuer exclusion is the greater of $10 million or ten times basis, applied separately to each partner (§702(b), §1202(g)); see Viswanathan (2020); Polsky and Yale (2023). Because carried interest is a profits interest with negligible basis, the $10 million amount, rather than the ten-times-basis amount, is the operative limit.

[53] Barry et al. (1990) report that the lead VC holds, on average, 13.6% of a portfolio company's equity immediately after its IPO (11.8% at the median), 11.6% (9.2%) one year later, and 19.1% (16.2%) just before the offering. Aggregate VC ownership is higher — 24.6% immediately after the IPO in Barry et al. (1990) and 26.3% in Megginson and Weiss (1991) — because financing rounds are syndicated across funds; measured earlier, at the financing stage and before IPO dilution, the combined VC stake is around 50% (Kaplan and Strömberg 2003).

[54] Metrick and Yasuda (2010), covering 94 venture funds, report a mean of 4.8 investment partners per fund (median 4, interquartile range 3–6); Jackson and Strebulaev (2026), covering roughly 4,000 U.S. venture firms over 2000–2025, reports a mean of about six (median about four) inclusive of one or two junior investment team members for the average firm.

Table IA2: QSBS Tax Saving on GP Carried Interest: Sensitivity to the Number of Partners

	Fund profit	GP carry	Number of GPs sharing the carry					
Exit value	(10% stake)	(20%)	1	2	3	4	5	10
Panel A: Federal tax avoided ($ millions)								
$100M	$10M	$2M	0.5	0.5	0.5	0.5	0.5	0.5
$500M (≈median)	$50M	$10M	2.4	2.4	2.4	2.4	2.4	2.4
$1B	$100M	$20M	2.4	4.8	4.8	4.8	4.8	4.8
$2B (≈mean)	$200M	$40M	2.4	4.8	7.1	9.5	9.5	9.5
$5B	$500M	$100M	2.4	4.8	7.1	9.5	11.9	23.8
$10B	$1,000M	$200M	2.4	4.8	7.1	9.5	11.9	23.8
Panel B: Tax avoided as a share of carry (%)								
$100M	$10M	$2M	23.8	23.8	23.8	23.8	23.8	23.8
$500M (≈median)	$50M	$10M	23.8	23.8	23.8	23.8	23.8	23.8
$1B	$100M	$20M	11.9	23.8	23.8	23.8	23.8	23.8
$2B (≈mean)	$200M	$40M	5.9	11.9	17.8	23.8	23.8	23.8
$5B	$500M	$100M	2.4	4.8	7.1	9.5	11.9	23.8
$10B	$1,000M	$200M	1.2	2.4	3.6	4.8	5.9	11.9

This table reports a per-deal calibration of the QSBS benefit to a fund's general partners on a single qualifying exit, assuming the fund holds 10% of the company at exit (so fund profit equals 10% of the exit value) and charges 20% carried interest (so GP carry equals 20% of profit), and varies the number of general partners who share the carry. The shaded rows mark the calibration points nearest the sample's median ($457 million) and mean ($1.89 billion) QSBS-qualifying, VC-backed exit values. Without QSBS, carried interest is taxed as a long-term capital gain at the post-2017 federal rate of 23.8% (20% plus the 3.8% net investment income tax); QSBS excludes it, capped at $10 million of gain per partner per issuer under IRS (1993) (§1202(g)), so the carry is sheltered up to $10 million times the number of partners. Panel A reports the federal tax avoided in dollars; Panel B reports it as a share of the deal's carry. The full benefit — 23.8% of carry, equivalently a 31% increase in take-home pay (the share of carry divided by 0.762) — holds wherever a partner's carry on the company stays below $10 million; it erodes only on large exits split among few partners. Conforming states add up to seven percentage points to the share of carry (Section 9).

Table IA3 fixes the number of partners at the sample-typical four and varies the fund's ownership stake at exit. Panel A gives the carry the stake generates (20% of the stake times the exit value). Panel B reports the federal tax avoided. With four partners sharing the carry, QSBS shelters at most $40 million of gain, so the saving tops out at $9.5 million — 23.8% of $40 million — once carry exceeds the cap. Panel C reports the same amount as a share of carry. At the median exit (the shaded $500 million row), this share equals the full 23.8% at every stake, as even a 30% stake produces only $30 million of carry. At the mean exit, it equals 23.8% through a 10% stake and falls to 11.9% and 7.9% at the 20% and 30% stakes. Because single-fund stakes typically range from 10% to 20%, the typical deal again retains the full 23.8% subsidy, eroding only at large stakes in the largest exits.

Table IA3: QSBS Tax Saving on GP Carried Interest: Sensitivity to the Fund's Ownership Stake

	Fund ownership stake at exit				
Exit value	2.5%	5%	10%	20%	30%
Panel A: GP carry ($ M), = 20% × stake × exit					
$100M	0.5	1	2	4	6
$500M (≈median)	2.5	5	10	20	30
$1B	5	10	20	40	60
$2B (≈mean)	10	20	40	80	120
$5B	25	50	100	200	300
$10B	50	100	200	400	600
Panel B: Federal tax avoided ($ millions)					
$100M	0.1	0.2	0.5	1.0	1.4
$500M (≈median)	0.6	1.2	2.4	4.8	7.1
$1B	1.2	2.4	4.8	9.5	9.5
$2B (≈mean)	2.4	4.8	9.5	9.5	9.5
$5B	6.0	9.5	9.5	9.5	9.5
$10B	9.5	9.5	9.5	9.5	9.5
Panel C: Tax avoided as a share of carry (%)					
$100M	23.8	23.8	23.8	23.8	23.8
$500M (≈median)	23.8	23.8	23.8	23.8	23.8
$1B	23.8	23.8	23.8	23.8	15.9
$2B (≈mean)	23.8	23.8	23.8	11.9	7.9
$5B	23.8	19.0	9.5	4.8	3.2
$10B	19.0	9.5	4.8	2.4	1.6

This table reports a per-deal calibration of the QSBS benefit to a fund's general partners on a single qualifying exit, assuming the fund has four general partners and charges 20% carried interest, and varies the fund's ownership stake at exit. The shaded rows mark the calibration points nearest the sample's median ($457 million) and mean ($1.89 billion) QSBS-qualifying, VC-backed exit values. Panel A reports the carry on the deal, equal to 20% of the stake times the exit value; Panels B and C report the federal tax avoided and its share of that carry. Without QSBS, carried interest is taxed as a long-term capital gain at 23.8% (20% plus the 3.8% net investment income tax); QSBS excludes it, capped at $10 million of gain per partner — $40 million across four (§1202(g)). The dollar saving is therefore fixed at $9.5 million once carry exceeds $40 million, and its share of carry falls as the stake grows; the full 23.8% (a 31% take-home raise) survives only where carry stays under the cap. Conforming states add up to seven percentage points to the share of carry (Section 9).

Across both calibrations the picture is the same: for the typical fund and the typical qualifying exit, the federal exemption eliminates the full 23.8% capital-gains tax on the carry and raises the GP's after-tax take-home on the deal by approximately 31% — before any state conformity. Because this benefit lands on the partners' convex carry, it most rewards right-tail outcomes; in our model it lowers the GP's investment threshold, and lowers it more for higher-variance ventures (Prediction 3; Appendix IA1.1).

IA3 QSBS Tax Liability: A Direct-Investor Illustration

We quantify federal and state tax liabilities across different investment periods to demonstrate the economic significance of these tax provisions. In this example the $10 million basis is large enough that the per-issuer cap (ten times basis = $100 million) covers the entire gain, so the exclusion is not constrained by the cap; for investments with smaller basis relative to the gain — including a GP's carried interest, which carries negligible basis — the $10 million floor instead governs, as discussed in Appendix IA2.

IA3.1 Federal-Level Tax

Scenario 1: Investment after September 28, 2010

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

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

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%)

Scenario 3: Investment before February 17, 2009

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

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

IA3.2 California State-Level Tax

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

Scenario 1: Investment with California tax filed before 2013

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

Scenario 2: Investment with California tax filed after 2013

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

IA3.3 Total Tax Liability (Federal + California)

Table IA4: Tax Liability on a $100M Capital Gain from a $10M QSBS Investment

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

IA4 Bunching Estimation Framework

This appendix develops the structural framework and the estimation procedure underlying the bunching analysis of the QSBS five-year holding requirement. The investor's realized holding period is the outcome of a dynamic exit-timing decision; the QSBS subsidy raises the net-of-tax return to holding an investment past five years, which creates a kink in the return to holding at the threshold and induces investors to cluster their exits at the five-year mark. We quantify the magnitude of this response with the partial-identification bunching estimator of Bertanha et al. (2023), and isolate the tax-induced component with a difference-in-bunching design. Throughout, we pool the QSBS-eligible investors in our sample — VC and angel investors, who face the same five-year threshold — and identify the tax response from the contrast between QSBS-eligible and ineligible sectors before and after the reform.

Exit-Timing Problem. An investor holds a portfolio-company position and chooses when to realize it. The realized holding period h is a *stopping time*, not a quantity fixed at entry: at each date the investor weighs the option value of continuing to hold — allowing the company to mature and waiting for a favorable exit opportunity such as an acquisition or IPO — against discounting, illiquidity, and the capital-gains tax due at exit. Let $u(h)$ denote the present discounted *pre-tax* value of exiting after a holding period h, which embeds these forces and is single-peaked at the investor's privately optimal pre-tax holding period. The investor chooses h to maximize the after-tax value of the position,

$$\max_{h} \; U(h) = u(h) - T(h), \tag{IA13}$$

where $T(h)$ is the capital-gains tax liability at exit. This exit-timing problem is the holding-period counterpart of the real-options entry decision in Section 2: the same option value of waiting that governs when a venture is funded also governs when it is exited.

The QSBS Incentive as a Kink in the Return to Holding. Holding a qualifying investment for at least five years exempts the capital gain from tax under IRC §1202. Crossing the five-year threshold therefore raises the net-of-tax return to holding: for a gain G taxed at the long-term capital-gains rate τ, the after-tax proceeds rise from $(1-\tau)\,G$ to G. In the bunching design we represent this as a kink in the net-of-tax return to holding at $\bar{h} = 5$ years, with the change in the log net-of-tax rate:

$$\Delta \log(1-\tau) \;=\; \log\big(1-\tau\big) \;=\; \log(1-0.20) \;=\; -0.2231, \tag{IA14}$$

where $\tau = 0.20$ is the federal long-term capital-gains rate removed by the exclusion.[55] An investor whose privately optimal pre-tax holding period falls just short of five years now finds it worthwhile to extend to exactly five years to capture the exclusion; investors whose optimum already exceeds five years are unaffected. The marginal buncher is the investor whose pre-tax optimum $\bar{h} - \Delta h^*$ falls just short of the threshold and who is just indifferent between exiting at that optimum and paying the tax, or delaying to exactly $\bar{h}$ to obtain the exclusion, so that all investors with pre-tax optima in $[\bar{h} - \Delta h^*, \bar{h})$ delay their exit to $\bar{h}$:

$$u(\bar{h} - \Delta h^*) - u(\bar{h}) \;=\; \tau\, G. \tag{IA15}$$

The width Δh^* of this relocation window is what the bunching estimator recovers.

Excess Mass and the Bunching Elasticity. Let $f_1(h)$ denote the observed density of holding periods and $f_0(h)$ the counterfactual density absent the tax incentive. The bunching response is summarized by the excess mass of exits at the five-year threshold which, by the conservation of mass, equals the mass drawn from the relocation window just below it,

$$B \;=\; \int_{\bar{h}-\Delta h^*}^{\bar{h}} \big[\, f_0(h) - f_1(h) \,\big]\, dh, \tag{IA16}$$

and the elasticity ε of the holding period with respect to the net-of-tax rate is recovered by relating this excess mass to the size of the kink, in the spirit of Saez (2010) and Chetty et al. (2011). We implement the recovery with the `bunchbounds` procedure of Bertanha et al. (2023), which returns a trapezoidal-approximation point estimate of ε and, as described below, partial-identification bounds. For the post-reform eligible cell the point estimate is $\hat{\varepsilon} = 4.45$ (Table IA13, column 1): a one-percentage-point increase in the tax benefit is associated with a 4.45% increase in the mass of investors exiting precisely at the five-year mark.

Partial Identification. Point identification of ε requires extrapolating the counterfactual density f_0 into the bunching region, an assumption that is difficult to verify. We therefore also report the nonparametric bounds of Bertanha et al. (2023), which replace that extrapolation with a weaker restriction on the curvature of the counterfactual density. The key parameter is M, an upper bound on the magnitude of the slope of the underlying (unobserved) heterogeneity density; larger M admits more curvature and widens the bounds. We report bounds at $M = 3.0$ and at $M = \hat{M}$, the largest M for which the upper bound remains finite. For the post-reform eligible cell the bounds at $M = \hat{M}$ are [4.19, 6.11]

[55] We use the 20% federal long-term capital-gains rate as the headline subsidy and report robustness at 15% and 25%. The dollar-value calculations in Appendix IA3 additionally incorporate the 3.8% net investment income tax, which began in 2013 and therefore does not apply uniformly across the holding-period cohorts that identify the bunching response.

(Table IA13, column 3), comfortably above the pre-reform and ineligible benchmarks.

Difference-in-Bunching Identification. Investors may cluster at five years for reasons unrelated to taxes — round-number focal points, fund-life conventions, or liquidity needs. To net out this natural bunching we difference the estimated elasticity across cells (Brown (2013); Kleven (2016)):

$$\Delta\varepsilon_i^{DB} \;=\; \hat{\varepsilon}_{\text{eligible,post}} - \hat{\varepsilon}_{\text{control}_i}, \qquad \text{control}_i \in \{\,\text{eligible,pre};\ \text{ineligible,post};\ \text{ineligible,pre}\,\}. \tag{IA17}$$

This difference-in-bunching design identifies the QSBS-induced excess bunching under a parallel-counterfactual-bunching assumption: absent the reform, the natural five-year clustering in the eligible-post cell would equal that in the control cell. This is the bunching analogue of parallel trends and is supported by the comparison cells — ineligible sectors and the pre-reform period, where the exclusion does not apply, exhibit substantially smaller elasticities (Table 2).

Inference. We compute standard errors by resampling the underlying investor–firm–year data with $R = 1{,}000$ bootstrap replications, re-estimating $\hat{\varepsilon}$ on each replication:

$$\widehat{SE}(\hat{\varepsilon}) \;=\; \sqrt{\tfrac{1}{R-1}\sum_{r=1}^{R}\left(\hat{\varepsilon}^{(r)} - \bar{\hat{\varepsilon}}\right)^2}, \qquad \bar{\hat{\varepsilon}} = \tfrac{1}{R}\sum_{r=1}^{R}\hat{\varepsilon}^{(r)}. \tag{IA18}$$

For the difference-in-bunching estimates, the two cells in each contrast are disjoint subsamples (distinct sectors or distinct entry cohorts), so we treat their estimates as independent and compute

$$\widehat{SE}\left(\Delta\varepsilon_i^{DB}\right) \;=\; \sqrt{\widehat{SE}(\hat{\varepsilon}_{\text{eligible,post}})^2 + \widehat{SE}(\hat{\varepsilon}_{\text{control}_i})^2}\,. \tag{IA19}$$

Because any residual cross-cell dependence (through investors appearing in more than one cohort) is positive, this standard error is conservative for the difference. The resulting t-statistics confirm that the post-reform eligible elasticity exceeds each benchmark at the 1% level (Table 2).

IA5 Capital Allocation Around the $50 Million Asset Threshold

This appendix reports our capital-allocation evidence built on the $50 million gross-asset eligibility cutoff: a bunching test for manipulation of deal sizes, a regression-discontinuity design, and a difference-in-discontinuities design. Throughout, the sample comprises VC and angel investments in QSBS-eligible sectors with deal sizes between $25 and $75 million.

IA5.1 Bunching at the Asset Threshold

The decision to hold an investment for a particular time horizon is made by the investor alone. In Section 5.1 of the main text, we document strategic timing at the holding-period margin. The decision to invest in a company of a specific size is more involved. It requires joint, strategic manipulation of deal sizes by investors and companies. We next examine whether strategic investment 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)).

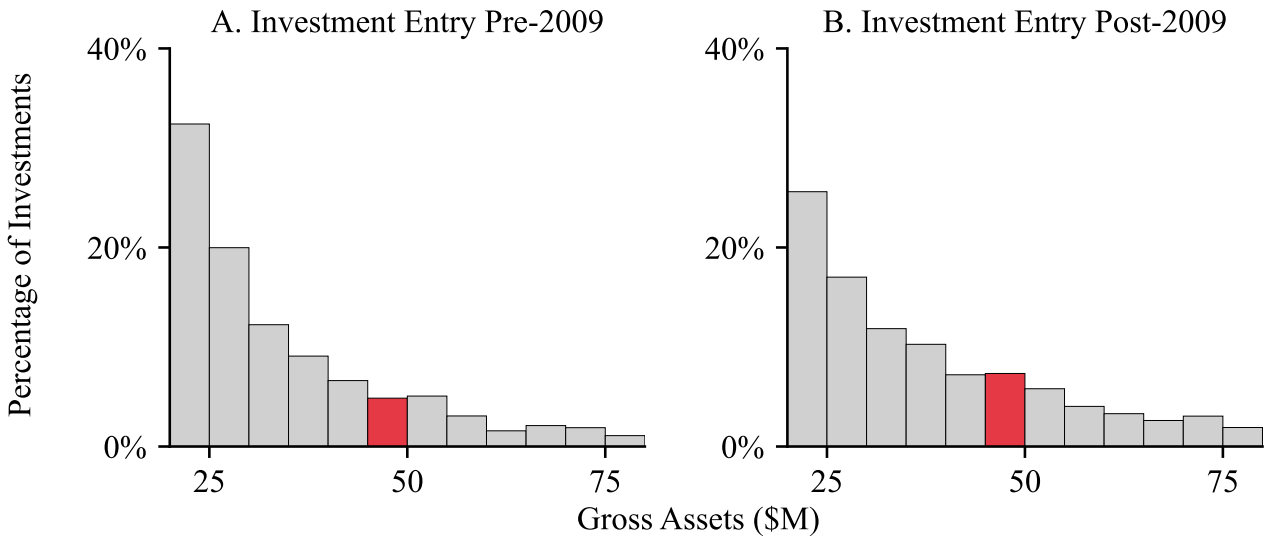
We proxy for gross assets using the investment amount in a given round. Under IRC Section 1202, gross assets equal cash plus the adjusted tax basis of other property. Startups typically lack tangible assets, with their market value resting primarily on intangible assets such as knowledge and human capital 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 IA7 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.[56] 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

[56]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). We apply the Kleven and Waseem (2013) notch estimator at the asset threshold and the Bertanha et al. (2023) partial-identification approach — which accommodates both kinks and notches — at the holding-period kink.

Figure IA7: 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. Panel A displays pre-2009 investments, while Panel B displays investments with entry year 2009 or later. 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.

to $75 million around the asset cutoff.[57] Table IA5 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 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.

IA5.2 Regression Discontinuity Approach

Having established that investors and companies do not seem to jointly, strategically manipulate deal sizes around the $50 million threshold — supporting the continuity assumption required for RDD — 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

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

Table IA5: 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.

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 — but over the full sample of investment years 2004–2017, with forward funding measured over the subsequent five years.[58] 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.

IA5.2.1 RDD Analysis

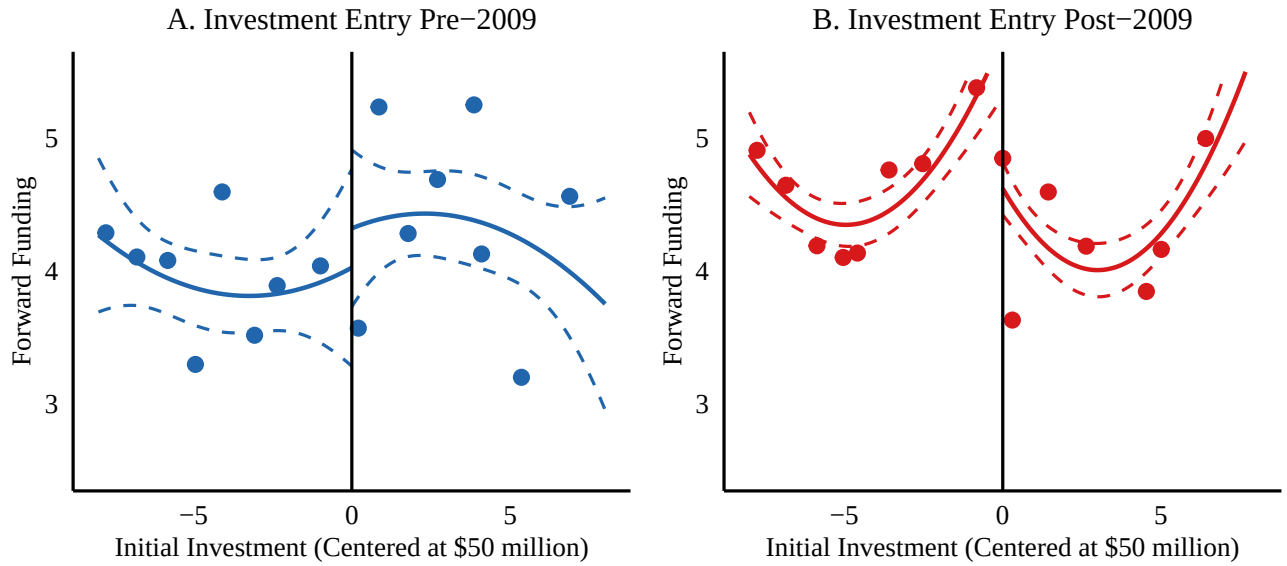
Our RDD exploits the sharp discontinuity in QSBS tax benefits at the $50 million asset threshold. We estimate the local average treatment effect by comparing forward funding outcomes for investments just below and just above the $50 million cutoff. The identifying assumption is that firms with investment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

$$\begin{aligned}\text{Forward Funding}_f =& \alpha + \beta \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} + \sum_{p=1}^{P} \gamma_p \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \delta_p \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} \cdot (\text{Initial Investment}_f - 50)^p + \epsilon_{i,f}\end{aligned} \tag{IA20}$$

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-asset 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

[58] 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)).

Figure IA8: 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 a 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.

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.[59]

Figure IA8 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.

[59] 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.

Table IA6 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.[60] 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.

Table IA6: Regression Discontinuity Estimates: QSBS-Qualification Status on Forward Funding

Dependent Variable:	Linear		Quadratic		Cubic	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pre-2009						
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						
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. 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.

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

IA5.2.2 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:

$$\begin{aligned}\text{Forward Funding}_f =& \alpha + \beta \cdot [\mathbb{1}\{\text{Initial Investment}_f > 50\} \times \mathbb{1}\{\text{Post-2009}\}_f] \\ &+ \gamma_1 \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} + \gamma_2 \cdot \mathbb{1}\{\text{Post-2009}\}_f \\ &+ \sum_{p=1}^{P} \delta_p \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \theta_p \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \lambda_p \cdot \mathbb{1}\{\text{Post-2009}\}_f \cdot (\text{Initial Investment}_f - 50)^p \\ &+ \sum_{p=1}^{P} \mu_p \cdot \mathbb{1}\{\text{Initial Investment}_f > 50\} \cdot \mathbb{1}\{\text{Post-2009}\}_f \cdot (\text{Initial Investment}_f - 50)^p + \epsilon_{i,f}\end{aligned} \tag{IA21}$$

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 IA7 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.

Table IA7: 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.

IA6 A Magnitude Bound on the Supply-Driven Effects

This appendix formalizes the magnitude bound referenced in Section 8.4. The exercise asks how much of the VC-specific change in failure and unicorn outcomes could be mechanically generated by a change in the composition of investable startups — a larger pool of QSBS-induced entrants — holding fixed how venture capitalists select and treat firms. We use the eligible-sector entry response to the QSBS expansion reported by Chen and Farre-Mensa (2026) — a 10% increase in firm births — to size the marginal pool, and then ask what each triple-difference coefficient would require of those marginal firms.

Decomposition. Let g denote the growth rate of eligible-sector firm births attributable to the QSBS expansion (relative to the ineligible-sector counterfactual) and $s = g/(1+g)$ the resulting post-reform share of "marginal" QSBS-induced firms in the pool. Let Y_0 denote the pre-reform (pre-2009-entry) mean of an outcome of interest (failure rate, unicorn rate) among eligible-sector firms in the VC estimation sample — the inframarginal baseline — and Y_m the corresponding mean for marginal firms. Define the marginal-firm risk multiplier $k \equiv Y_m/Y_0$. Under a pure supply-side compositional change with no behavioral response from VCs, the post-reform eligible-sector mean of Y is

$$\mathbb{E}[Y]^{\text{supply}}_{\text{post}} = (1-s)\,Y_0 + s\,Y_m = Y_0\,[1 + s(k-1)], \tag{IA22}$$

so the pure-supply contribution to the observed change is $\Delta_{\text{supply}} = s\,Y_0\,(k-1)$. With $g = 0.10$, $s \approx 0.091$. Setting Δ_{supply} equal to the observed triple-difference coefficient Δ_{obs} and solving for k gives the multiplier a pure supply-side explanation would require:

$$k^* = 1 + \frac{\Delta_{\text{obs}}}{s\,Y_0}. \tag{IA23}$$

This composition-versus-behavior accounting is in the spirit of the aggregate-decomposition logic of Oaxaca (1973), Blinder (1973), and Fortin et al. (2011); the required multiplier k^* is a partial-identification magnitude bound in the spirit of Manski (1990). It requires no assumption about how risky marginal firms actually are — only the entry response g and the inframarginal baseline Y_0, both observed.

Results. Table IA8 reports, for each VC-specific triple-difference coefficient, the inframarginal baseline Y_0, the multiplier k^* required to attribute the entire effect to supply-side composition, and the implied marginal-firm outcome $Y_m = k^* Y_0$. For the failure margin, composition would require marginal entrants to fail at twenty-two times the inframarginal rate among all firms ($k^* = 22$, $Y_m = 0.14$) and forty-six times among exited firms ($k^* = 46$, $Y_m = 0.46$). The unicorn margin is starker still: attributing the effect to composition would require QSBS-induced entrants to reach unicorn status at twenty-seven

times the inframarginal rate unconditional of exit ($k^* = 27$, an implied $Y_m = 0.58$) and at sixty-two times among exited firms ($k^* = 62$). The latter is not merely implausible but mechanically impossible: it implies a marginal-firm unicorn rate of $Y_m = 1.57$ — a probability above one.

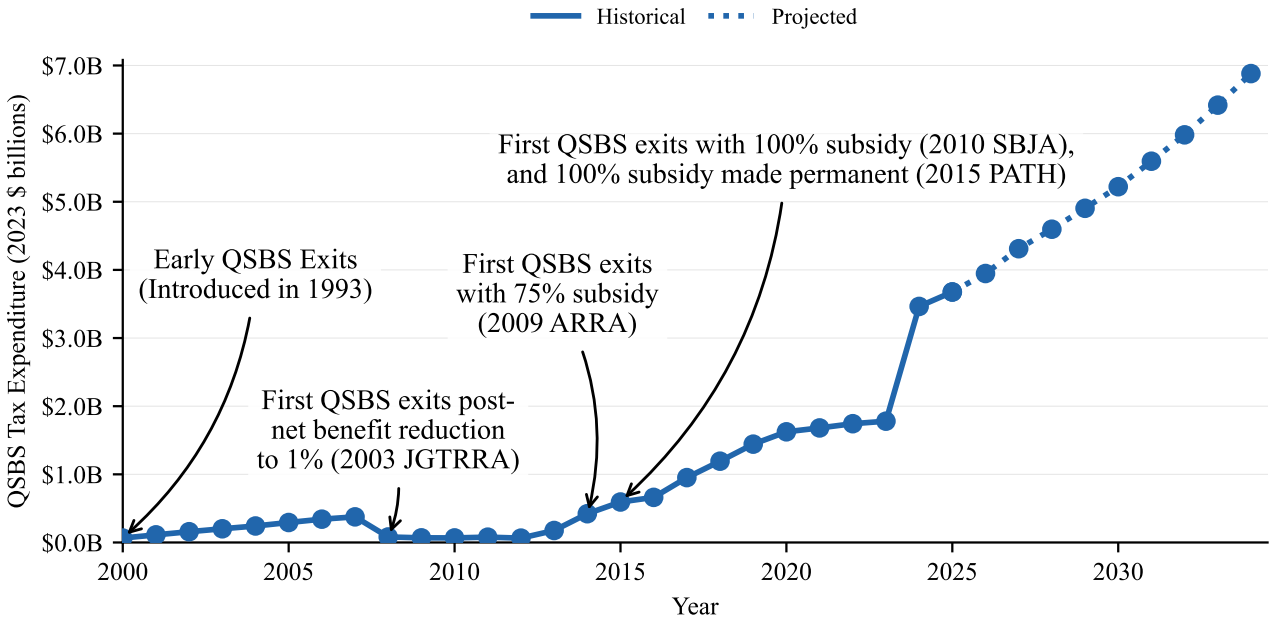
Caveats. These bounds are generous to the supply story. They treat the entire 10% entry response as QSBS-induced marginal firms, let those firms account for the whole observed change, and assume no offsetting response among inframarginal firms. Relaxing any of these assumptions raises the required k^* further, strengthening the conclusion that the bulk of our triple-difference results reflects a change in VC behavior, not a change in the supply of startups.

Table IA8: Marginal-Firm Risk Required to Explain QSBS Effects by Supply Alone

Outcome Margin	Inframarginal Y_0	Required k^*	Implied $Y_m = k^* Y_0$
VC failure rate (all firms)	0.0062	22.29	0.14
VC failure rate (exited firms)	0.0100	46.10	0.46
VC unicorn rate (all firms)	0.0214	27.00	0.58
VC unicorn rate (exited firms)	0.0252	62.11	1.57

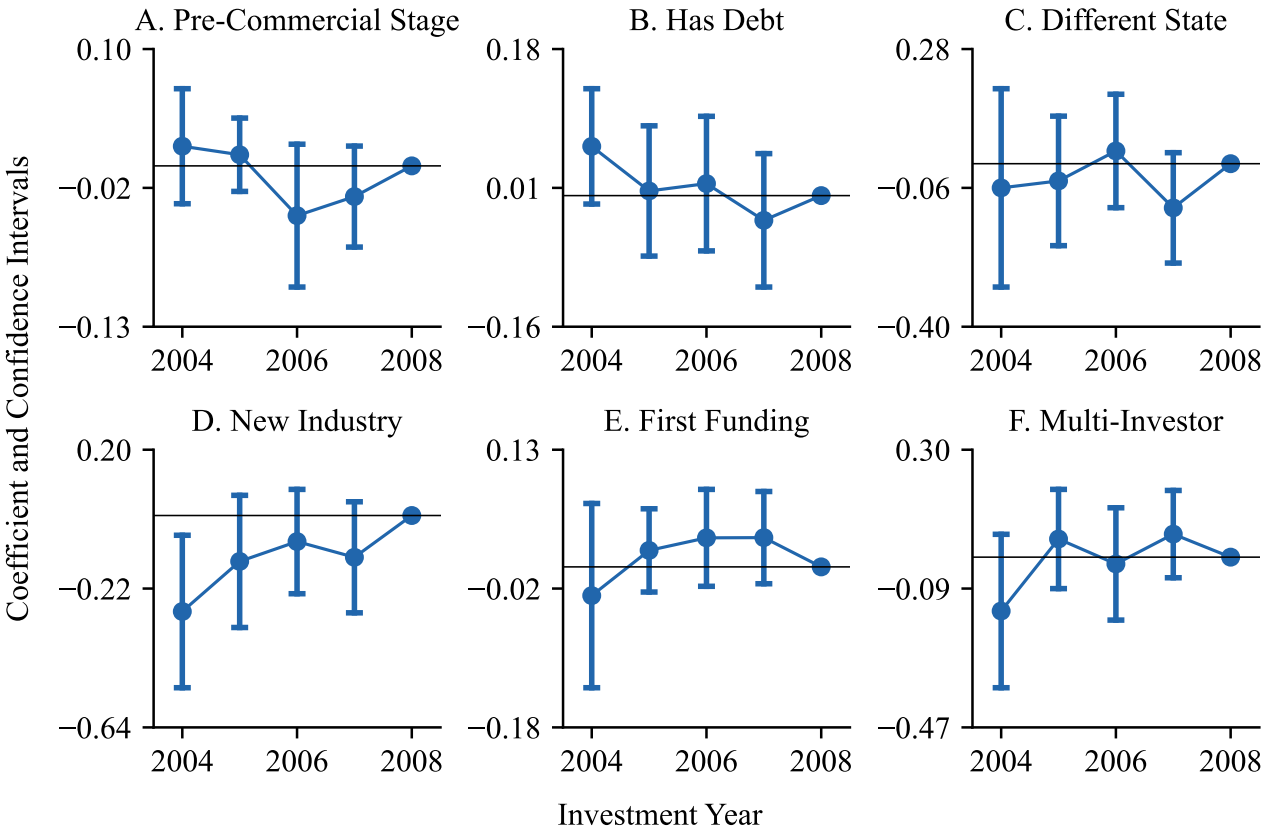
This table reports a magnitude bound on how much of the VC-specific triple-difference effects could be generated by a supply-side change in the composition of investable startups — a larger pool of QSBS-induced entrants — rather than by a change in how venture capitalists select and treat firms. For each outcome margin, the required multiplier $k^* = 1 + \Delta_{\text{obs}}/(s\,Y_0)$ (third column) is the ratio of the marginal-firm outcome to the inframarginal outcome that would attribute the entire VC triple-difference coefficient Δ_{obs} to composition alone. Δ_{obs} is the coefficient on the triple interaction of the five-year-holding indicator, post-2009 entry, and eligible-sector status, estimated on the VC estimation sample with year, holding-period, and investor-firm fixed effects and standard errors clustered at the investor level. The marginal share $s = g/(1+g) \approx 0.091$ is the post-reform share of QSBS-induced entrants implied by the eligible-sector firm-birth response $g \approx 10\%$ that Chen and Farre-Mensa (2026) attribute to the QSBS expansion. The inframarginal baseline Y_0 (second column) is the pre-reform (pre-2009-entry) mean of the outcome among eligible-sector VC investments, computed over the same estimation sample as the corresponding coefficient, and $Y_m = k^* Y_0$ (fourth column) is the implied marginal-firm outcome level. The failure rate is an indicator for the portfolio company going out of business outside of bankruptcy; the unicorn rate is an indicator for a post-money valuation of at least $1 billion. "All firms" rows use the full VC estimation sample; "exited firms" rows restrict to investments the investor has exited. Data are from PitchBook.

Figure IA9: 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 IA10: 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.

Table IA9: 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 IA10: 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 constitutes the primary asset, such as professional services, financial services, hospitality, and farming.

Table IA11: Tax Treatment of Investment Returns by Party

Party	Capital Source	QSBS Eligible?	Tax Treatment of Gain on Eligible-Sector Investment
Panel A: Limited Partners (LPs)			
Individual LP (HNW)	Personal wealth	Yes	Pre-2009: long-term capital gains rate, with the 14% §1202 rate yielding ≈1pp benefit by 2003. Post-2010: up to 100% federal exclusion under SBJA, capped at $10M or 10× basis per issuer.
Public pension fund	Beneficiary and employer contributions	Tax-exempt	Tax-exempt at the entity level under IRC §§115 / 401(a). QSBS provides no direct subsidy to LP.
Corporate/private pension fund	Employer and employee contributions	Tax-exempt	Tax-exempt at the entity level under §501(a) as qualified trust under §401(a); no tax on capital gains regardless of QSBS status.
Endowment, foundation, or sovereign wealth fund	Donor capital, perpetual reserves, or sovereign assets	Tax-exempt	Tax-exempt under §501(a) (endowments, foundations) or by sovereign immunity (§892); no tax on capital gains regardless of QSBS status.
Corporate LP	Corporate balance sheet	No	Statutorily ineligible under §1202(a) (non-corporate taxpayers only); subject to corporate income tax on fund returns.
Panel B: General Partners (GPs) – VC Carry			
VC GP – carried interest	1–2% GP commitment + carry on outside capital	Yes (at individual partner level)	Carry passes through partnership(s) and inherits QSBS character under §§702(b) and 1202(g). With 5-year hold and SBJA: up to 100% federal capital gains exclusion on the GP's allocable share, capped at greater of $10M or 10× basis per issuer.
Panel C: Direct Investors			
Angel investor	Personal wealth	Yes	Pre-2009: long-term capital gains rate. Post-2010: up to 100% federal exclusion under SBJA.
Corporate investor (including Corp. VC)	Corporate balance sheet	No	Statutorily ineligible under §1202(a); subject to corporate income tax on gains.

This table summarizes the tax treatment of investment returns under the post-2010 QSBS regime for each party in the venture-investment ecosystem. Panel A covers limited partners (LPs), the passive capital providers in VC funds. Panel B covers VC general partners (GPs) earning carried interest, the central channel through which QSBS reaches the GP's marginal incentive even when LPs are tax-exempt. Panel C covers investors who deploy capital directly, outside the LP–GP fund structure. "QSBS Eligible?" indicates whether the party can directly claim the QSBS capital-gains exclusion under IRC §1202, conditional on a five-year hold and the per-issuer cap of the greater of $10 million or 10× basis. The pass-through of QSBS character to the GP's carry follows from IRC §§702(b) and 1202(g) and is preserved through any number of pass-through entities until it reaches a taxable individual partner (Viswanathan (2020); Polsky and Yale (2023)). Tax-exempt LPs (public pensions, corporate pensions, endowments, foundations, and sovereign wealth funds) generally do not generate unrelated business taxable income (UBTI) on capital gains from VC fund interests, and funds are typically structured to limit debt-financed UBTI exposure, allowing such institutions to participate without jeopardizing their exempt status. While public and private pension plans share identical federal tax-exempt status, they differ substantially in governance structures, investment sophistication, and behavioral incentives — distinctions that motivate our heterogeneity analysis in Section 9. Pre-2009 references reflect that the QSBS program existed since 1993 with a 14% rate that, after the 2003 reduction in long-term capital gains rates to 15%, provided only a ≈1 percentage point benefit over the standard rate. State-level capital gains rates and conformity with QSBS vary by jurisdiction (see Figure 3 and Table IA9).

Table IA12: 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 (5)	Ineligible (6)	Difference (7)	*t*-stat (8)
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 (5) to (8) present statistics on investments from 2009 to 2017. Investments tracked from 2004 to 2022, and 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*-statistics are based on standard errors clustered by investor. Data are from PitchBook.

Table IA13: 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 in 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 gains tax rate). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Data are from PitchBook and NBER TAXSIM.

Table IA14: Impact of QSBS Tax Benefits on Syndication: Number of Investors

	All Investors		VCs		Angels		Corporates	
Estimation Method:	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable = Number of Investors								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$	−0.659***	−0.173***	−0.994***	−0.215***	−0.673	−0.108	−0.648	−0.144
	(−5.32)	(−6.41)	(−6.00)	(−6.23)	(−1.41)	(−1.61)	(−1.12)	(−0.94)
Observations	113,103	113,103	55,626	55,626	23,132	23,132	7,262	7,262
Adj. R^2 / Pseudo-R^2	0.31	0.31	0.22	0.23	0.23	0.29	0.17	0.24
Mean Dependent Variable	6.191	6.191	5.982	5.982	10.136	10.136	5.218	5.218
Investor × Industry FE	✓	✓	✓	✓	✓	✓	✓	✓
Investor State × Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Industry × Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Industry × Firm State FE	✓	✓	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓	✓	✓

This table re-estimates the syndication result of Table 3 using the number of investors in the funding round as a continuous dependent variable, rather than the above-median multi-investor indicator. For each investor type, the effect is estimated by ordinary least squares (OLS, odd columns) and by Poisson pseudo-maximum-likelihood (PPML, even columns), the latter appropriate for a count outcome. Each cell reports the coefficient on $\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Post}\}$, where $\mathbb{1}\{\text{Eligible}\}$ indicates QSBS-eligible sectors and $\mathbb{1}\{\text{Post}\}$ indicates investments made after 2009. The OLS coefficient measures the change in the number of investors per round; the PPML coefficient is a semi-elasticity, i.e., the proportional change in the count. All specifications include Investor×Industry, Investor State×Year, Industry×Year, and Industry×Firm State fixed effects, with standard errors clustered at the investor level. Test statistics (t for OLS, z for PPML) are shown in parentheses. 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 IA15: Impact of QSBS Tax Benefits on Investment Selection: FE Specification Comparison

		Dependent Variable					
		𝟙{Pre-Commercial}	𝟙{Has Debt}	𝟙{Diff. State}	𝟙{New Industry}	𝟙{First Funding}	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***	0.023**	0.043*	0.048*	0.018**	−0.073***
	Robustness						
1	Inv + Ind + InvState	0.021***	0.001	0.067***	0.047**	0.012**	−0.108***
2	Inv + Ind + InvState×Year	0.023***	0.003	0.065***	0.050**	0.015***	−0.093***
3	Inv×Ind + FirmState + Ind×Year×InvState	0.025***	0.021**	0.041*	0.052**	0.014*	−0.077***
4	Inv×Ind + FirmState + Ind×Year + InvState×Year	0.024***	0.023**	0.040*	0.046*	0.018***	−0.076***
5	Inv×Ind + FirmState + Ind×Year + InvCity×Year	0.028***	0.024**	0.046**	0.050*	0.016**	−0.074***
Panel B: Angel							
	Baseline						
	Inv×Ind + Ind×Year + InvState×Year + Ind×FirmState	0.003	−0.007	−0.033	0.046	0.008	0.013
	Robustness						
1	Inv + Ind + InvState	−0.003	0.002	−0.040	0.003	−0.003	−0.026
2	Inv + Ind + InvState×Year	−0.003	−0.005	−0.031	0.004	0.001	−0.014
3	Inv×Ind + FirmState + Ind×Year×InvState	0.014	−0.002	−0.018	0.028	0.022	−0.004
4	Inv×Ind + FirmState + Ind×Year + InvState×Year	0.005	−0.004	−0.031	0.046	0.006	0.012
5	Inv×Ind + FirmState + Ind×Year + InvCity×Year	0.008	−0.008	−0.044	0.056	0.015	0.023
Panel C: Corporate							
	Baseline						
	Inv×Ind + Ind×Year + InvState×Year + Ind×FirmState	−0.020	0.044	−0.072	0.123	−0.004	0.002
	Robustness						
1	Inv + Ind + InvState	−0.020	0.023	−0.083	0.059	−0.042	−0.044
2	Inv + Ind + InvState×Year	−0.024	0.030	−0.084	0.060	−0.022	−0.001
3	Inv×Ind + FirmState + Ind×Year×InvState	−0.001	0.056	−0.089	0.091	0.002	0.037
4	Inv×Ind + FirmState + Ind×Year + InvState×Year	−0.025	0.040	−0.066	0.096	−0.002	0.004
5	Inv×Ind + FirmState + Ind×Year + InvCity×Year	−0.032	0.057	−0.086	0.124*	0.024	0.009

This table presents robustness checks for the main investment selection results. Each row shows the coefficient on 𝟙{Eligible} × 𝟙{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) Has debt, an indicator equal to one if the firm has outstanding private debt or raised debt (excluding convertibles and SAFEs) in the financing year or prior year; (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 any form of debt (including private debt) at the time of the initial investment; and (6) Multi-Investor, with an indicator for deals with five or more investors (above the sample median). 𝟙{Eligible} indicates QSBS-eligible sectors, and 𝟙{Post} is an indicator for investments made after 2009. The baseline specification includes Investor×Industry, Industry×Year, InvState×Year, and Industry×FirmState fixed effects. Specifications 1–5 are robustness checks that progressively vary the fixed-effect structure, from 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 IA16: Impact of QSBS Tax Benefits on Investment Selection: Clustering Robustness

	Dependent Variable					
	𝟙{Pre-Commercial}	𝟙{Has Debt}	𝟙{Diff. State}	𝟙{New Industry}	𝟙{First Funding}	𝟙{Multi-Investor}
Clustering	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Venture Capital						
Baseline						
Investor	0.025***	0.023**	0.043*	0.048*	0.018**	−0.073***
Robustness						
1 Investor × Industry	0.025***	0.023**	0.043*	0.048*	0.018**	−0.073***
2 Investor × Year	0.025***	0.023**	0.043*	0.048*	0.018**	−0.073***
3 Investor & Company	0.025***	0.023*	0.043*	0.048*	0.018**	−0.073**
4 Investor × Year & Company	0.025***	0.023*	0.043*	0.048*	0.018*	−0.073**
5 Investor & Firm State	0.025***	0.023*	0.043**	0.048***	0.018*	−0.073***
Panel B: Angel						
Baseline						
Investor	0.003	−0.007	−0.033	0.046	0.008	0.013
Robustness						
1 Investor × Industry	0.003	−0.007	−0.033	0.046	0.008	0.013
2 Investor × Year	0.003	−0.007	−0.033	0.046	0.008	0.013
3 Investor & Company	0.003	−0.007	−0.033	0.046	0.008	0.013
4 Investor × Year & Company	0.003	−0.007	−0.033	0.046	0.008	0.013
5 Investor & Firm State	0.003	−0.007	−0.033	0.046	0.008	0.013
Panel C: Corporate						
Baseline						
Investor	−0.020	0.044	−0.072	0.123	−0.004	0.002
Robustness						
1 Investor × Industry	−0.020	0.044	−0.072	0.123	−0.004	0.002
2 Investor × Year	−0.020	0.044	−0.072	0.123	−0.004	0.002
3 Investor & Company	−0.020	0.044	−0.072	0.123	−0.004	0.002
4 Investor × Year & Company	−0.020	0.044	−0.072	0.123	−0.004	0.002
5 Investor & Firm State	−0.020	0.044	−0.072	0.123*	−0.004	0.002

This table presents clustering-robustness checks for the main investment selection results. The baseline specification (Investor × Industry, Industry × Year, InvState × Year, and Industry × FirmState fixed effects) is held fixed across all rows; only the level at which standard errors are clustered varies. Each row reports the coefficient on 𝟙{Eligible} × 𝟙{Post}. Because clustering does not affect point estimates, coefficients are identical across rows within each panel and only the standard errors (and resulting significance levels) differ. The baseline clusters at the investor level; alternatives include interaction-based clustering (rows 1–2) and two-way clustering (rows 3–5, denoted with "&") along combinations of investor, company, year, and firm-state dimensions. The dependent variables are as in Table IA15. 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 IA17: 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 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. 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 IA18: Impact of QSBS Tax Benefits on Investment Outcomes: Estimation with Binary Models

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

This table presents estimates of the effect of QSBS tax benefits on VC-backed investment outcomes using binary models. All variables are demeaned by year to control for time-varying factors. Columns (1) and (2) show results for business closure outcomes, while Columns (3) and (4) show 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 IA19: Angel Triple-Difference by VC Penetration: SUTVA Spillovers Check

	Low-VC cells (Angels) (1)	High-VC cells (Angels) (2)	All cells (Angels) (3)	Low-VC cells (VCs, sanity) (4)
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	0.001	0.001	0.018**
	(1.02)	(0.24)	(0.34)	(1.99)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.011	0.010*	0.011***	−0.004
	(1.54)	(1.85)	(4.03)	(−0.46)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.017**	−0.019***	−0.014***	−0.032***
	(−2.22)	(−3.56)	(−4.69)	(−3.66)
Observations	45,571	148,283	302,134	43,194
Adjusted R^2	0.11	0.11	0.11	0.11
Mean Dependent Variable	0.018	0.018	0.019	0.018
Panel B: Dependent Variable $= \mathbb{1}\{$*Five Years Without Funding*$\}$				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.108	0.045	0.048	0.097*
	(1.50)	(0.77)	(1.36)	(1.91)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.071	−0.046	−0.045	−0.085*
	(−1.00)	(−0.81)	(−1.31)	(−1.71)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.110	−0.061	−0.065*	−0.096*
	(−1.58)	(−1.12)	(−1.95)	(−1.86)
Observations	45,571	148,283	302,134	43,194
Adjusted R^2	0.31	0.29	0.31	0.29
Mean Dependent Variable	0.071	0.058	0.070	0.052
Year FE	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓

This table re-estimates the failure triple-difference of Table 4 on subsamples defined by local VC penetration, to test whether the null angel response reflects VC–angel matching spillovers (Sørensen (2007)) rather than structural insensitivity. Each (industry × state × entry-year) cell with at least three unique investor–firm entries is classified by its VC share; "low-VC cells" have below-median VC share (where VCs are too scarce to displace angel deals), "high-VC cells" have above-median share. Columns 1–3 report the angel subsample in each cell group; column 4 reports VCs in low-VC cells, as a sanity check that VCs continue to respond structurally where they are scarce. The angel triple-difference is statistically null across all cell groups, while VCs respond, ruling out crowding-out as the explanation for the angel null. $\mathbb{1}\{\text{Eligible}\}$, $\mathbb{1}\{\text{Holding} \geq 5\}$, and $\mathbb{1}\{\text{Post}\}$ are defined as in Table 4. *t*-statistics based on standard errors clustered at the investor level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level. Data are from PitchBook.

Table IA20: Robustness: Impact of QSBS on Valuations Using Linearly Interpolated Valuations

	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)
Dependent Variable = Valuation ($ billions)								
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.004	0.039	0.069*	0.215***	−0.192***	−0.315***	−0.009	−0.073
	(0.15)	(0.75)	(1.75)	(2.60)	(−4.81)	(−3.24)	(−0.11)	(−0.53)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.075***	−0.200***	−0.144***	−0.333***	0.144***	0.041	−0.104	−0.035
	(−3.33)	(−4.25)	(−4.05)	(−4.46)	(3.84)	(0.46)	(−1.35)	(−0.32)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.077***	0.011	0.002	−0.170**	0.300***	0.355***	0.036	0.076
	(3.26)	(0.22)	(0.05)	(−2.13)	(7.85)	(3.78)	(0.44)	(0.57)
Observations	386,547	172,424	180,319	85,753	109,612	42,508	31,742	15,862
Adjusted R^2	0.51	0.54	0.52	0.56	0.47	0.49	0.54	0.58
Mean Dependent Variable	0.174	0.193	0.175	0.189	0.175	0.189	0.182	0.201
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓	✓	✓	✓	✓

This table presents robustness estimates of the effect of QSBS tax benefits on portfolio company valuations using linearly interpolated valuation measures. As in the baseline specification, the dependent variable is firm valuation in billions of dollars, and the bottom and top 1% of observations are trimmed to mitigate the influence of outliers. $\mathbb{1}\{\text{Eligible}\}$ is an indicator for QSBS-eligible sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held for at least five 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 IA21: 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 IA22: 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 IA23: Impact of QSBS Tax Benefits on VC Contract Terms

Dependent Variable:	𝟙{Participating Preferred} (1)	𝟙{Cumulative Dividends} (2)	𝟙{Redemption Rights} (3)	𝟙{Liquid Pref Multiple > 1} (4)	𝟙{Antidilution Provision} (5)
𝟙{Eligible} × 𝟙{Post}	0.091***	0.027	0.075	0.022	0.022
	(2.60)	(1.01)	(1.04)	(1.31)	(0.81)
Observations	33,121	25,232	10,351	30,345	33,121
Adjusted R^2	0.23	0.29	0.33	0.08	0.04
Mean Dependent Variable	0.232	0.154	0.254	0.025	0.906
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 contract provisions for VC investments, with each provision matched to the specific rounds in which the focal investor participated. The dependent variables are indicators for: (1) participating-preferred stock; (2) cumulative dividend provisions; (3) redemption rights; (4) liquidation-preference multiples greater than one; and (5) antidilution provisions (weighted-average or ratchet; deals with no recorded provision are coded zero). 𝟙{Eligible} indicates QSBS-eligible sectors, and 𝟙{Post} is an indicator for investments made after 2009. 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 is restricted to VC investments from 2004–2017. *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 IA24: 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 IA25: VC versus Angel Risk-Taking Among Dual-Capacity Investors: Business Failure

Investor Capacity:	VC		Angel	
	All Firms (1)	Exited (2)	All Firms (3)	Exited (4)
Panel A: Dependent Variable $= \mathbb{1}\{$*Out of Business*$\}$				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.004	0.034***	−0.002	0.014
	(1.37)	(3.91)	(−0.30)	(0.76)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	0.011***	0.015***	0.013***	0.021**
	(4.61)	(3.06)	(3.12)	(2.23)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.018***	−0.068***	−0.017***	−0.054***
	(−5.39)	(−7.82)	(−3.08)	(−2.78)
Observations	145,295	71,316	33,140	14,078
Adjusted R^2	0.12	0.11	0.11	0.11
Mean Dependent Variable	0.017	0.035	0.017	0.039
Distinct Investors	1,186	1,006	1,183	658
Panel B: Dependent Variable $= \mathbb{1}\{$*Five Years Without Funding*$\}$				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.091***	0.065**	0.155	0.011
	(3.18)	(2.11)	(1.50)	(0.14)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.075***	−0.056*	−0.132	−0.014
	(−2.73)	(−1.81)	(−1.28)	(−0.19)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.086***	−0.068**	−0.109	0.040
	(−3.01)	(−2.16)	(−1.07)	(0.50)
Observations	145,295	71,316	33,140	14,078
Adjusted R^2	0.28	0.15	0.29	0.19
Mean Dependent Variable	0.046	0.017	0.061	0.023
Distinct Investors	1,186	1,006	1,183	658
Year FE	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓

This table presents triple-difference estimates of QSBS tax benefits on portfolio company failure, estimated *separately* on the venture-capital-vehicle deals ("VC") and personal angel deals ("Angel") of investors who appear in our sample in both capacities (at least one distinct portfolio-company investment in each). Panel A examines out-of-business status; Panel B examines funding gaps of five or more years. For each capacity, results are shown for all portfolio companies ("All Firms") and for the subset that experienced an exit ("Exited"). The specification matches the main text, with investor–firm, year, and holding-period fixed effects; the eligible, post, and eligible×post terms are absorbed by the investor–firm fixed effects. $\mathbb{1}\{\text{Eligible}\}$ indicates QSBS-qualifying sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investor entry after 2009. Estimating both vehicles on the same population of dual-capacity investors isolates the response of the investment vehicle rather than selection over which individuals become venture capitalists. Among firms that experienced an exit, the VC vehicle exhibits significantly higher business failure — the downside of greater risk-taking — while the same individuals' angel investments do not. Shaded cells highlight the triple-difference 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 IA26: VC versus Angel Valuation Among Dual-Capacity Investors

Investor Capacity:	VC		Angel	
	All Firms (1)	Exited (2)	All Firms (3)	Exited (4)
Panel A: Dependent Variable = Valuation ($ billions)				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.161*	0.204	−0.183	−0.445**
	(1.85)	(1.28)	(−1.25)	(−2.15)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.277***	−0.454***	0.104	0.018
	(−3.50)	(−3.25)	(0.80)	(0.17)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.037	−0.128	0.254**	0.329*
	(−0.44)	(−0.83)	(2.06)	(1.75)
Observations	40,639	20,169	8,277	3,723
Adjusted R^2	0.39	0.42	0.33	0.38
Mean Dependent Variable	0.184	0.183	0.186	0.190
Distinct Investors	1,002	771	732	363
Panel B: Dependent Variable = $\mathbb{1}\{Unicorn\}$				
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	0.127***	0.199***	0.030	0.025
	(2.98)	(2.93)	(0.20)	(0.12)
$\mathbb{1}\{\text{Eligible}\} \times \mathbb{1}\{\text{Holding} \geq 5\}$	−0.163***	−0.286***	−0.069	−0.249
	(−4.24)	(−4.95)	(−0.48)	(−1.38)
$\mathbb{1}\{\text{Holding} \geq 5\} \times \mathbb{1}\{\text{Post}\}$	−0.048	−0.132**	−0.043	−0.112
	(−1.12)	(−2.04)	(−0.31)	(−0.56)
Observations	41,223	20,534	8,490	3,862
Adjusted R^2	0.29	0.35	0.32	0.43
Mean Dependent Variable	0.055	0.056	0.064	0.075
Distinct Investors	1,003	773	736	365
Year FE	✓	✓	✓	✓
Holding Period FE	✓	✓	✓	✓
Investor × Firm FE	✓	✓	✓	✓
Clustered SE (Investor)	✓	✓	✓	✓

This table presents triple-difference estimates of QSBS tax benefits on portfolio company valuations, estimated *separately* on the venture-capital-vehicle deals ("VC") and personal angel-vehicle deals ("Angel") of investors who appear in our sample in both capacities. Panel A examines firm valuation in billions of dollars (with the bottom and top 1% of observations trimmed); Panel B examines unicorn status (valuation exceeding $1 billion). For each capacity, results are shown for all portfolio companies ("All Firms") and for the subset that experienced an exit ("Exited"). The specification matches the main text, with investor–firm, year, and holding-period fixed effects; the eligible, post, and eligible×post terms are absorbed by the investor–firm fixed effects. $\mathbb{1}\{\text{Eligible}\}$ indicates QSBS-qualifying sectors, $\mathbb{1}\{\text{Holding} \geq 5\}$ indicates investments held five or more years, and $\mathbb{1}\{\text{Post}\}$ indicates investor entry after 2009. Estimating both vehicles on the same population of dual-capacity investors isolates the response of the investment vehicle rather than selection over which individuals become venture capitalists. Among firms that experienced an exit, eligible long-held VC investments reach significantly higher unicorn rates, whereas the same individuals' angel investments do not and, if anything, attain lower valuations. Shaded cells highlight the triple-difference 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 IA27: 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 IA28: 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 most recent 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 and 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.