

Dilution vs. Risk Taking:

Capital Gains Taxes and Entrepreneurship

Eduardo Azevedo
Wharton

Florian Scheuer
Zurich

Kent Smetters
Wharton

Min Yang
Zurich

Capital gains taxes in practice

- Capital gains typically taxed upon realization

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- Capital gains typically taxed **upon realization**
- But recent policy proposals
 - tax capital gains **on accrual**
(Biden/Harris administration, Netherlands...)
 - tax **wealth**
(Piketty, Zucman, CA...)
- Old idea: **Haig-Simons** comprehensive income tax

$$\text{income} = \text{consumption} + \Delta \text{ wealth}$$

Effects on entrepreneurship?

National Venture Capital Association

“direct attack on
entrepreneurial
ecosystem”

“slows down startup
formation”

The Times (2024)

Marc Andreessen

“makes startups
completely implausible”

“kills venture capital”

“the thing that tipped me
to support Donald
Trump”

Vox (2024)

Philippe Aghion

“Mistral AI would have
to find financiers to pay
its taxes instead of being
able to fund innovation”

“turns France into
Camembert country”

BFM2 (2025)

What we do

- Entrepreneurs face lots of risk
 - Under-entry?
- Dilution of illiquid founders from pre-exit tax payments
 - Loss of control?

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This paper

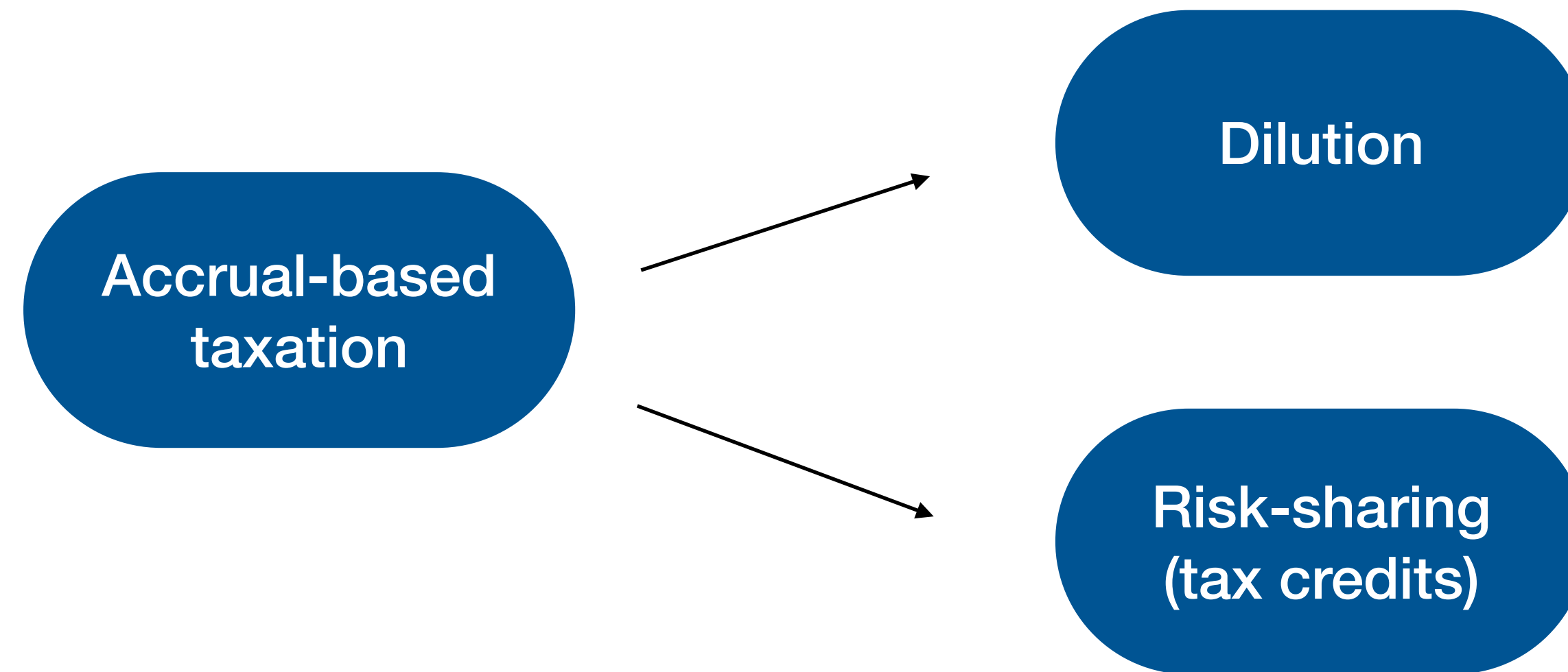
1. Returns to high-powered entrepreneurship?
 - New data on U.S. venture-backed startups, deals and founders
2. Impact of capital gains tax regimes?
 - Effects on founders, VCs and gov't

What we find

Payoffs extremely skewed: 88% get zero, top 1% capture 79% of total value, Pareto tail

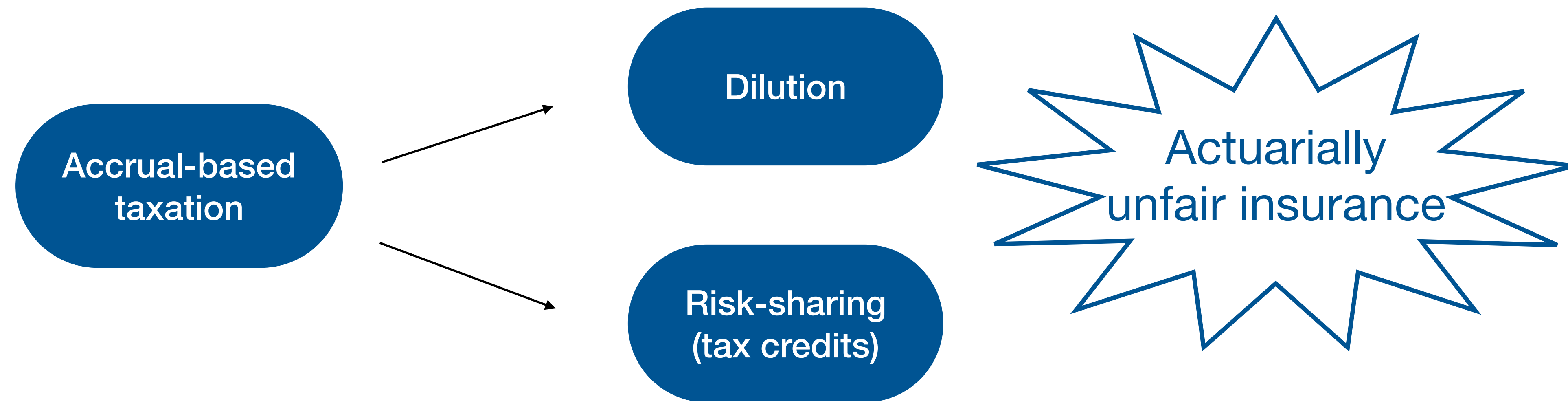
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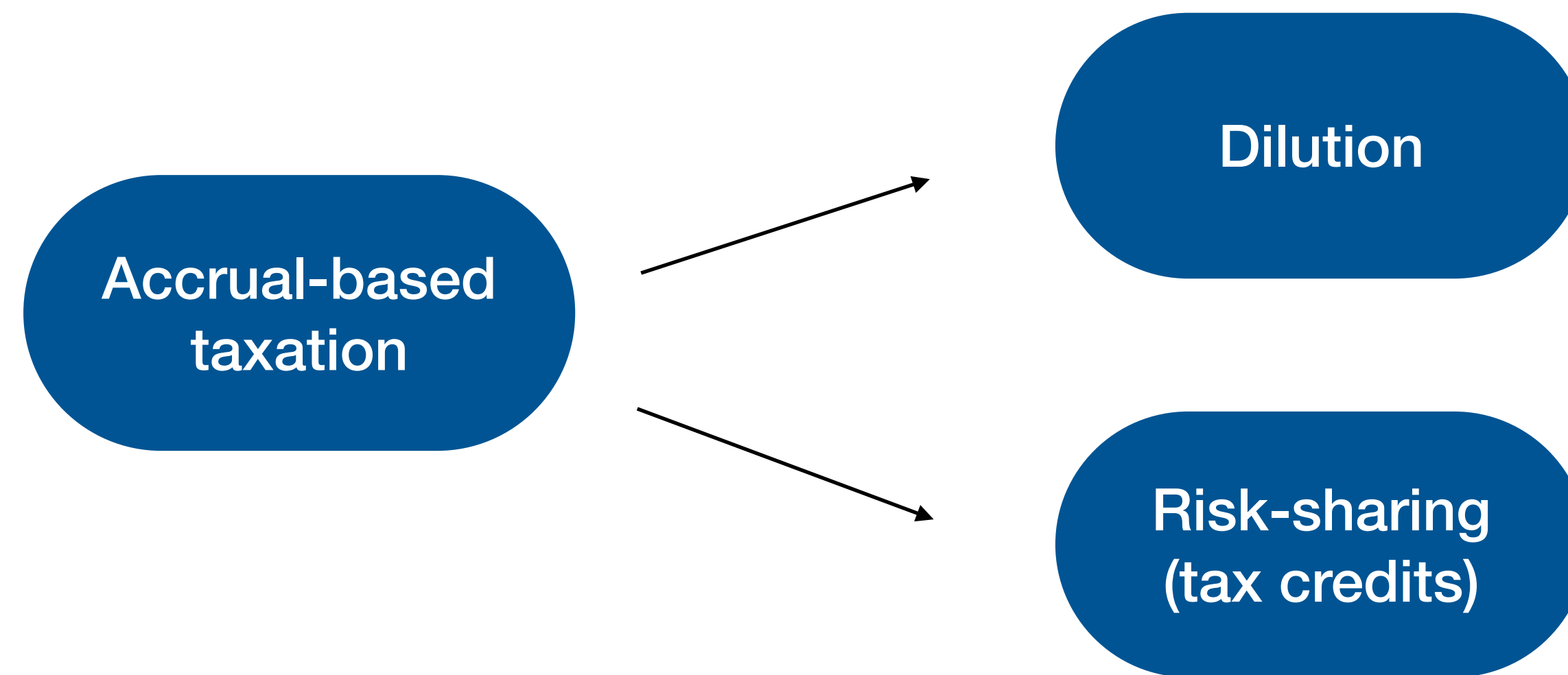
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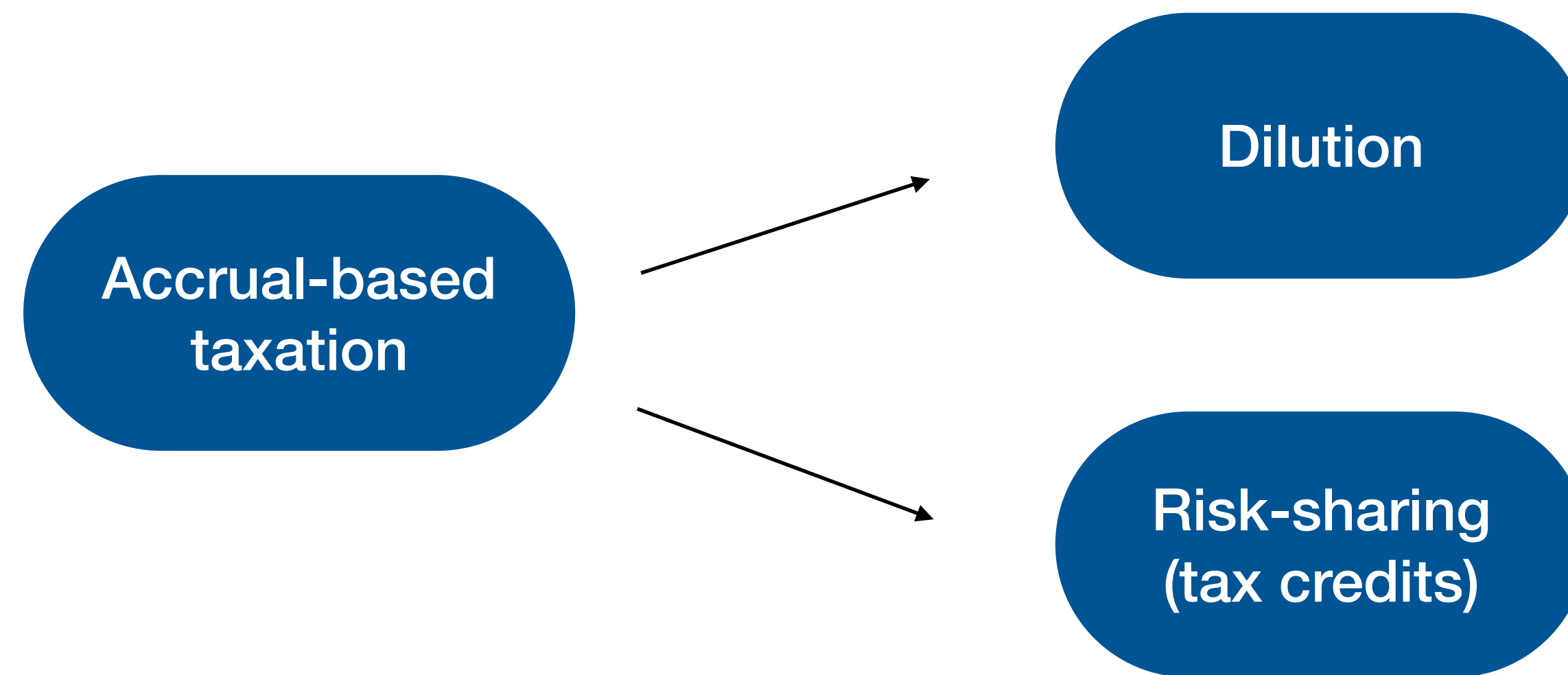
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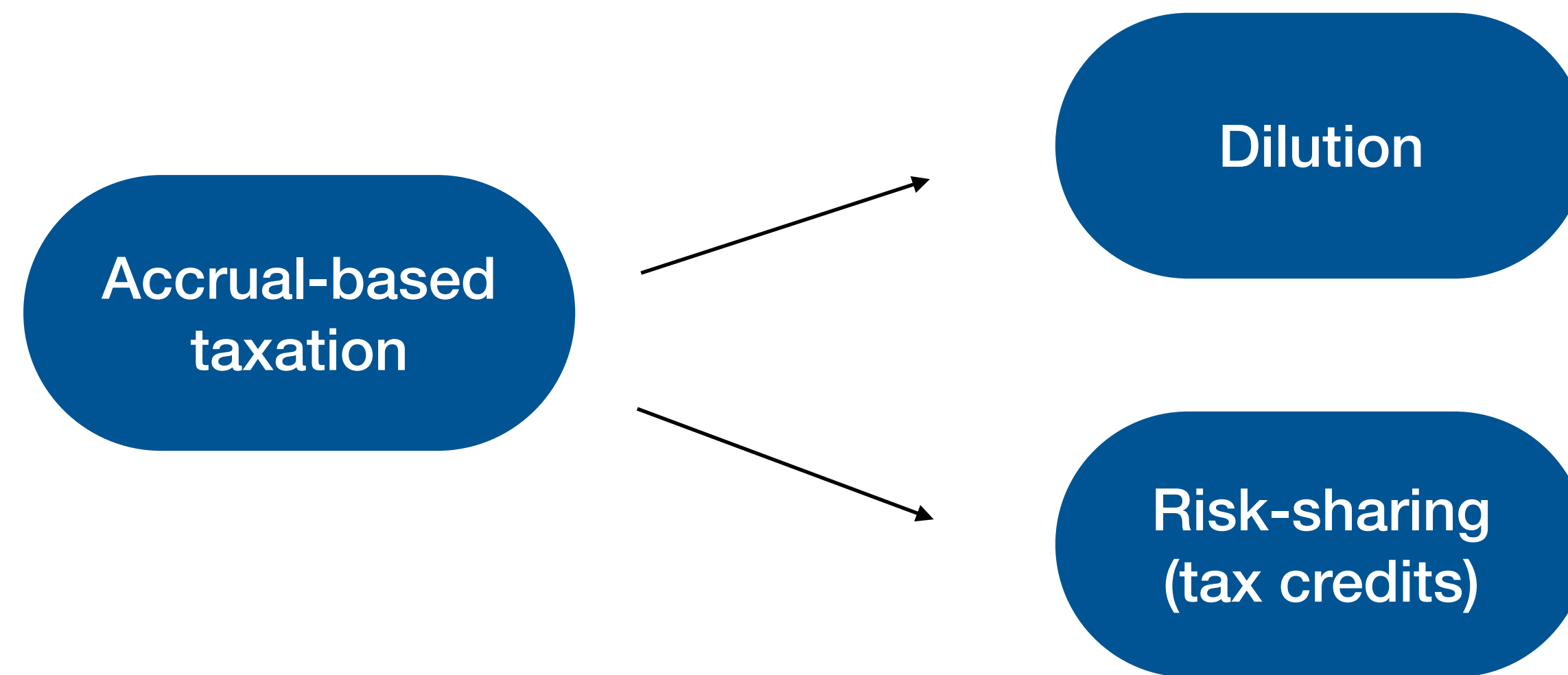
Founders' ownership share decreases by 25% at exit

Fraction receiving positive payoffs increases from 12% to 44% with complete tax credits

Effects on entrepreneurship crucially depend on loss provisions

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Founders' ownership share decreases by 25% at exit

Fraction receiving positive payoffs increases from 12% to 44% with complete tax credits

Effects on entrepreneurship crucially depend on loss provisions

Literature

1. Capital gains taxation

Auerbach (1989, 1991), Poterba (1989), Chari et al. (2005), [Kopczuk \(2019\)](#), [Scheuer-Slemrod \(2021\)](#), Aguiar et al. (2025)

2. Returns to entrepreneurship, income and wealth inequality

Hamilton (2000), [Hall-Woodward \(2010\)](#), Kerr et al. (2014), Smith et al. (2019, 2023), Bhandari et al. (2021, 2025), Gocmen et al. (2025)

3. Optimal taxation and entrepreneurship

Cagetti-De Nardi (2006), Scheuer (2013, 2014), Shourideh (2014), Jaimovich-Rebelo (2017), Bell et al. (2019), Dyrda-Pugsley (2022), Kindermann-Krueger (2022), Jones (2022), Guvenen et al. (2023), [Bhandari et al. \(2024\)](#)

Plan

1. Data and evidence

- Company exit values
- Founder dilution

2. Value of entrepreneurship

3. Accrual-based taxation

- Stylized model of startup lifecycle
- Quantitative career-choice model

4. Extensions

- Loss offset rules, wealth tax

Data and Evidence

Data

Universe of U.S. VC-backed companies

Sourcing from PitchBook, PrivCo, Capital IQ, CB Insights, Compustat, SEC filings

- 157,669 companies founded between 1987 and 2025
- 82,569 exits
- 288,021 funding deals
- 248,454 founders
- 1,300 cap tables from S-1 filings (IPOs)

Data

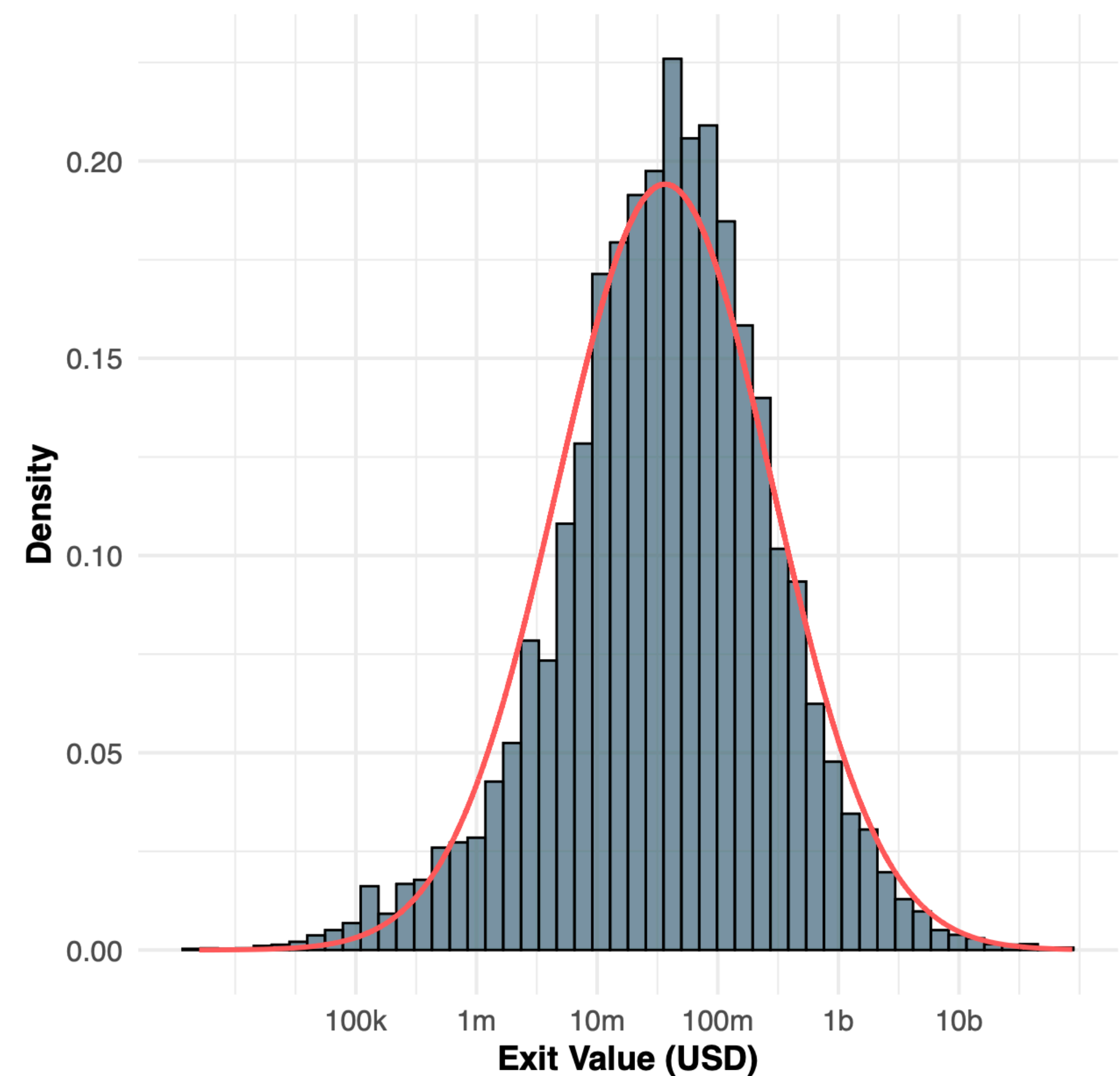
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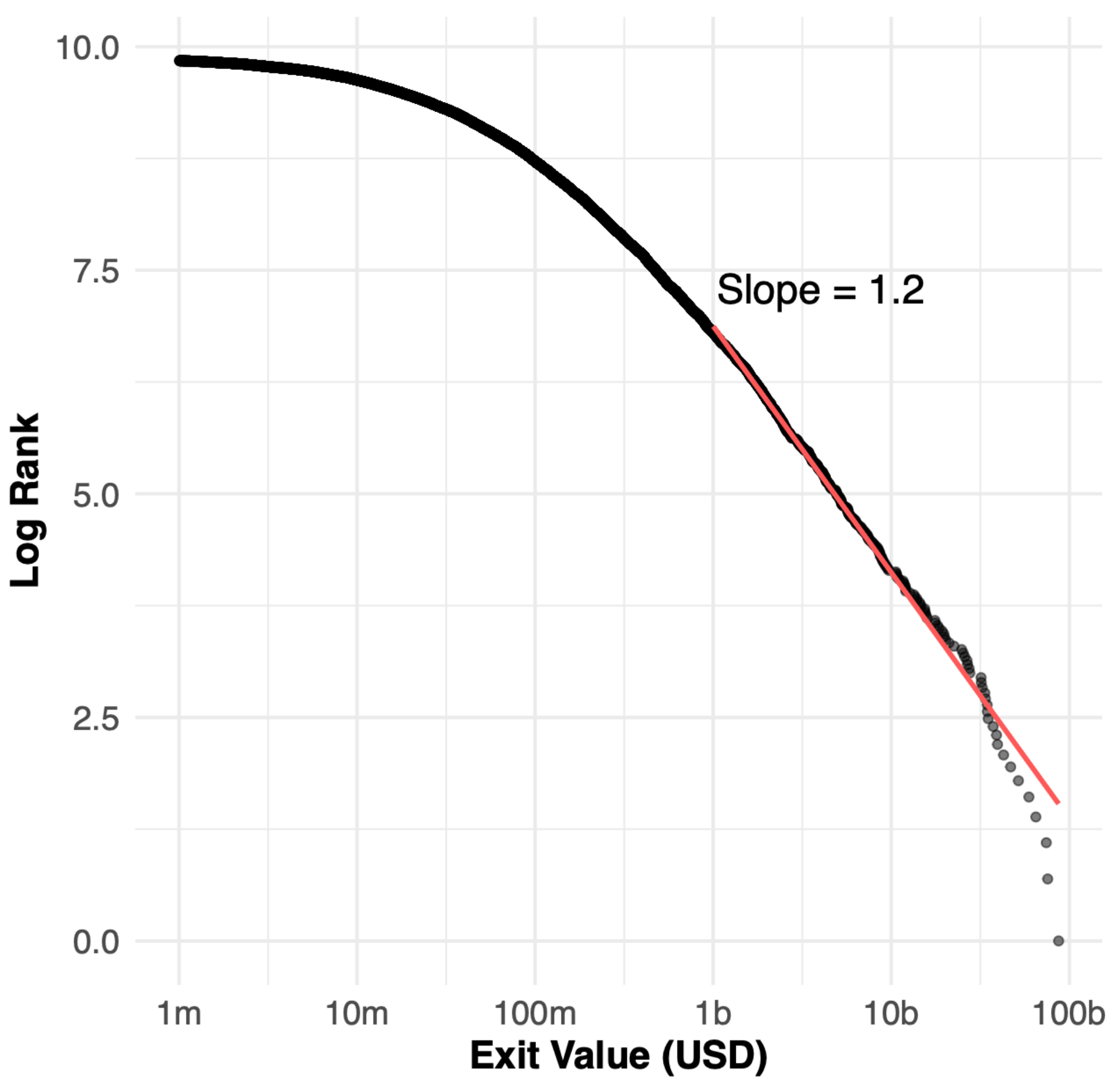
Exit type	#
IPO	2,669
Merger/acquisition	22,640
Shutdown	57,260
Ongoing	75,100

Company exit values



$\Pr(x>0)=31\%$

cond'l median \$40m



cond'l mean \$283m

top 1% \$3.9bn

Dilution — WhatsApp

Date	Deal	Premoney Valuation	Invested Capital	Postmoney Valuation	Founder Share
2010	Seed		\$0.26m		80%
2011	Early VC	\$32m	\$8m	\$40m	60%
2013	Later VC	\$1.5bn	\$53m	\$1.6bn	58%
2014	Acquisition			\$17bn	

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Complications:

- (convertible) debt deals
- down rounds
- preferences
- employee stock

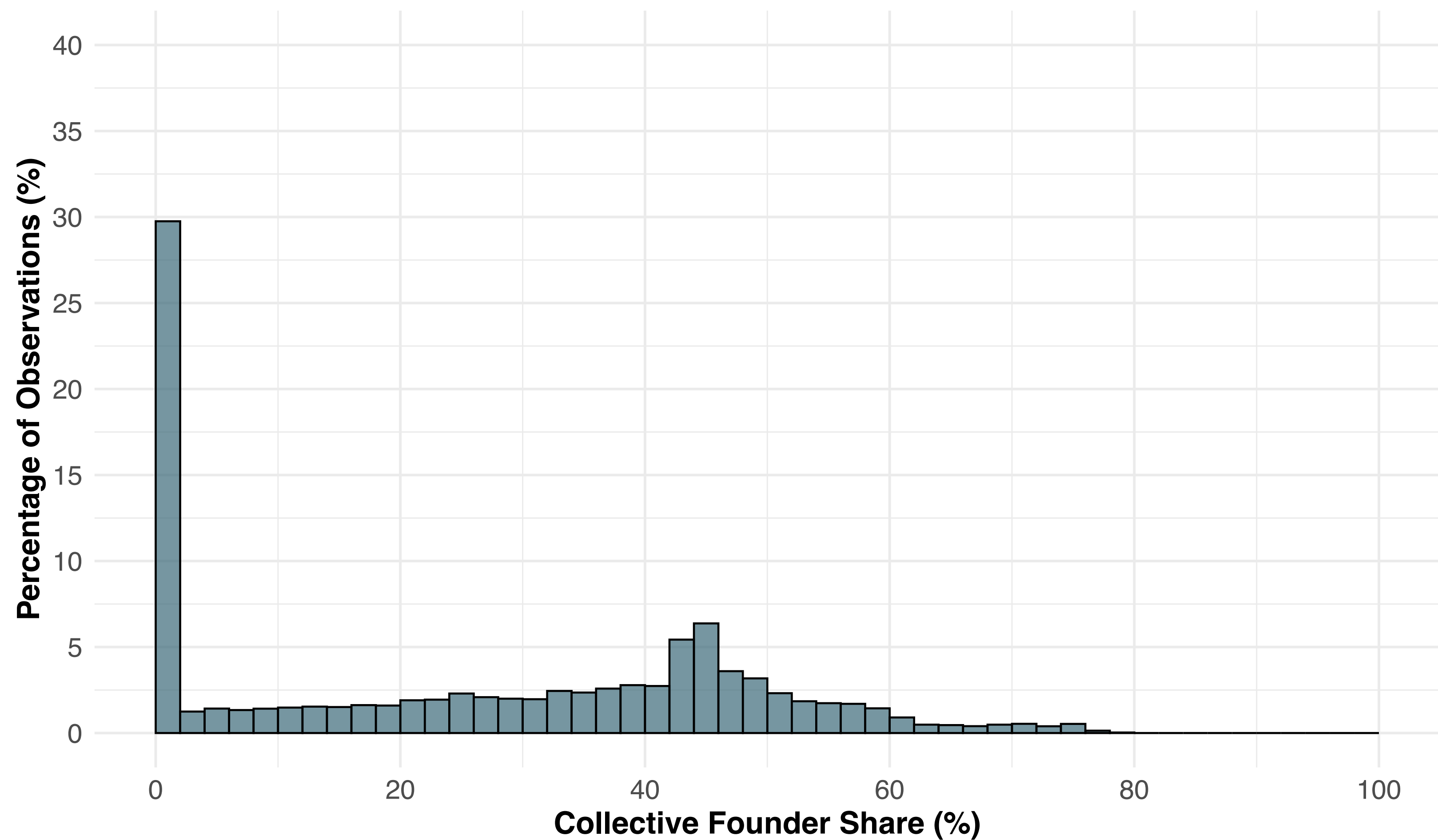
Example — Dropbox

Date	Deal	Invested Capital	Postmoney Valuation	Founder Share
2007	Incubator	\$15k		80%
2007	Seed	\$1.25m	\$4.75m	59%
2008	Early VC	\$6m	\$25m	45%
2011	Early VC	\$250m	\$4bn	42%
2014	Later VC	\$350m	\$10bn	41%
2017	Later VC	N/A	N/A	41%
2018	IPO		\$7.5bn	

Example — Theranos

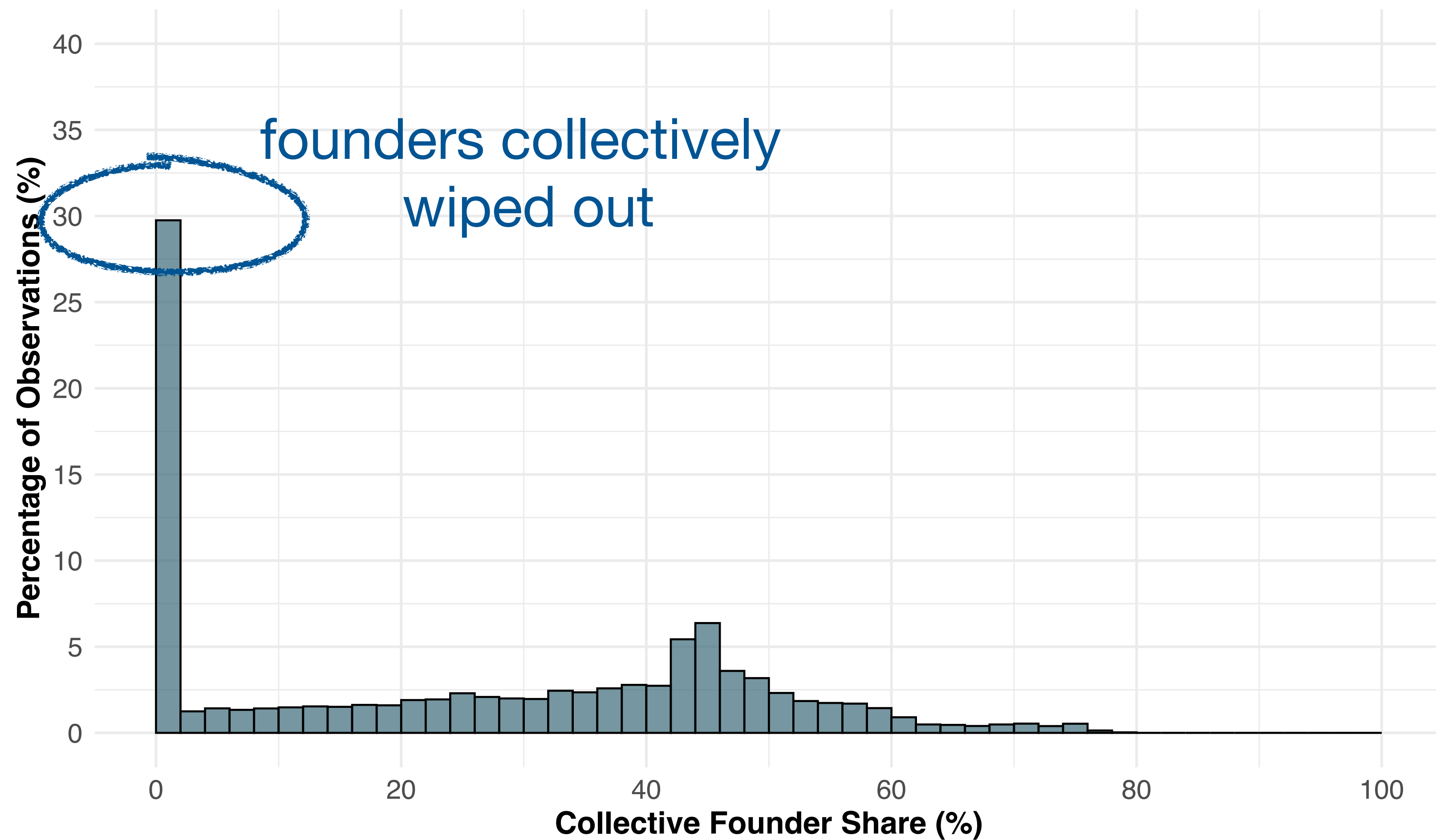
Date	Deal	Invested Capital	Postmoney Valuation	Founder Share
2005	Early VC	\$7m	\$27m	59%
2006	Early VC	\$9m	\$46m	46%
2006	Later VC	\$32m	\$159m	37%
2010	Later VC	\$45m	\$1.1bn	35%
2013	Later VC	\$84m	\$1.3bn	33%
2014	Later VC	\$633m	\$9.1bn	31%
2017	Debt	\$100m		
2018	Liquidation			

Dilution



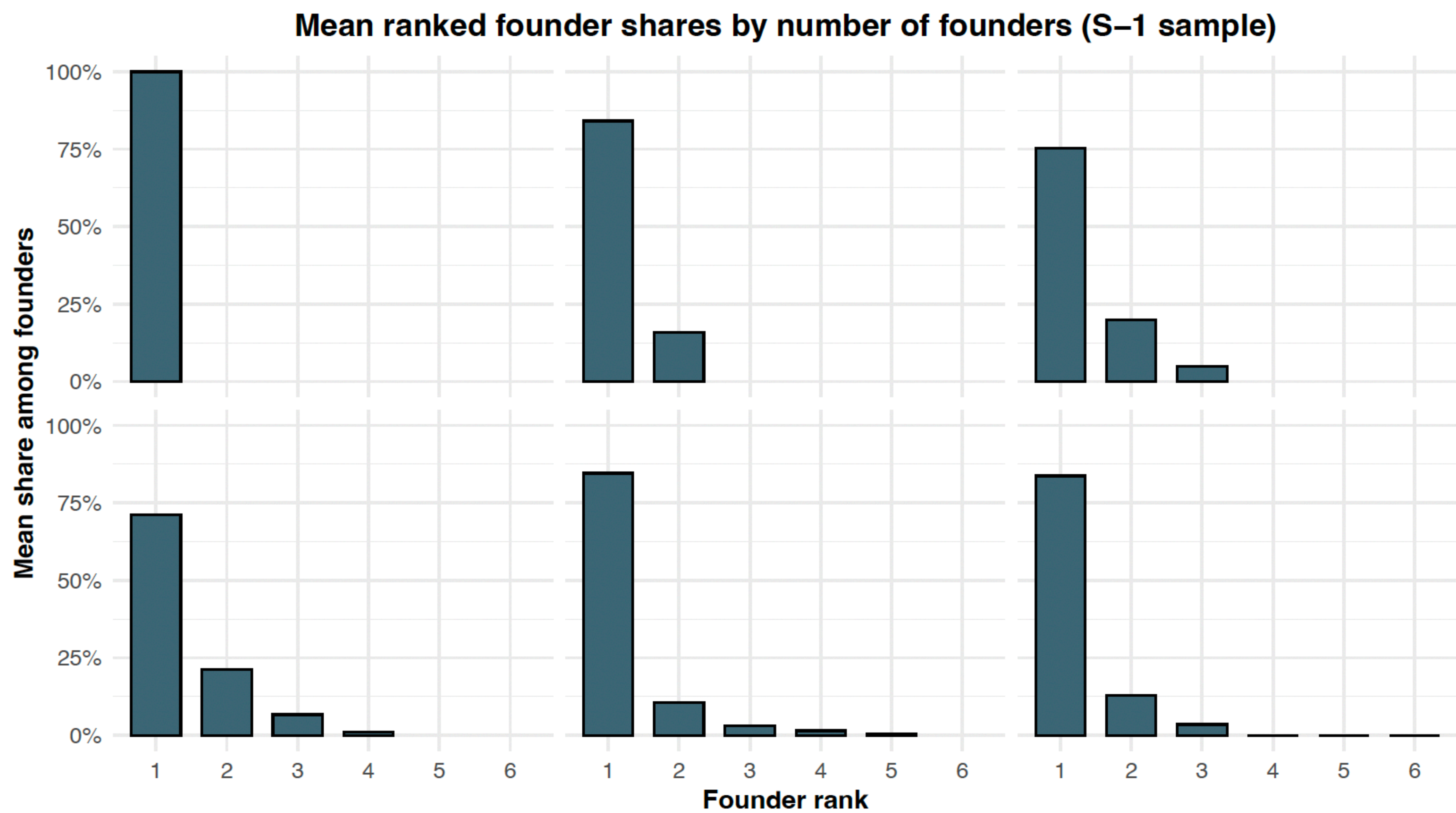
Distribution of collective founder shares at exit among all IPOs and M&As

Dilution



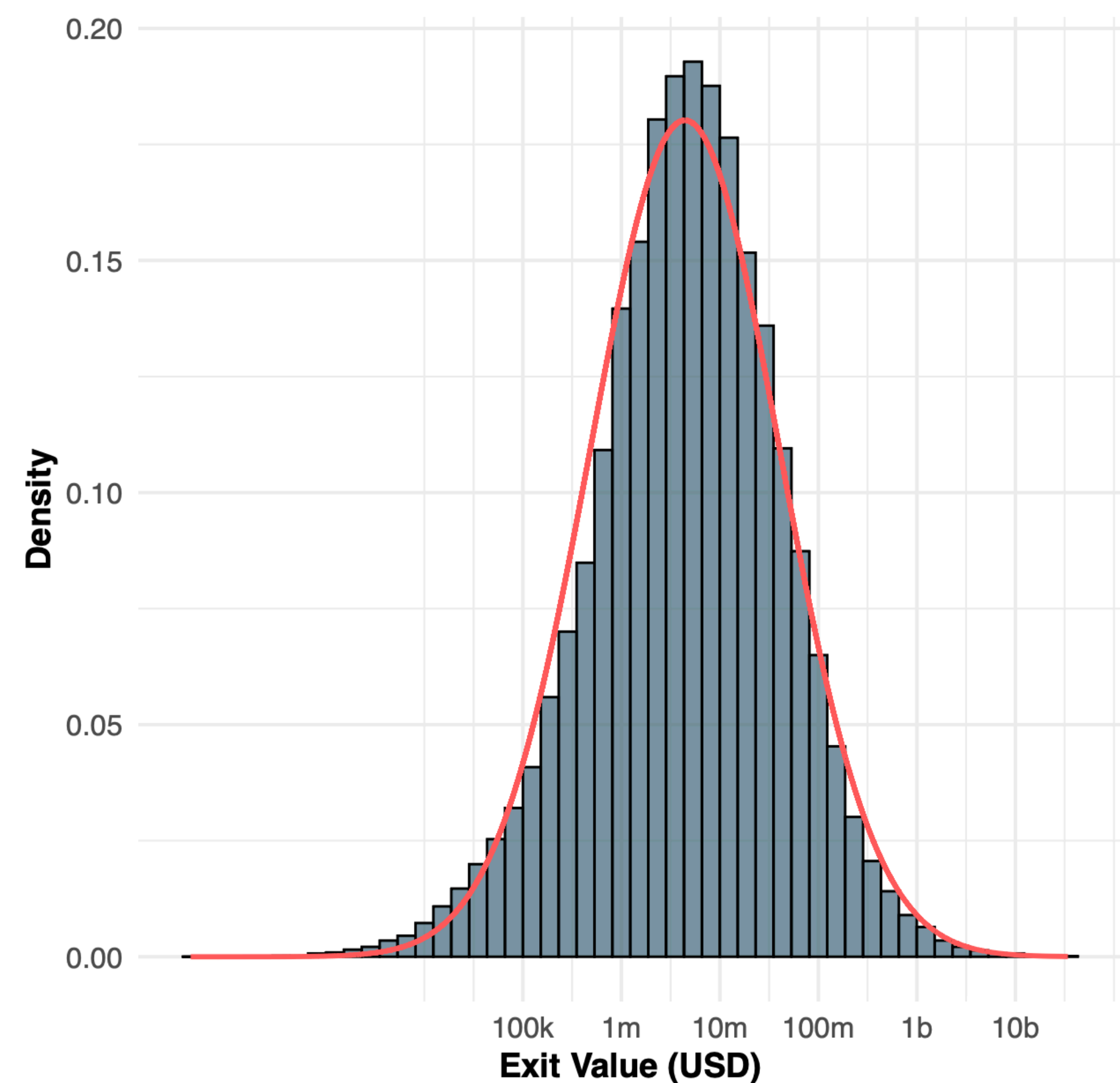
Distribution of collective founder shares at exit among all IPOs and M&As

Ownership among founders (IPOs)



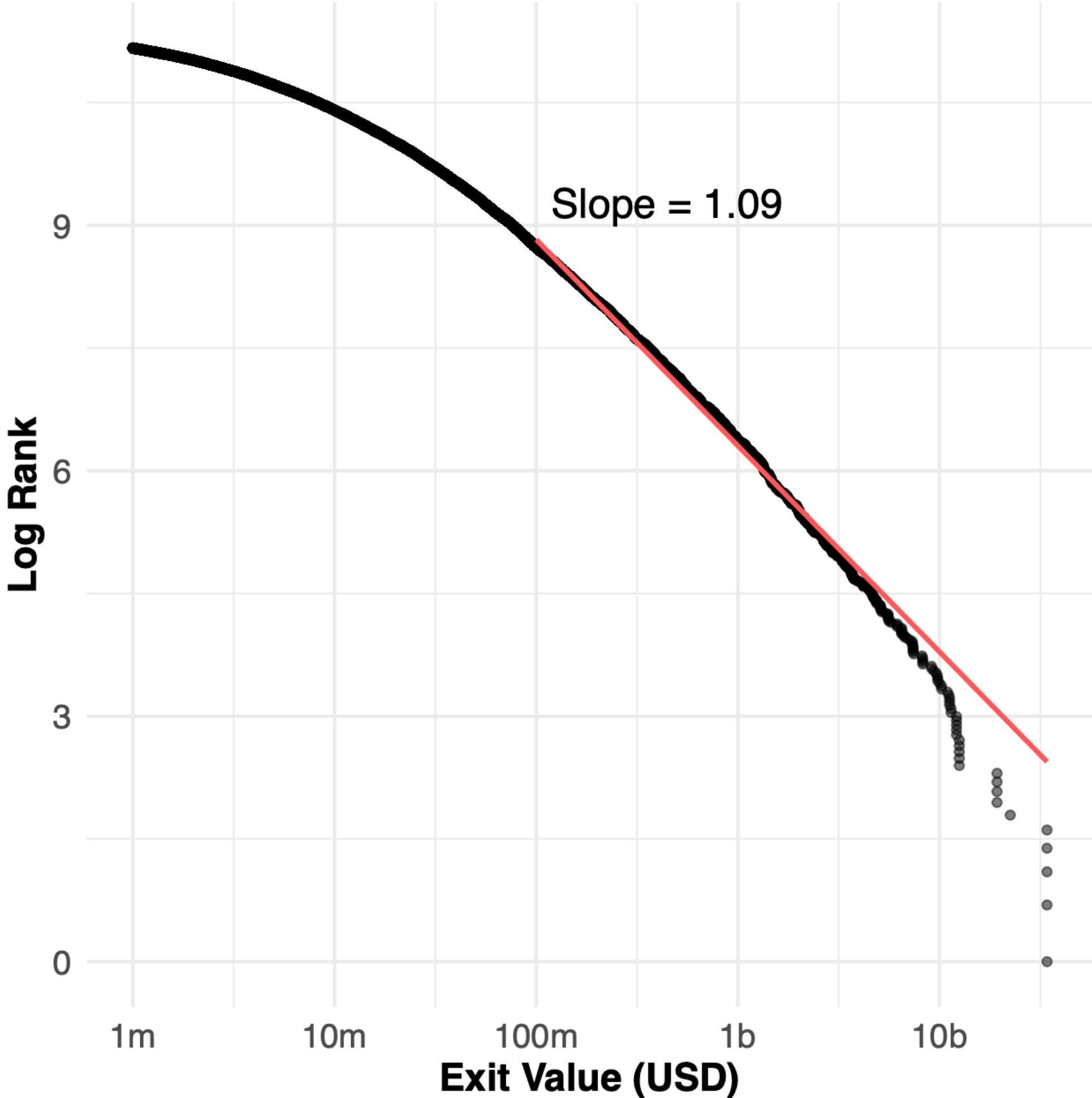
38% of founders in IPO sample have left before exit

Founder exit payoffs



$\Pr(x>0)=12\%$

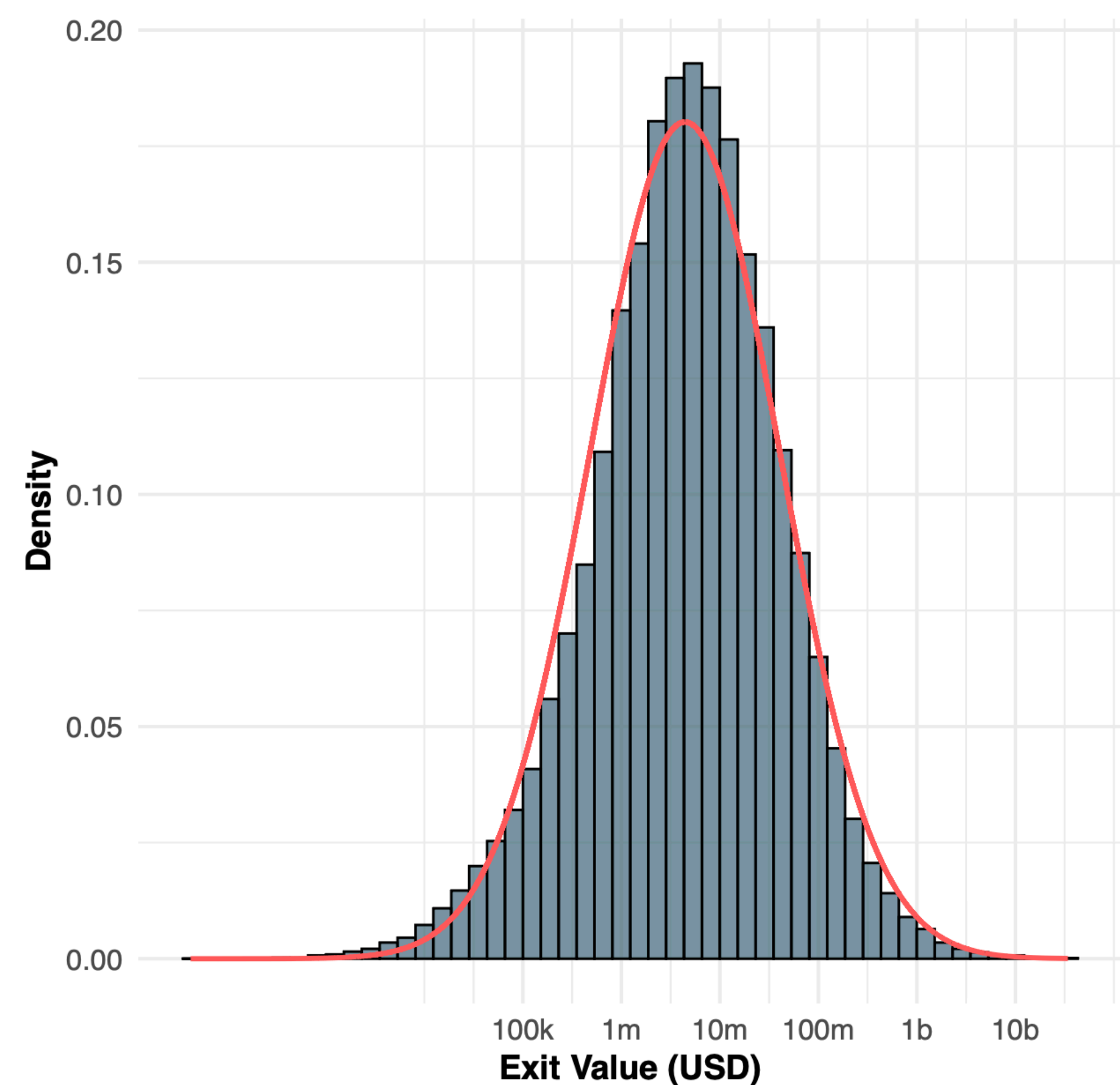
cond'l median \$5m



cond'l mean \$47m

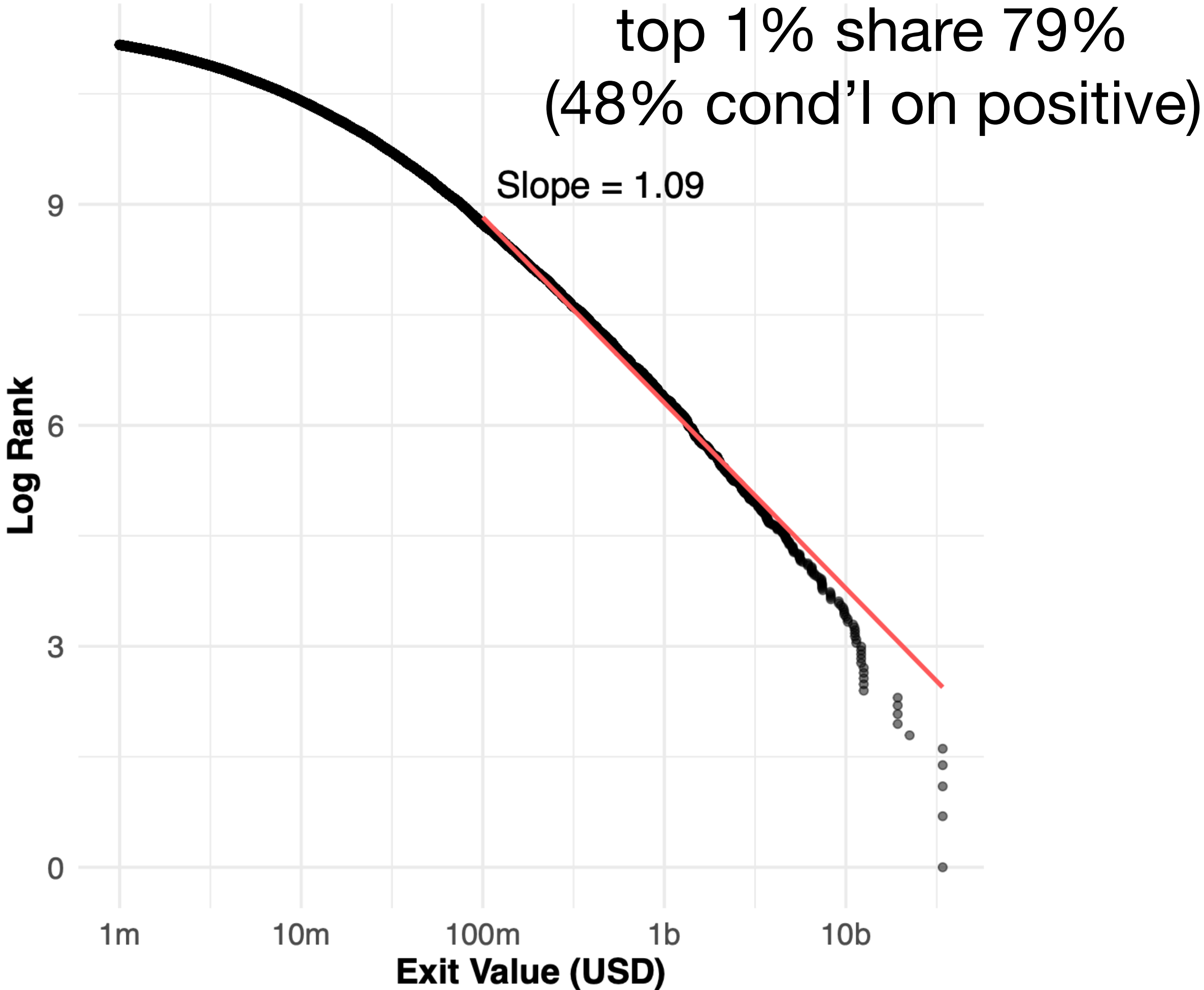
top 1% \$661m

Founder exit payoffs



$\Pr(x>0)=12\%$

cond'l median \$5m



cond'l mean \$47m

top 1% \$661m

Value of Entrepreneurship

Career choice model

Preferences

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

Career options

- Worker with wage w^*
- Founder with startup wage $w < w^*$, but probability of exit π with (after-tax) jackpot payoff x
- (Dis-)save to smooth consumption

$$a_{t+1} = Ra_t + w - c_t$$

Bellman equation

$$V(a) = \max_{c, a'} u(c) + \frac{\pi \mathbb{E}[V_w(a' + x)] + (1 - \pi)V(a')}{R}$$

$$\text{s.t.} \quad a' = Ra + w - c \geq 0$$

where

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$$6.2\% * \$5.6\text{m} = \$350\text{k}$$

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- Critical paycut: wage gap that leaves founder indifferent $\Delta = w^* - w$
- Risk discount β such that $\Delta = \beta \pi \mathbb{E}x$

Bellman equation

CARA

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Value of entrepreneurship

risk aversion σ	critical payout Δ	risk discount β
0	\$350k	100%
1	\$28k	8.1%
2	\$10k	2.9%

$r = 5\%$ $w^* = \$115k$ $a_0 = \$246k$ capital gains tax 28%

Value of entrepreneurship

Hall-
Woodward

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Accrual-based Taxation

Simple model

$t = 0$ Company founded, value 0

$t = 1$ VC investment d

$t = 2$ Exit $y \in \{0, Y\}$ (success probability p)

Simple model

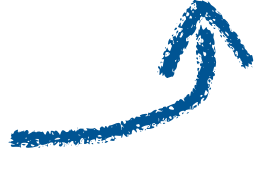
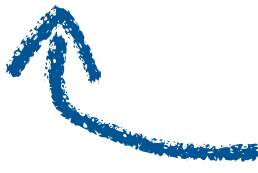
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- Equity finance: founders retain share s at $t = 1$, VCs obtain share $1 - s$

- Valuation at $t = 1$:
$$u = v + d$$

post-money   pre-money

$$s = v / u$$

- Founders obtain (after-tax) payoff x at exit

- VCs require (after-tax) rate of return $\Psi = 1 + \psi$

Capital gains taxes

- Tax rate τ
- Realization-based: taxes due at $t = 2$
- Accrual-based: taxes already due at $t = 1$
- More generally: accrual tax level $\alpha \in [0, 1]$
- Founders sell shares at $t = 1$:

$$T = \alpha\tau v + (1 - \alpha)\tau T$$

- Pre-paid taxes partially refunded at $t = 2$ in case of down round
- 1\$ of tax credit valued at $\phi \leq 1$

Valuations and dilution

Proposition

1. Pre- and postmoney valuations decrease with τ but are independent of α :

$$u = v + d = \frac{\mathbb{E}[y]}{\tilde{\psi}}$$

where

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

2. Investment $d + T$ and the share of the company acquired by VCs increase with α :

$$1 - s = \frac{d + T}{\mathbb{E}[y]} \tilde{\psi}$$

Founder payoffs

Proposition

1. The after-tax payoff to successful founders is decreasing in α :

$$x = \underbrace{(1 - \tau) \left(Y - \frac{\tilde{\Psi}}{p} d \right)}_{\text{jackpot in realization regime}} - \underbrace{(1 - \tau) \left(\frac{\tilde{\Psi}}{p} - 1 \right) T}_{\text{additional cost of capital}}$$

2. The after-tax payoff to failed founders is increasing in α :

$$x = \phi(1 - \tau)T$$

3. Founders' expected payoff is decreasing in α :

$$\mathbb{E}[x] = \underbrace{(1 - \tau)(\mathbb{E}[y] - \tilde{\Psi} d)}_{\text{mean jackpot in realiz. regime}} - \underbrace{(1 - \tau)(\tilde{\Psi} - 1)T}_{\text{mean add'l cost of capital}} - \underbrace{(1 - \phi)(1 - p)(1 - \tau)T}_{\text{unused tax credits}}$$

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Actuarially
unfair insurance

Founder payoffs

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Tax revenue

Proposition

Expected gov't revenue is independent of (increasing in) α if $\phi = 1$ ($\phi < 1$):

$$\underbrace{\tau(\mathbb{E}[y] - d)}_{\text{revenue in realization regime}} + \underbrace{(1 - \phi)(1 - p)(1 - \tau)T}_{\text{unused tax credits of founders}} + \underbrace{(1 - \phi)(1 - p)\tau(d + T)}_{\text{unused tax credits of VCs}}$$

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 fully borne
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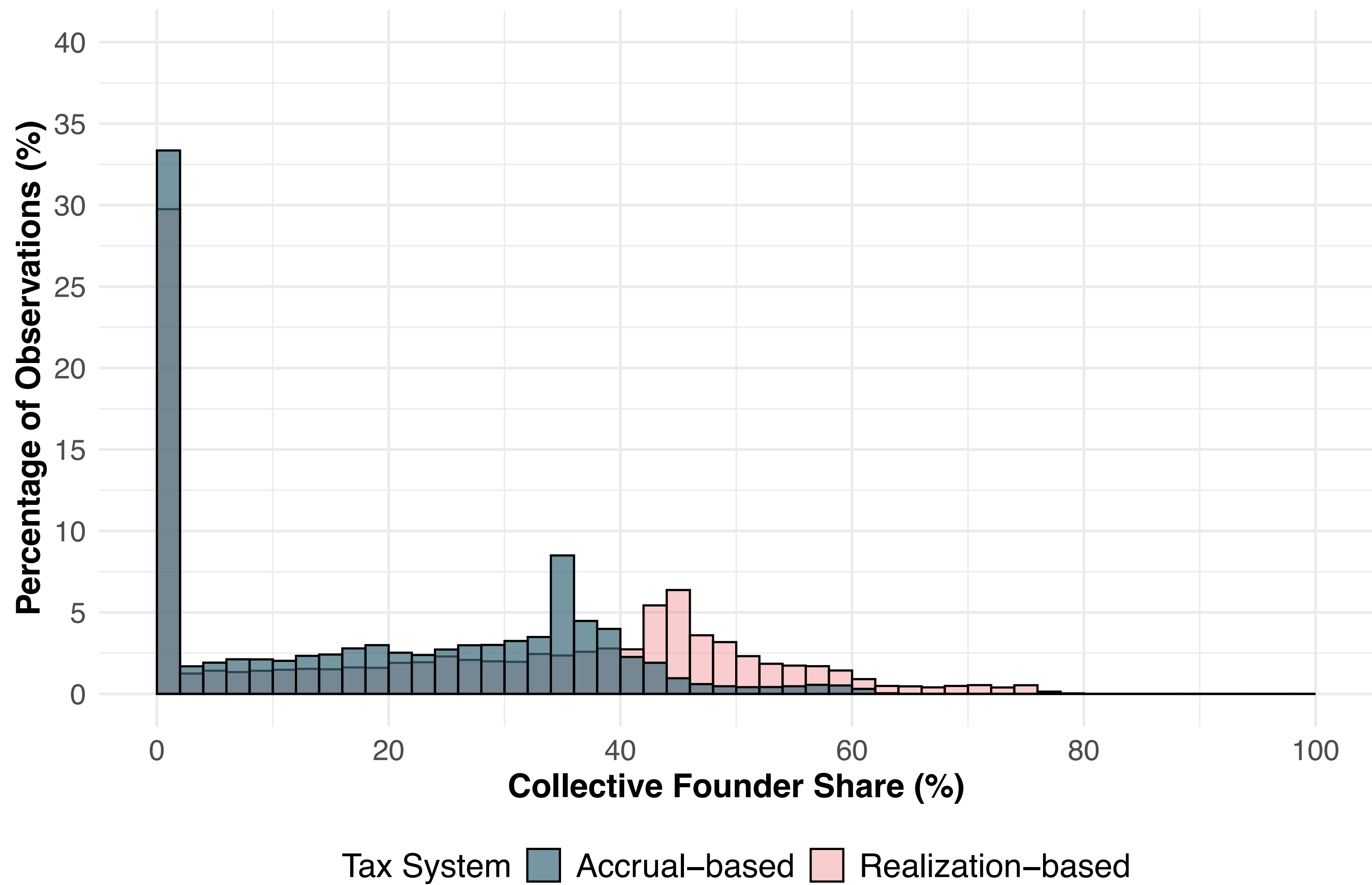
 fully borne
by founders

Provides clean theoretical benchmark:

1. Accrual level neutral for valuations, VCs and gov't
2. Welfare effects depend on founders, theoretically ambiguous

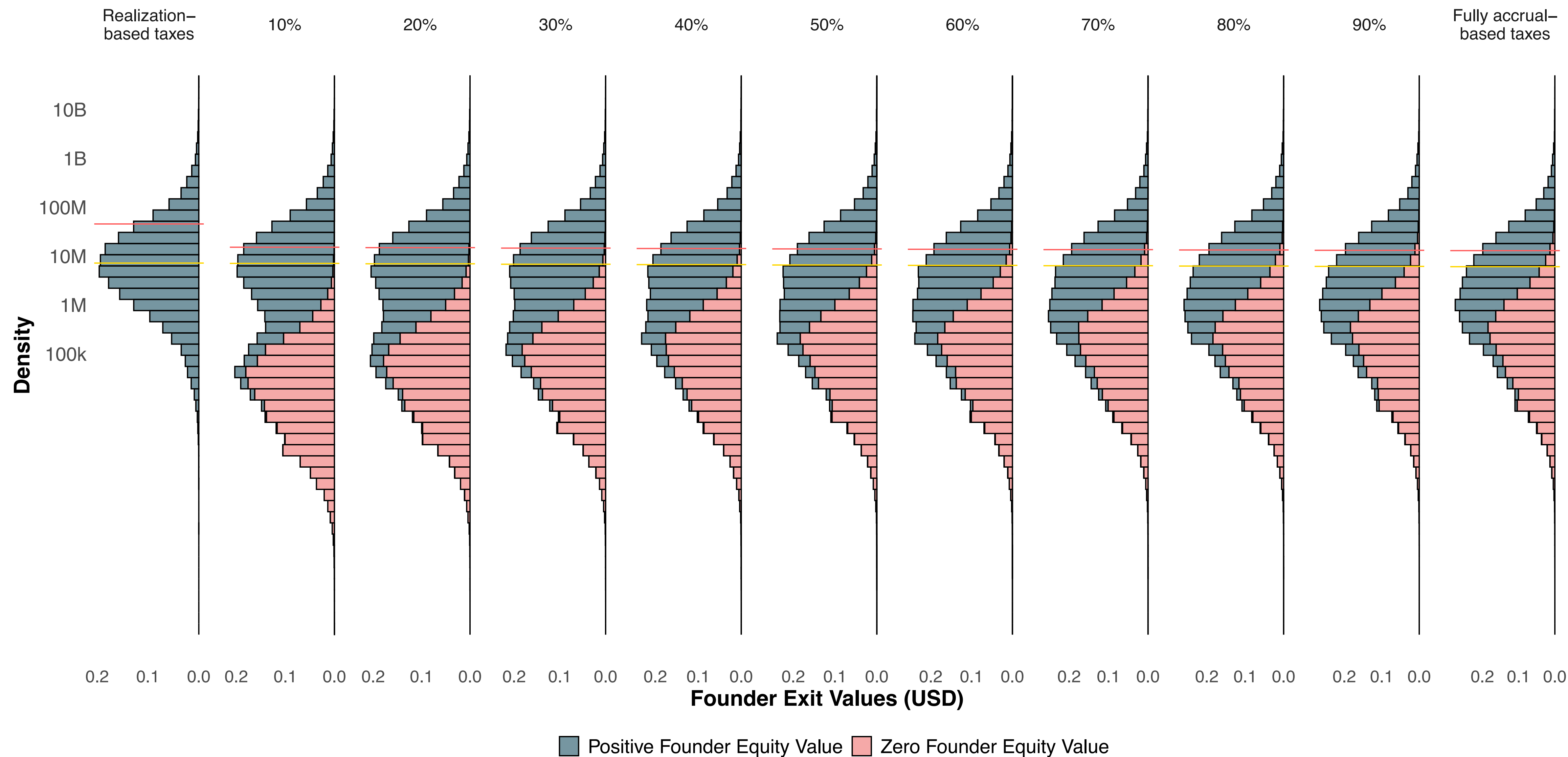
Quantitative Results

Extra dilution

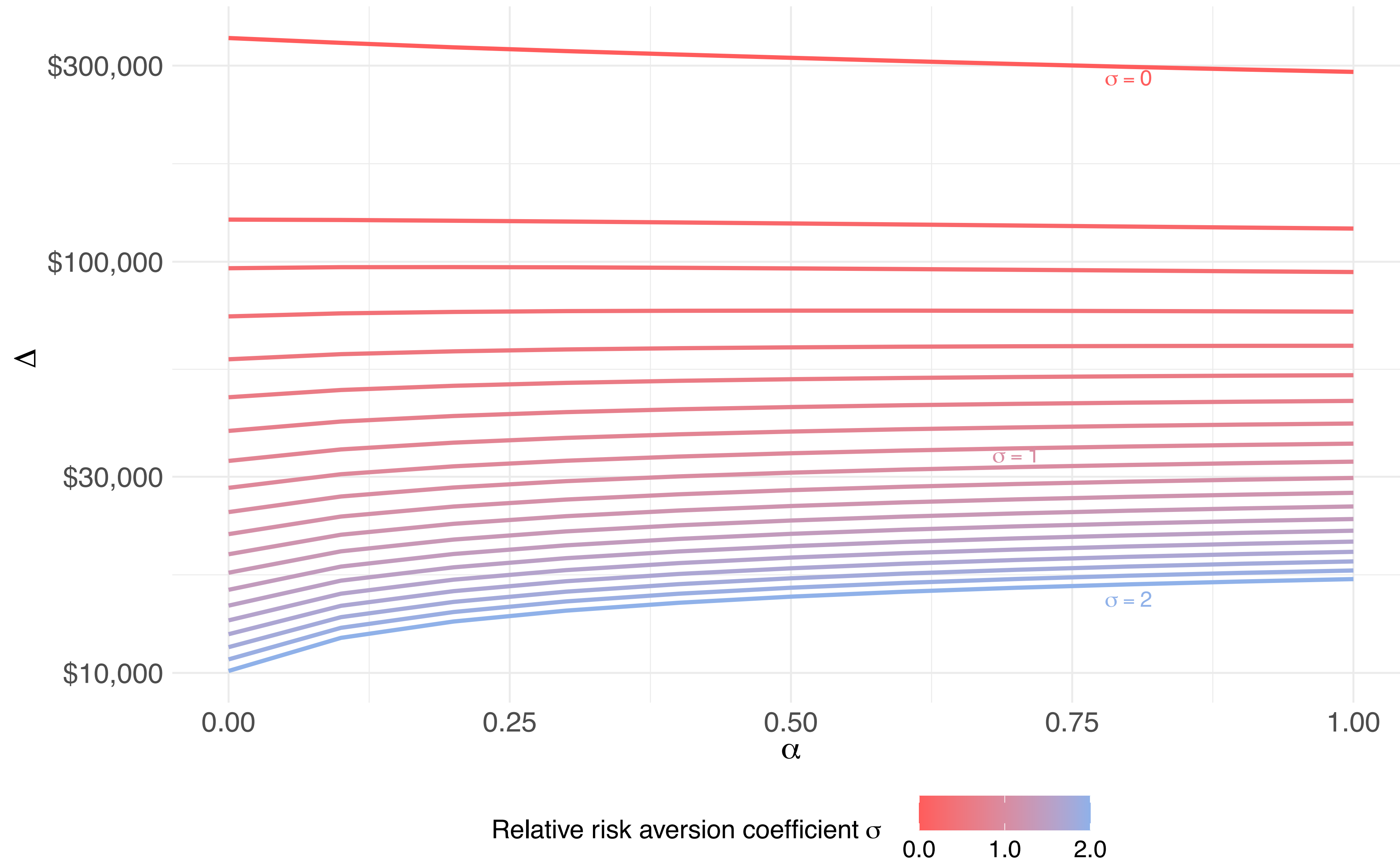


Average collective founder share at exit drops by 25%

Founder exit payoff distribution



Value of entrepreneurship



Aggregate effects on entrepreneurship

Distribution of wages, assets and risk aversion

Details

Tax regime	Change in entrepreneurship (compared to status quo)
Accrual-based taxation, full tax refunds	+12%
Accrual-based taxation, carry-forward	-38%
2% annual wealth tax	-7%

Laffer curves

Status quo: $t=28\%$

Tax regime	Revenue-maximizing tax rate
Realization-based taxation	48%
Accrual-based taxation, full tax refunds	42%
Accrual-based taxation, carry-forward	30%

Extensions

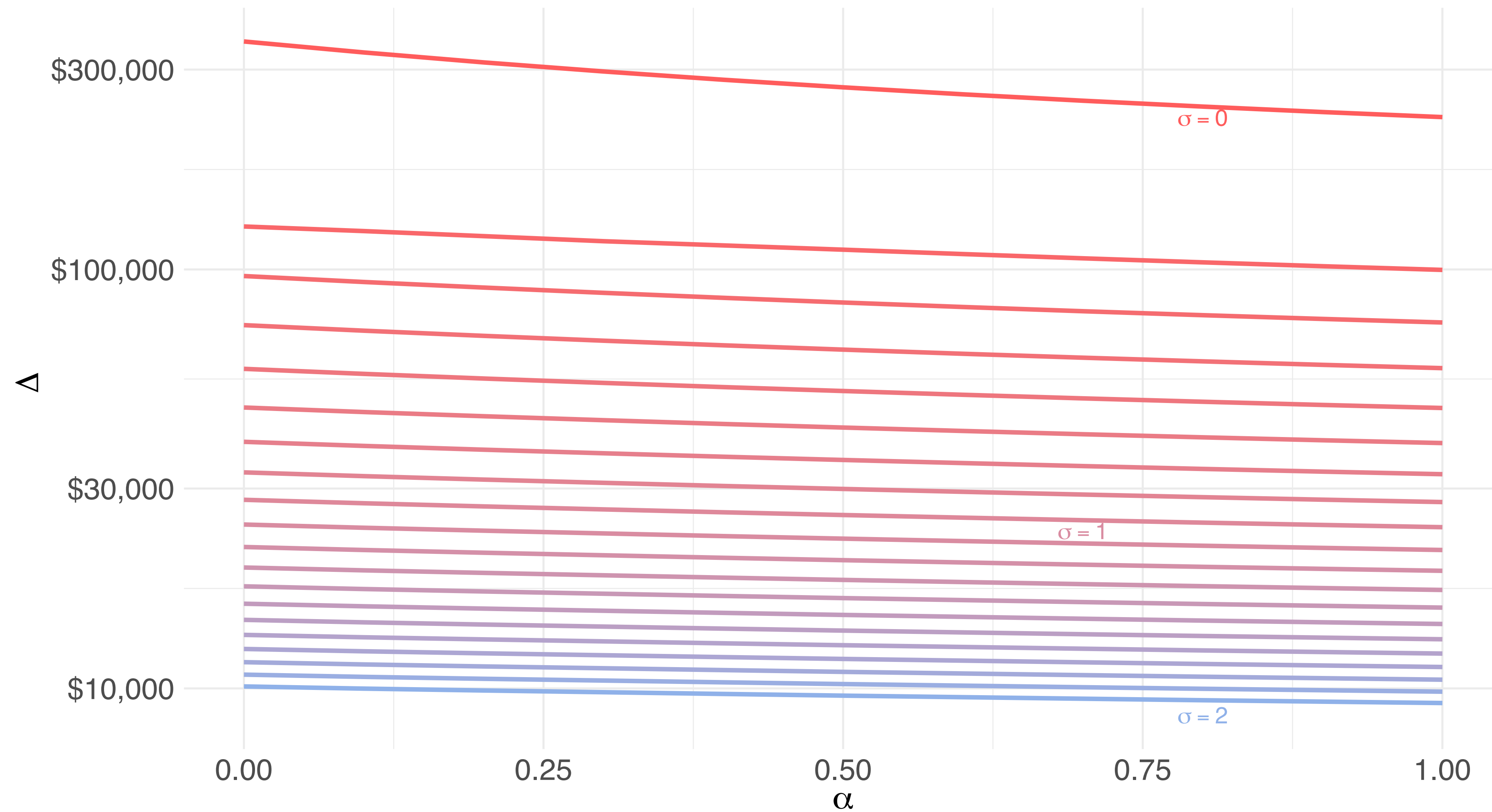
1. Loss carry-forward
2. Wealth tax
3. Endogenous valuations
4. Ex-post risk vs. ex-ante heterogeneity
5. Endogenous VC contracting

Conclusion

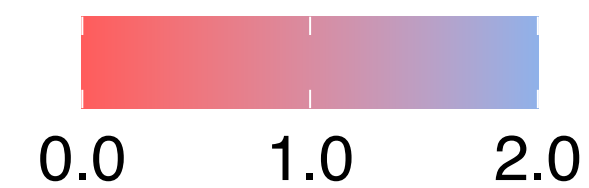
- New evidence on payoff distribution of VC-backed founders, power law
- Accrual-based taxation
 - ownership dilution through advance tax payments
 - downside insurance through early cashing out
- Key: loss provisions for down rounds
 - risk-sharing benefits only when tax credits are refunded

Loss Carry-Forward

Value of entrepreneurship

[back](#)

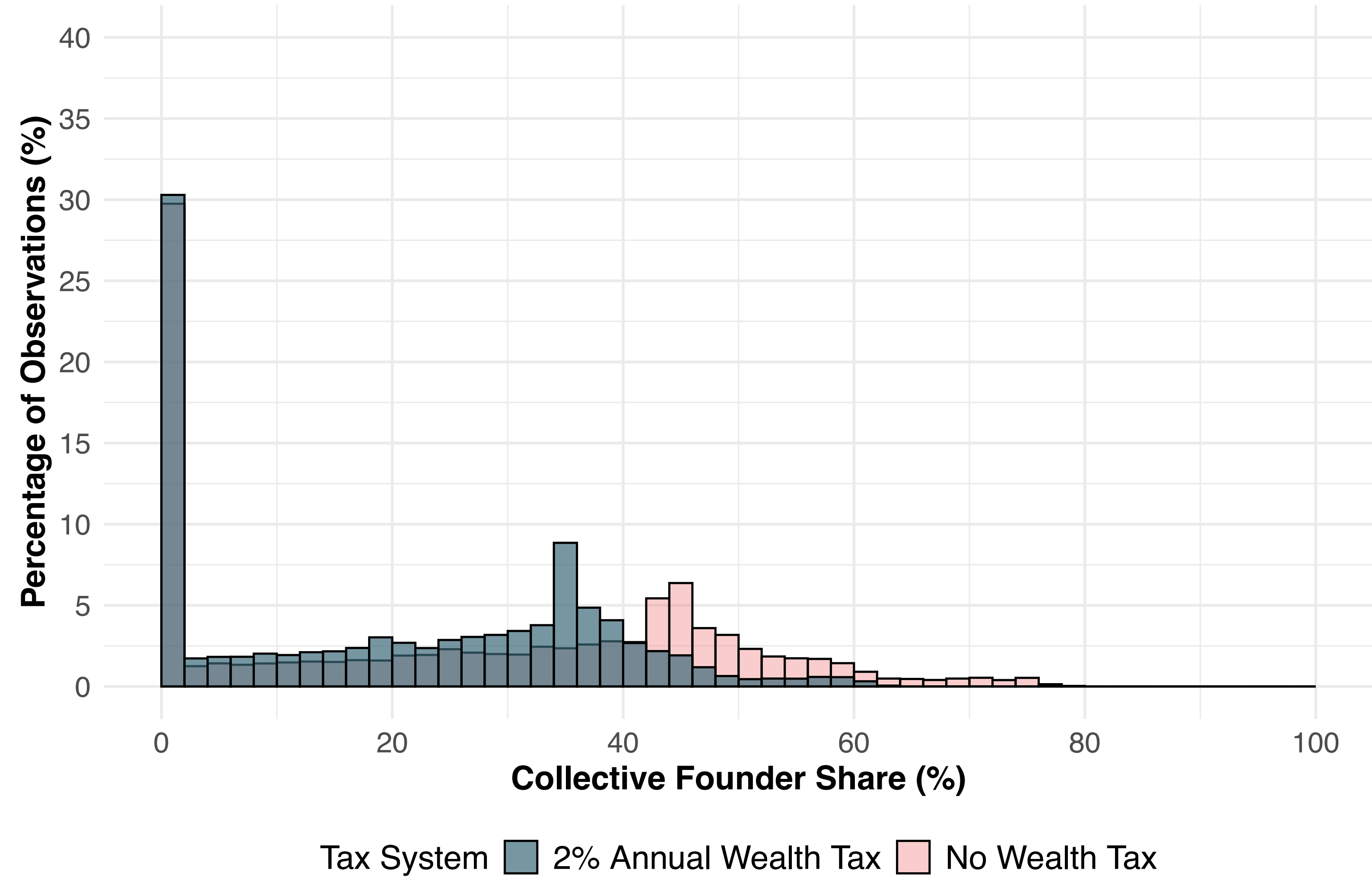
Relative risk aversion coefficient σ



Wealth Tax

Extra dilution with 2% wealth tax

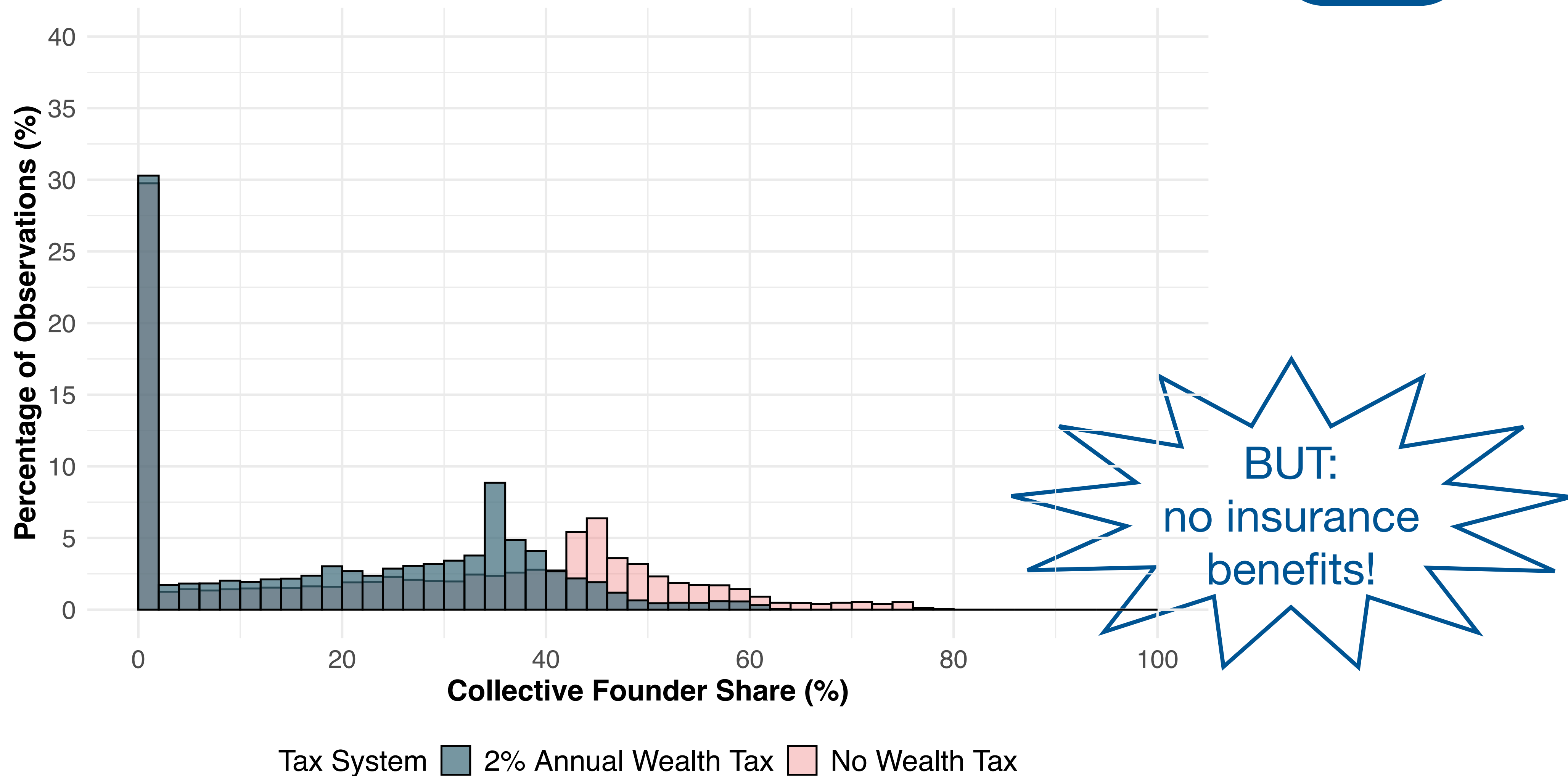
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Average collective founder share at exit drops by 22%, similar to accrual-based tax

Extra dilution with 2% wealth tax

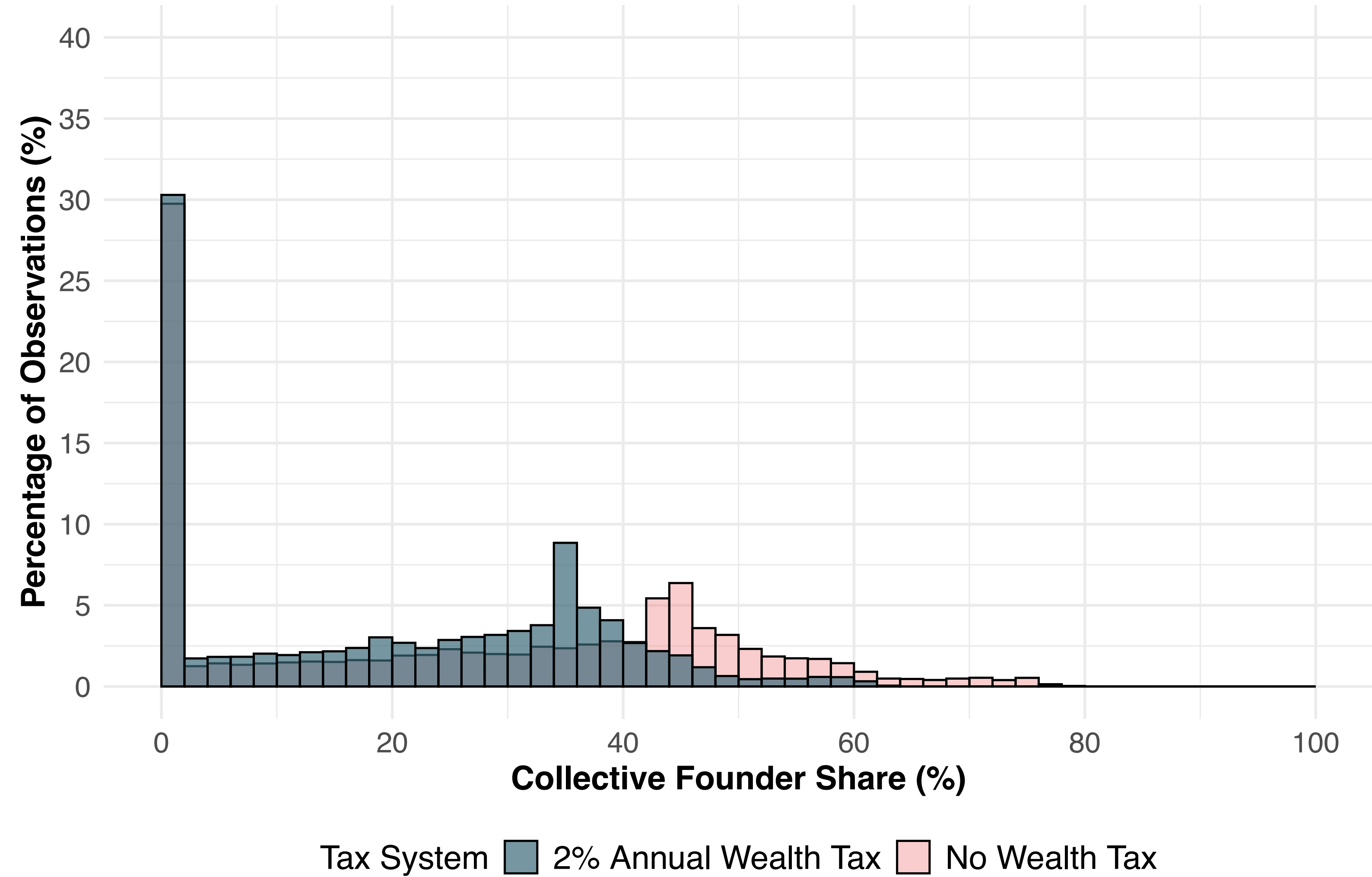
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Endogenous Valuations

Endogenous valuations

back

- Founders' collective ownership goes from 36% to 26% under accrual-based taxation
- Ewens et al. (2022): valuations should decrease by 21%

risk aversion	critical payout (exogenous valuations)	critical payout (endogenous valuations)
0	\$290k	\$227k
1	\$32k	\$29k

- Founders with risk-aversion 1 would still prefer accrual-based taxation (insurance effect dominates!), but aggregate entrepreneurship would fall by 20%

Ex-post Risk vs. Ex-ante Heterogeneity

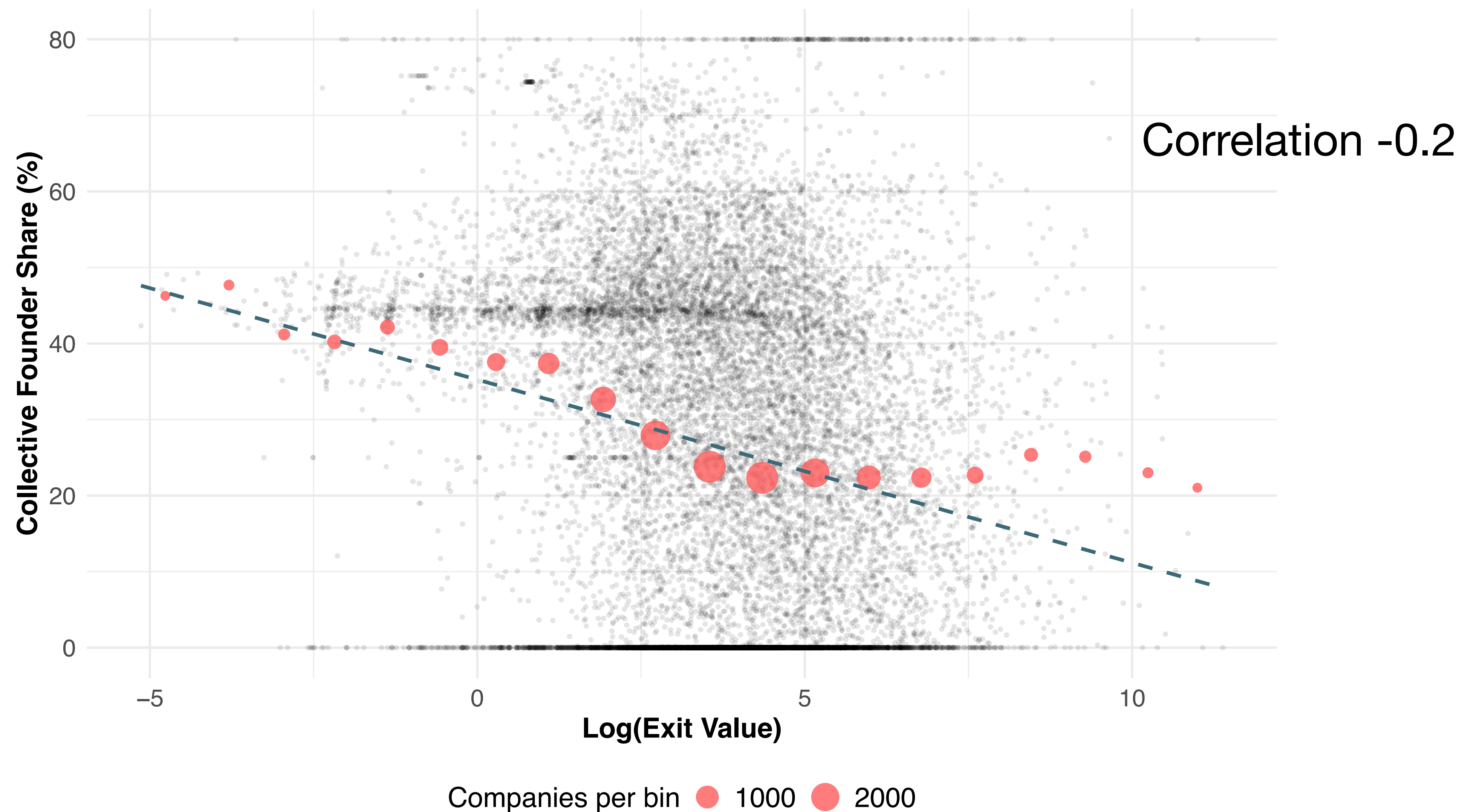
Exit distribution cond'l on milestones

pre-exit valuation	prob. positive	prob. exit below threshold	25% percentile	median	75% percentile	IQR
1	41%	59%	14	45	144	130
10	53%	47%	31	73	201	171
50	64%	39%	95	171	403	308
100	68%	38%	165	274	606	440
500	74%	41%	610	1048	2100	1491
1000	74%	43%	1040	1854	3833	2793

Monetary values in millions of dollars

Founder shares vs. exit values

back



Endogenous VC Contracting

Endogenous VC contracting

back

- On average, 85% of compensation to founders is equity (rather than wage)
- Why?
- Adverse Selection
 - accrual-based taxation can make founders better or worse off
 - for example, status-quo equilibrium may expose founders to too much risk
- Moral Hazard
 - moving to accrual-based taxes either neutral or negative (worse incentives!)

Closed-form solution with CARA utility

[back](#)

Proposition

Under CARA preferences with coefficient γ , the critical payout is

$$\Delta = \frac{\pi}{\gamma r} [\mathbb{E}u(rx) + 1]$$

It is bounded above by

$$\Delta \leq \bar{\beta} \pi \mathbb{E}x$$

where the static risk discount $\bar{\beta}$ is such that $\mathbb{E}u(rx) \equiv u(\bar{\beta} r \mathbb{E}x)$

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$$12\% \cdot u(r \cdot \$47\text{m}) + 88\% \cdot 1 = u(\bar{\beta} \cdot \$5.6\text{m})$$

$$r = 5\%, \gamma = 2.9 (\sigma = 1) \Rightarrow \bar{\beta} = 16\%, \Delta \leq \$55k$$

Comparison to Hall-Woodward (2010)

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Parameters		Certainty Equivalent	
risk aversion σ	worker wage w^*	our estimate	HW estimate
0	\$307k	\$1,951,106	\$9,181,951
0	\$581k	\$-491,812	\$8,073,785
0	\$1.8m	\$-11,229,509	\$3,641,119
1	\$307k	\$-797,061	\$1,424,786
1	\$581k	\$-3,759,975	\$474,929
1	\$1.8m	\$-19,876,714	\$-6,332,380
2	\$307k	\$-1,172,802	\$316,619
2	\$581k	\$-4,933,334	\$-949,857
2	\$1.8m	\$-26,551,983	\$-14,089,546

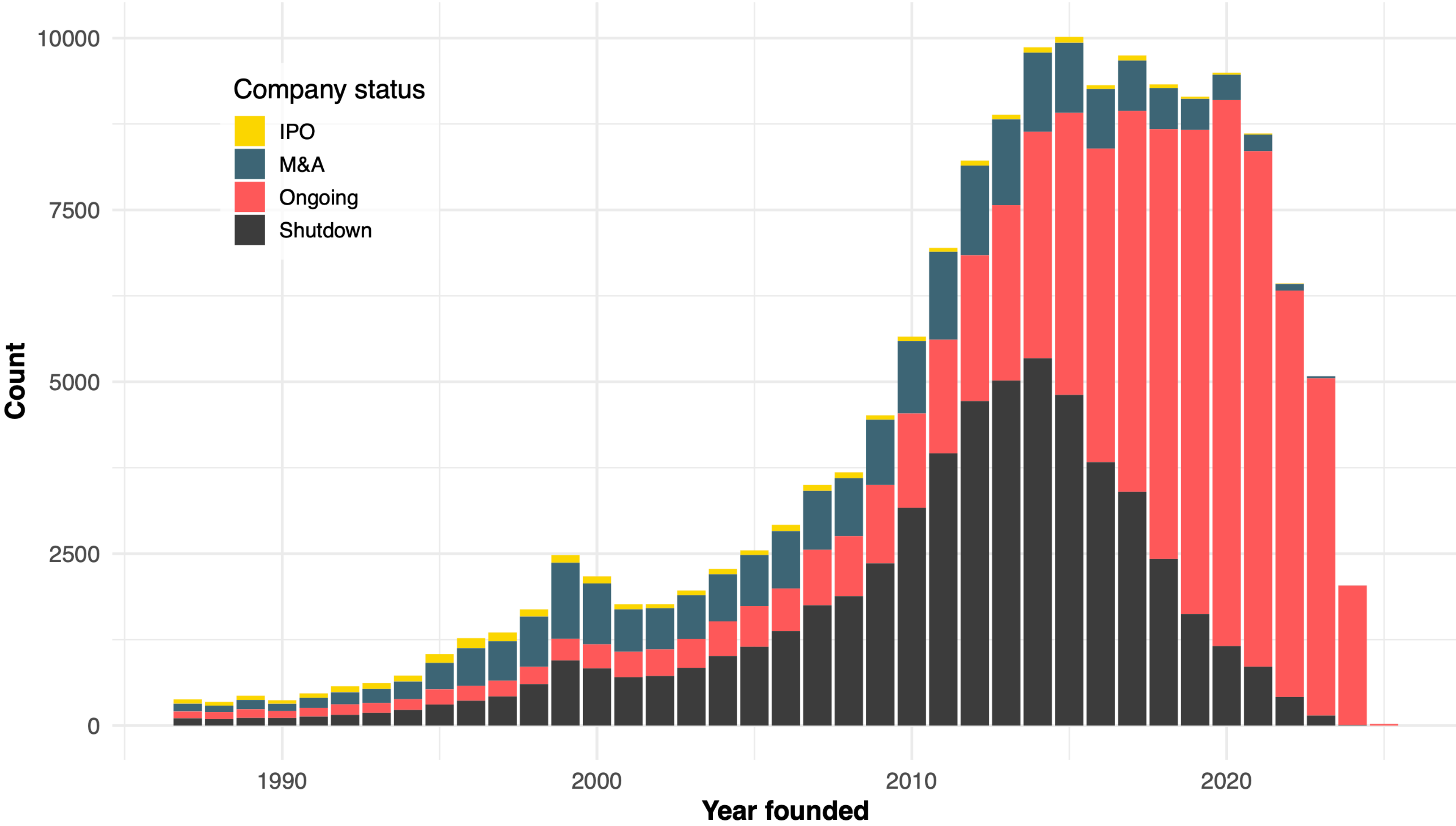
$r=5\%$

initial assets \$1.6m

startup wage $w=\$176k$

Comparison to Hall-Woodward (2010)

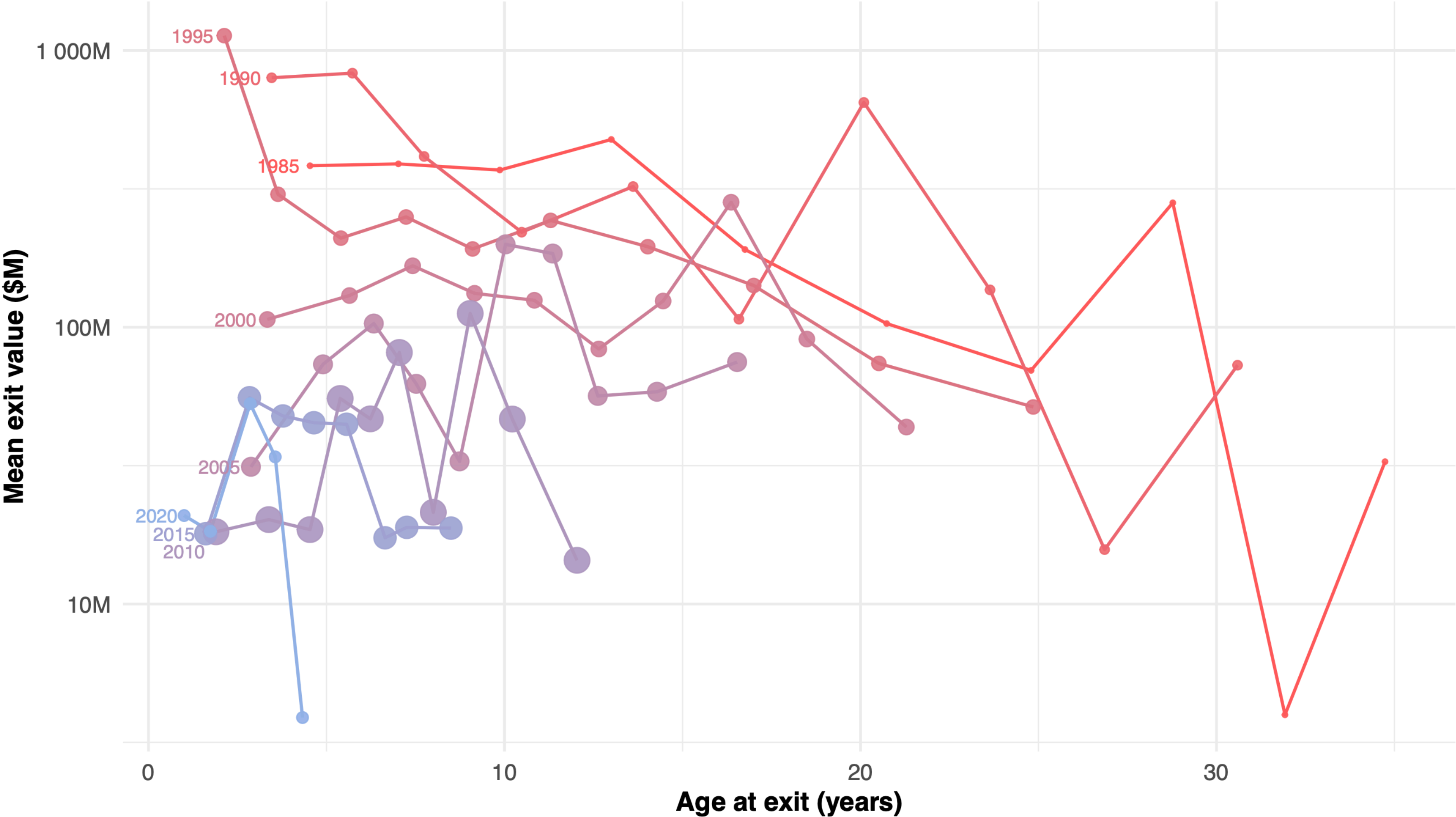
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Distribution of companies by year founded and exit status

Comparison to Hall-Woodward (2010)

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Mean exit value vs. age at exit by five-year founding cohort

Distribution of wages, assets and risk aversion

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- Wages and assets jointly lognormally distributed, matched to fit ACS and SCF
- ACS (2023): ages 25–45 with a master's, professional, or doctoral degree and a field of degree in computer science, engineering, or business
- SCF (2022): households whose reference person is aged 25–45, has at least a college degree, works in a managerial or professional occupation
- Risk aversion: lognormally distributed (Chetty 2006, Kimball et al. 2008)
- Results: median wage \$115k, median assets \$246k, median risk aversion 0.7