

Financing R&D

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Important question

Background

- ▶ R&D is the key for economic growth; the government should lower its threshold

This paper

- ▶ Hold on... It can generate an **unintended financial consequence** that **lowers TFP**

Overview

Theory

- ▶ Financial friction + information friction
- ▶ R&D promoting policy raises R&D financing costs and lowers aggregate TFP

New theory and important aggregate implications!

Empirical evidence

- ▶ Administrative loan-level data
- ▶ R&D promoting policy raises the interest rate of industries with higher patent intensity

Great data and interesting empirical findings!

Discussion roadmap

1. What does the theory need?
2. What does the data say?

Theory

Ingredients

1. Financial friction: R&D firms may fail (default)
2. Information friction: Banks don't know firm-specific default probabilities

Both make a lot of sense for R&D activities!

Mechanism

1. *Selection effect*: Policy lowers R&D fixed cost \Rightarrow less productive firms enter
2. *Information friction*: Banks cannot distinguish the quality of R&D firms
3. *Misallocation*: Incumbent good firms pay a higher interest rate and R&D less

Aggregate TFP may decline!

How general is the mechanism?

1. Frictions need to be strong

- ▶ Particularly, banks have very limited knowledge of firm-specific default rate
- ▶ Otherwise, the lower threshold is a good thing (more firms R&D)

2. Depends on which kind of policy: *extensive margin* > *intensive margin*

- ▶ Reducing fixed costs directly lets low-productivity firms enter \Rightarrow TFP \searrow
- ▶ Reducing tax rate or subsidizing loans \Rightarrow TFP \nearrow

How to "prove" the mechanism? \Rightarrow Let the data speak!

Empirical findings

Regression specification

$$\text{Rate}_{lft} = \alpha \text{Treat}_{ct} + \gamma \text{Pa_Intensity}_i \times \text{Treat}_{ct} + \text{Controls} + \epsilon_{lft}$$

- ▶ l loan, f firm, c city, t month, i industry

Empirical result

- ▶ The estimated γ is significantly positive
⇒ The policy raises interest rates of firms in industries with higher patent intensity

What does the empirical result suggest? Selection effect

Result: The policy raises interest rates in **industries with higher ex-ante patent intensity**
($Pa_Intensity_i$)

1. It supports the selection effect

- ▶ The entry of less productive firms makes banks charge higher interest rates

2. How to map the heterogeneity to the model?

- ▶ Higher $Pa_Intensity_i$ \Rightarrow Industries were **less frictional** \Rightarrow Why stronger effect?
- ▶ Hope to see more discussion on the **source of heterogeneity**

What may not the empirical result imply? Misallocation

Concern: The result may not imply misallocation

- ▶ The explanatory variables are at the industry-city levels
⇒ Implications are for the **average** interest rate
- ▶ E.g., no information friction, all loans are correctly priced by their default risk
⇒ Entrants are less productive and pay higher interest rates
⇒ Average interest rate still increases, but **no misallocation**

Suggestion: Direct tests of misallocation

- ▶ E.g., does the policy raise the interest rates or lower R&D of **incumbent** R&D firms?

↑
key for TFP ↘

Conclusion

- ▶ Important research question
- ▶ A fresh perspective on evaluating R&D promoting policy
- ▶ Clear mechanism and great micro-level evidence