Dilution vs. Risk Taking: Capital Gains Taxes and Entrepreneurship

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How to tax capital gains?

- Current realization based system is at odds with classic law / public finance principle

$$\text{Haig–Simons' comprehensive income} = \text{consumption} + \Delta\text{wealth}$$

- Allows delaying of taxation by borrowing against assets.
- Recent proposals
  - Tax capital gains on accrual (Biden/Harris administration, H.R. 6498, Netherlands "actual return" legislative proposal)
  - Tax wealth (see BPEA 2019 Saez and Zucman / Kopczuk discussion)
- Key concern: effects on entrepreneurship (VC funded companies = 60% of IPOs and corporate R&D)

Reception in the VC Industry

National Venture Capital Association:
"direct attack on entrepreneurial ecosystem"
"slows down startup formation"
The Times (2024)

Marc Andreesen:
"makes startups completely implausible"
"kills venture capital"
"the thing that tipped me to support Donald Trump"
Vox (2024)

Heritage Foundation:
"literally forces people to sell off a portion of their investments every year"
Schemmel (2024)

Marginal Contribution and Main Results

1. New data on U.S. venture-backed startups, deals, and founders.
   - Update Hall and Woodward (2010).
   - Average equity "salary" $450,000 per year.
   - 85% of founders get zero.
   - Top 2% capture 80% of total value.
   - Pareto tail coefficient 1.03.
2. Simple model of accrual-based taxation in startup lifecycle.
   - Neutrality of valuations.
   - Accrual taxation $\approx$ actuarially unfair insurance to founders.
3. Evaluate effects of accrual-based taxation in the data.
   - Founder ownership share at exit drops by 25%.
   - Fraction receiving positive payoffs increases from 15% to 50% with complete tax credits.
   - Insurance and dilution effects cancel out with moderate risk aversion.

Literature

1. Capital gains taxation: Auerbach (1989, 1991), Poterba (1989), Kopczuk (2019), Scheuer–Slemrod (2021), Aguiar et al. (2025)
2. Returns to entrepreneurship: Hall–Woodward (2010), Smith et al. (2019, 2023), Bhandari et al. (2021, 2025)
3. Optimal taxation & entrepreneurship: Cagetti–De Nardi (2006), Scheuer (2013, 2014), Jaimovich–Rebelo (2017), Bell et al. (2019), Guvenen et al. (2023)

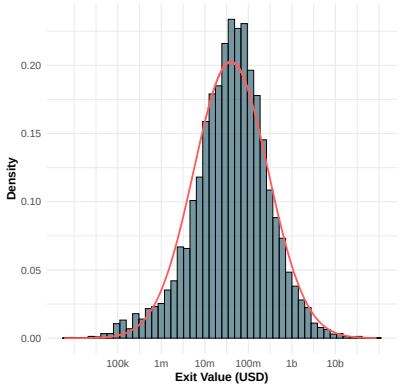
Plan

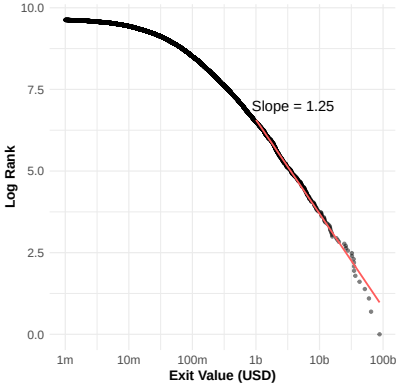
1. Data.
2. Simple model.
3. Evaluate effects of accrual-based taxation in the data.
4. Extensions.

Data

- Updating Hall and Woodward (2010).
- **Venture Capital Data on Companies, Deals, and Founders:**
  - $\approx$ universe of U.S. VC-backed startups (1987–2021).
  - Sources: *PitchBook*, *CB Insights*, *PrivCo*, *Capital IQ*, *Compustat*, SEC filings, Wikipedia.
- **Founder Identification:** Founder names compiled from *PitchBook*, *PrivCo*, and *Capital IQ*, validated on a hand-collected Wikipedia benchmark.
- **Founder Ownership (S-1 Sample):** SEC *Form S-1* filings (1,077 IPOs) used to measure within-founder ownership shares.
- 96,000 companies, 167,000 funding rounds, 48,000 exits, 185,000 founders.

Company Exit Values





$\Pr(x > 0) = 41\%$

Conditional median: \$44m

Conditional mean: \$258m

Top 1%: \$3.3bn

Example — WhatsApp

Date	Deal	Invested Capital	Postmoney Valuation	Founder Share
2010	Seed	$0.26m		80%
2011	Early VC	$8m	$40m	60%
2013	Later VC	$53m	$1.6bn	58%
2014	Acquisition	–	$17bn	58%

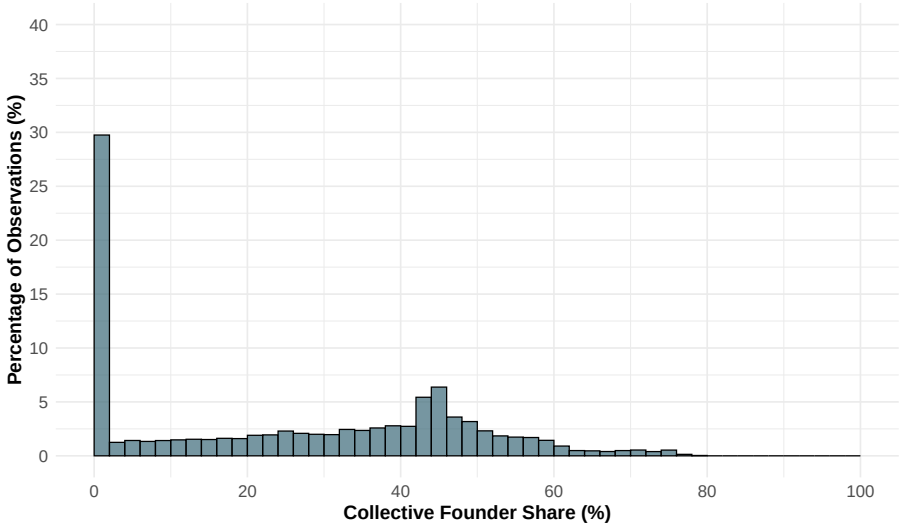
Complications:

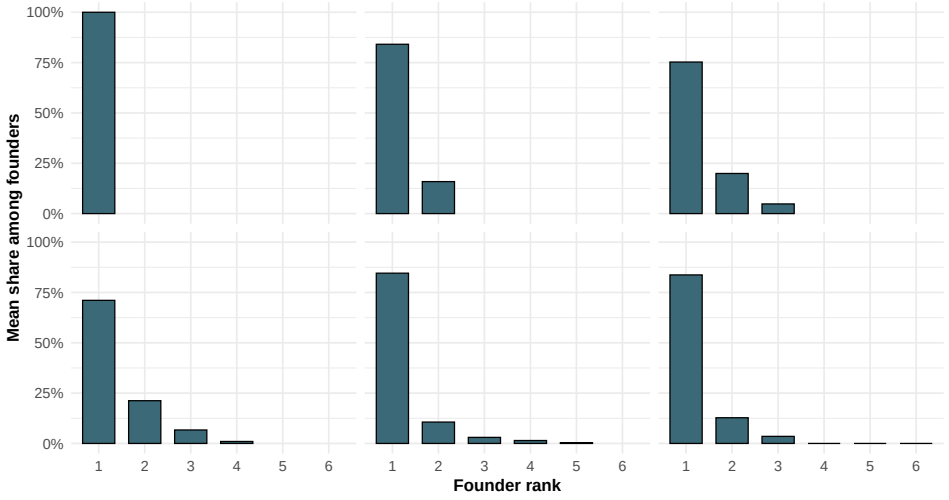
- (Convertible) debt deals
- Down rounds
- Preferences
- Employee stock
- Missing data

Example — Theranos

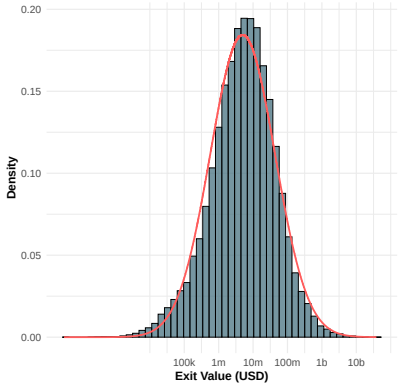
Date	Deal	Invested Capital	Postmoney Valuation	Founder Share
2005	Early VC	$7m	$27m	59%
2006	Early VC	$9m	$46m	46%
2006	Later VC	$32m	$159m	37%
2010	Later VC	$45m	$1.1bn	35%
2013	Later VC	$84m	$1.3bn	33%
2014	Later VC	$633m	$9.1bn	31%
2017	Debt	$100m	–	–
2018	Liquidation	–	–	–

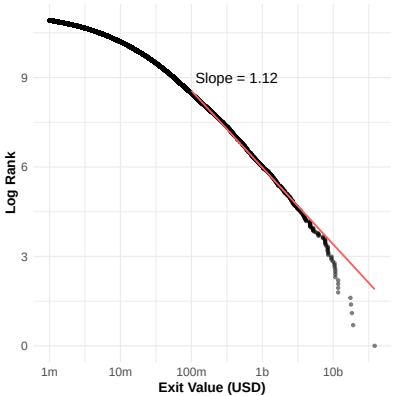
Collective Founder Share at Exit for IPO and MnA exits




Mean ranked founder shares by number of founders (S−1 sample)
Mean share among founders
100%
75%
50%
25%
0%
1
2
3
4
5
6
Founder rank

Individual Founder After-Tax Exit Values





$\Pr(x > 0) = 16\%$

Median: \$6m

Mean: \$46m

Top 1%: \$620m

Top 1% share: 45%

Top 2% share: 80%

Career Choice Model

Preferences:

$$\mathbb{E}\sum_{t=0}^{\infty}(1+r)^{-t}u(c_t).$$

Career options:

- **Worker:** earns wage w^* each period.
- **Founder:** earns wage $w < w^*$, but with probability π receives a jackpot payoff x and becomes a worker.

Critical Paycut:

Δ such that startup wage of $w^* - \Delta$ makes the founder indifferent between careers.

Quantitative Results

$$\Delta = \beta\pi\,\mathbb{E}[x] \approx \underbrace{\beta}_{\text{risk discount}} \times \underbrace{6.4\%}_{\text{exit rate}} \times \underbrace{\$7.2\text{m}}_{\mathbb{E}[x]} \approx \beta \times \$460\text{k}$$

risk aversion σ	critical paycut Δ	risk discount β
0.0	\$462,719	100.0%
0.9	\$57,946	12.5%
2.0	\$23,731	5.1%

Notes: $r = 5\%$, worker wage = \$194,126, initial assets = \$1,000,000, capital gains tax = 20%.

Plan

1. Data.
2. Simple model.
3. Evaluate effects of accrual-based taxation in the data.
4. Extensions.

Simple Model

Timeline:

- $t = 0$: Company founded, value 0.
- $t = 1$: VC invests d.
- $t = 2$: Company value realized $y = Y$ with probability p otherwise $y = 0$.

Contract:

- VC gets fraction $1 - s$ of company at $t = 1$.
- Notation: pre-money valuation v, post-money $v + d$, so $s = v/(v + d)$.
- Equilibrium: s set so that VC gets expected return ψ.

Solution without taxes

Post-money valuation is expected discounted value:

$$v + d = \frac{pY}{1+\psi}.$$

Investor break-even implies that s solves

$$(1-s)pY = (1+\psi)d.$$

So founders expected payoff is

$$pY - (1+\psi)d.$$

Numerical Example

Parameters:

$$Y = 100 \text{ million}, \quad p = 10\%, \quad d = 5 \text{ million}, \quad \psi = 20\%$$

Compute valuations:

$$v + d = \frac{pY}{1+\psi} = \frac{0.1 \times 100}{1.2} = 8.33 \text{ million}.$$

$$v = 8.33 - 5 = 3.33 \text{ million}.$$

Shares:

$$s = \frac{v}{v+d} = \frac{3.33}{8.33} = 0.40.$$

Founders own 40%, VC owns 60%.

Expected payoff to founders: 4 million.

Capital Gains Taxes

- **Tax rate** τ
- **Realization-based:** taxes due at $t = 2$
- **Accrual-based:** fraction **accrual level** $\alpha \in [0, 1]$ due at $t = 1$.
- Founders sell shares at $t = 1$.
- If company fails at $t = 2$, each \$1 of tax credit valued at $\phi \leq 1$.
- Period 1 taxes paid: $T = \alpha\tau v + (1 - \alpha)\tau T$.

Effects of increasing Accrual Level α

Neutrality results. The following do not depend on the accrual level α:

- Investor welfare.
- Pre-money and post-money valuations.
- Government welfare.

Increase in total investment:

- Total investment $d + T$ increases in α.
- Founder share s decreases in α.

Effects on founders:

- Failed founders ($y = 0$) receive some tax credits.
- Successful founders' ($y = Y$) payoff goes down.
- Average founder payoff is lower.

Main Tradeoff

Founders get more insurance. But at an actuarially unfair price to get costly additional venture capital finance.

Average founder payoff:

$$\underbrace{(1-\tau)(\mathbb{E}[y]-\tilde{\Psi}d)}_{\text{mean jackpot in realization regime}} - \underbrace{(1-\tau)(\tilde{\Psi}-1)T}_{\text{mean additional cost of capital}} - \underbrace{(1-\phi)(1-p)(1-\tau)T}_{\text{unused tax credits}},$$

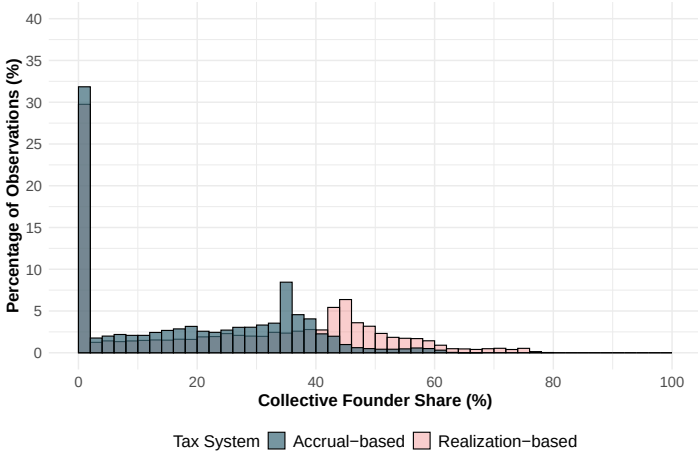
where

$$\tilde{\Psi} \equiv 1 + \frac{\psi}{1-\tau} + \frac{\tau}{1-\tau}(1-p)(1-\phi).$$

Plan

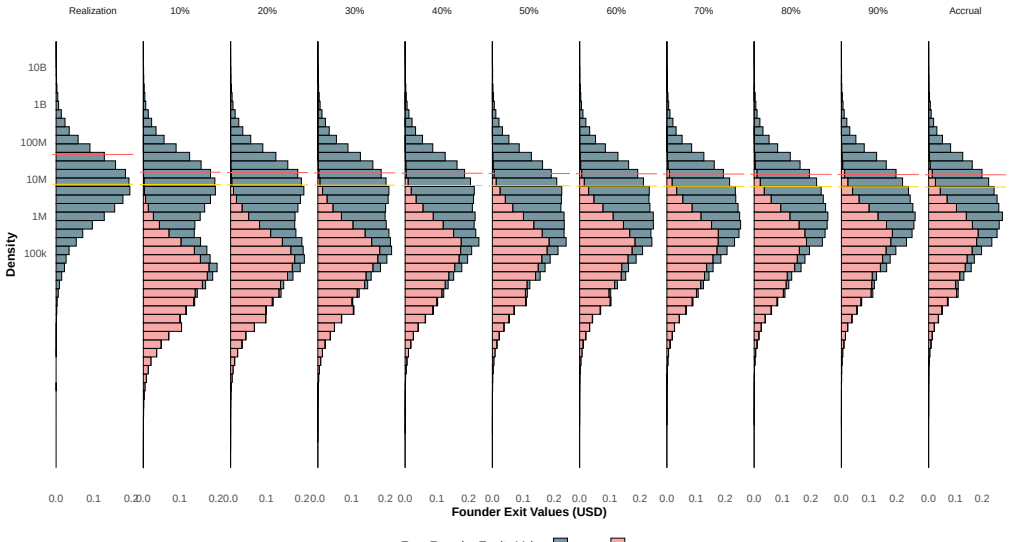
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Quantitative Results: Extra Dilution



Average collective founder share at exit drops by 25% under accrual-based taxes

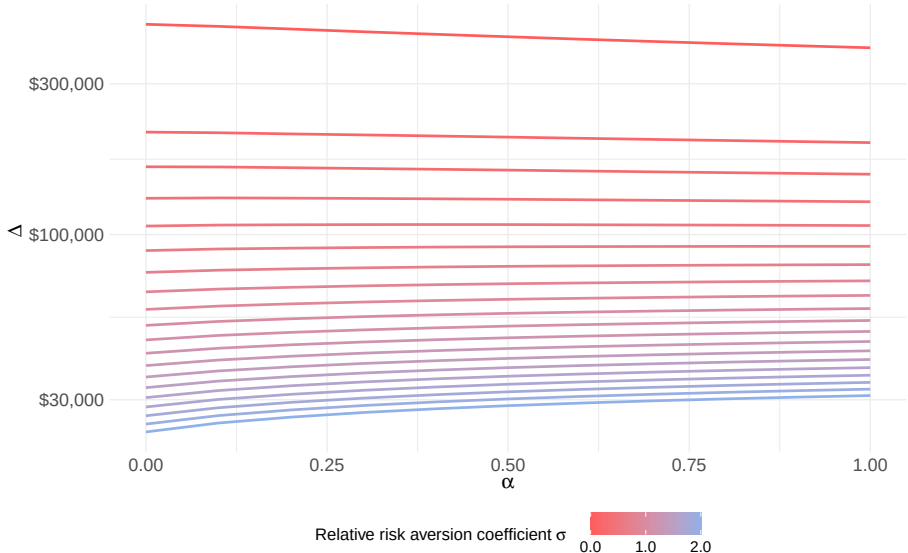
Effect on Founder Payoffs (costly insurance)



Effect on Founder Payoffs (costly insurance)

Accrual Level α	All Exit Values			Positive Exit Values			
	Average Tax Refund	Probability Positive	Mean	Mean	Median	99th Percentile	Pareto Tail Coefficient
0%	0.000	16%	7.2	45.6	5.558	621	1.03
10%	0.043	47%	7.1	15.2	0.070	236	1.03
20%	0.085	47%	7.0	14.9	0.126	227	1.03
30%	0.124	47%	6.8	14.6	0.177	220	1.04
40%	0.162	47%	6.7	14.3	0.220	214	1.05
50%	0.198	47%	6.6	14.1	0.259	206	1.05
60%	0.232	47%	6.5	13.8	0.296	202	1.06
70%	0.265	47%	6.4	13.6	0.330	198	1.07
80%	0.293	47%	6.3	13.4	0.360	194	1.07
90%	0.321	47%	6.2	13.2	0.389	191	1.08
100%	0.347	47%	6.1	13.0	0.416	187	1.08

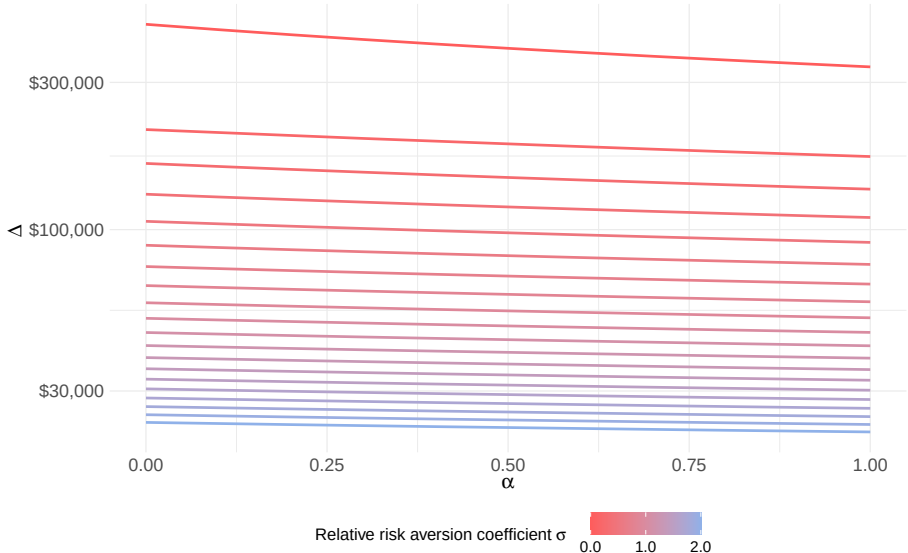
Effect on Value of Entrepreneurship (sign depends on risk aversion)



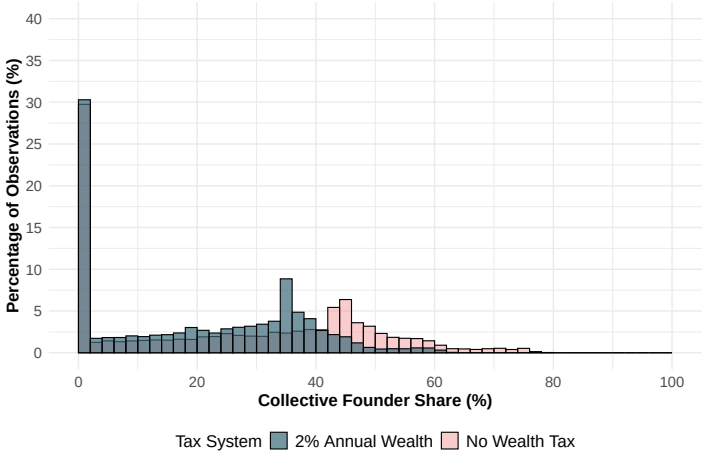
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   - Loss carry-forward
   - Wealth tax
   - Ex-post risk vs. ex-ante heterogeneity

Loss Carryforward

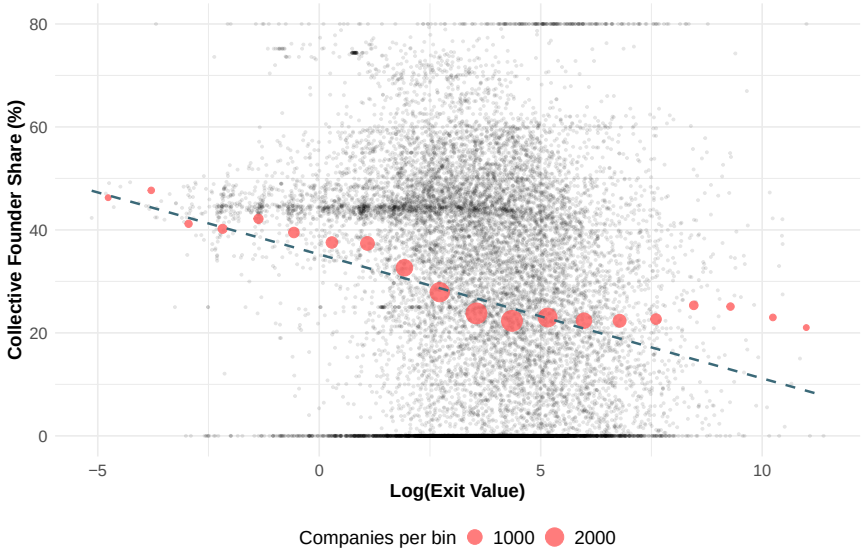


Additional Wealth Tax of 2%



Similar loss in ownership as accrual-based taxation.

Ex-ante Heterogeneity vs. Ex-post Risk



Ex-ante Heterogeneity vs. Ex-post Risk

Round	N	Prob. Positive Value	Mean	P25	P50	P75	IQR
1st	43,638	50%	283	19	58	161	142
2nd	24,441	66%	332	30	76	200	170
3rd	15,623	73%	403	41	100	257	216
4th	9,598	76%	498	54	129	333	279
5th	5,610	78%	591	66	152	407	341
6th	3,244	80%	785	76	184	502	426
7th	1,784	82%	1024	88	229	591	502

Conclusion

- New evidence on VC founder payoffs (power law)
- Accrual-based taxation causes ownership dilution through advance tax payments
- Provides downside insurance through early cashing out
- Loss provisions are key for risk-sharing benefits
- Key open question: why don't contracts provide this insurance already?