

Financing Risk and Startup Growth

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Paper Link

Motivation and Research Question

Managing Financing Risk: The Big Picture

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Historically the "big three" risk axis in venture investing have been Team, Market, and Technology. There's a fourth critical risk - financing risk - that's too often overlooked. That's unfortunate, as with some thoughtful and recurrent planning financing risk can be managed.

A Question About Risk That Founders Forget to Ask VCs

Ethan Kurzweil, Bessemer Venture Partners
"There are a bunch of risks we think through when evaluating a new startup:
• Team risk
• Technical risk
• Scaling risk
• Distribution / growth risk
• Market risk
• Financing risk

Financing risk: Startup's belief about the probability of insufficient funding in future rounds.

Question: How does financing risk shape startup behavior?

Main Takeaways

Financing risk distorts investment, growth, and survival.

- Model of intertemporal investment under uncertainty
 - Distinct from traditional financial constraints
- Text-based measure of financing risk
- Among the recently funded startups, financing risk...
 - reduces innovation, especially novel types, ...
 - slows employment and product growth, ...
 - and increases failure rates.

Measuring Financing Risk

Data: 148,880 U.S. VC-backed startups from PitchBook
18M full-text news articles from ProQuest (1980-2023)

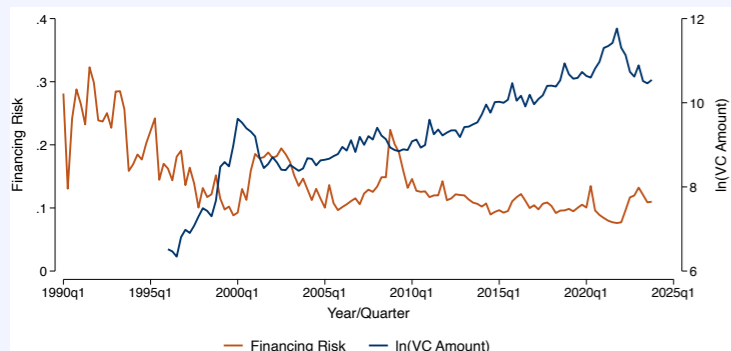
Methodology:

- Label 40K WSJ training sample using the GPT model.
 - Labels: Limited/neutral/sufficient future funding.
- Transfer learning by training a BERT model and applying it to the full sample of articles from ProQuest.
 - Financing risk = $0 \times \text{Pr}(\text{sufficient}) + 0.5 \times \text{Pr}(\text{neutral}) + 1 \times \text{Pr}(\text{limited})$.

3) Aggregate at the startup-quarter level.

Interpretation of text-based financing risk measure:

- Predicted probability of limited future funding**



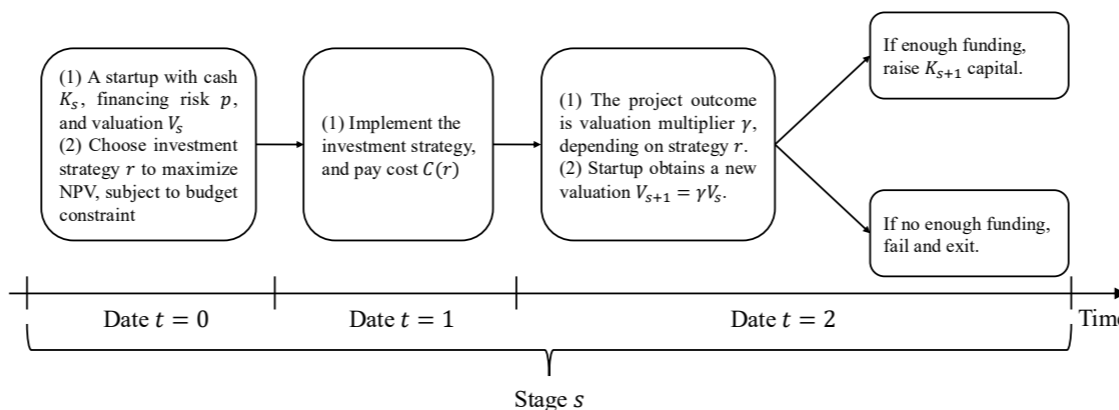
A Model of Intertemporal Investment Decisions in Staged Financing

Setup: In each stage, a startup chooses the riskiness of its investment strategy based on its **expectations about future funding availability (i.e., financing risk)**, s.t. budget constraints.

Trade-off of the startup problem:

- Pursuing aggressive, high-upside investments that could boost future valuation
- Avoiding downside risk that could affect survival

Four testable predictions regarding how financing risk affects (1) innovation, (2) growth, and (3) failure rate, and (4) its relationship with current financial constraints.



Prediction #1: Financing Risk Reduces Innovation, Especially Novel Types

Sample: Startups that received external financing within the past six quarters.

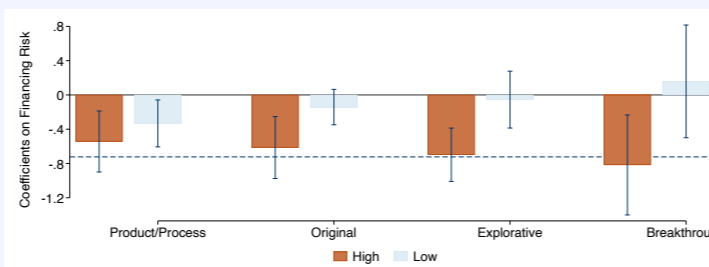
• They are less likely to face immediate constraints but are exposed to future funding risk.

IV strategy: Daily macroeconomic uncertainty shocks at the timing of news articles

- First stage:** $FinRisk_{f,t} = \beta_1 Uncertainty_{y,f,t} + \pi_1 Return_{f,t} + \gamma_2 X_{f,t} + \xi_f + \xi_{S(f)} \times I(f) \times t + \epsilon_{f,t+4}$
- Second Stage:** $Y_{f,t+4} = \beta_2 FinRisk_{f,t} + \pi_2 Return_{f,t} + \gamma_2 X_{f,t} + \xi_f + \xi_{S(f)} \times I(f) \times t + \epsilon_{f,t+4}$

Model	ln(Patent)			ln(Citation-Weighted Patent)		
	OLS	OLS	2SLS	OLS	OLS	2SLS
Financing Risk _{f,t}	-0.040*** (0.013)		-0.798*** (0.239)	-0.053*** (0.020)		-0.980*** (0.361)
Uncertainty Shocks _{f,t}		-0.485*** (0.140)			-0.596*** (0.213)	
First-Stage F-Statistic	124			123.7		
Observations	53,804	53,804	53,804	53,804	53,804	53,804
R-squared	0.838	0.838	0.003	0.816	0.816	-0.020
Controls	Firm FE, State-Industry-Period FE, Startup Controls, First-Moment Controls					

10 p.p. higher financing risk
(or 0.1 probability of limited future funding)
⇒ **8% decline in #patents**
10% decline in #citations



Stronger effects on

- Product** innovation
- High originality** innovation
- High exploratory** innovation
- Breakthrough** innovation

Prediction #2: Lower Growth and Fewer Products

10 p.p. higher financing risk ⇒ 20% slower employment
(or 0.1 probability of limited future funding) **9% fewer trademarks**

Model	ln(Employment)			ln(Trademark)		
	OLS	OLS	2SLS	OLS	OLS	2SLS
Financing Risk _{f,t}	-0.086*** (0.011)		-1.986*** (0.244)	-0.051*** (0.016)		-0.924*** (0.251)
Uncertainty Shocks _{f,t}		-1.206*** (0.102)			-0.560*** (0.146)	
First-Stage F-Statistic	123			123.2		
Observations	53,665	53,665	53,665	53,804	53,804	53,804
R-squared	11,939	11,939	11,939	11,981	11,981	11,981
Controls	Firm FE, State-Industry-Period FE, Startup Controls, First-Moment Controls					

Prediction #3: Fewer Exits and More Failures

10 p.p. higher financing risk ⇒ 2.3 p.p. fewer IPO exits
(or 0.1 probability of limited future funding) **1.2 p.p. fewer M&A exits**
0.6 p.p. more failures

Model	1(IPO)		1(Merger & Acquisition)		1(Bankruptcy)		
	OLS	2SLS	OLS	2SLS	OLS	2SLS	
Financing Risk _{f,t}	-0.005 (0.005)		-0.225*** (0.067)	0.008 (0.005)	-0.120* (0.070)	0.007** (0.003)	0.055** (0.026)
Uncertainty Shocks _{f,t}		-0.137*** (0.040)		-0.073* (0.042)		0.033** (0.016)	
First-Stage F-Statistic	123.8		123.8		123.8		
Observations	53,804	53,804	53,804	53,804	53,804	53,804	
R-squared	11,981	11,981	11,981	11,981	11,981	11,981	
Controls	Firm FE, State-Industry-Period FE, Startup Controls, First-Moment Controls						

Prediction #4: Distinct from Financial Constraints

Sample: Non-recently funded startups that are more likely to face binding financial constraints.

The effects are attenuated for financially constrained startups, except for **employment and bankruptcy**.

Model	Innovation		Growth		Exit		
	ln(Patent)	ln(CW Patent)	ln(Employment)	ln(Trademark)	1(IPO)	1(M&A)	1(Bankruptcy)
Financing Risk _{f,t}	-0.281 (0.223)	-0.444 (0.309)	-0.534*** (0.147)	0.088 (0.286)	0.006 (0.049)	0.080 (0.056)	0.037* (0.020)
First-Stage F-Statistic	83.51	83.34	82.13	83.15	83.66	83.66	83.66
Observations	27,700	27,700	27,622	27,700	27,700	27,700	27,700
R-squared	0.084	0.015	0.477	0.011	0.004	-0.015	-0.026
Controls	Firm FE, State-Industry-Period FE, Startup Controls, First-Moment Controls						

Implications

Future funding uncertainty distorts startup behavior today, even in the absence of current financial constraints.

- Expectations about continuation funding are a crucial dimension of financing frictions.
- Policymakers and VC investors should take financing risk into account and consider strategies to mitigate it, such as multi-year programs and countercyclical facilities.