Competition, Firm Innovation, and Growth under Imperfect Technology Spillovers

Karam Jo & Seula Kim

Discussion by Maarten De Ridder

Summary

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- Threat of creative destruction? Reallocate external to internal innovation

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- Firms can expand their portfolio or improve their existing products
- New friction: expanding portfolio requires time-intensive learning
- Internal innovation is defensive as it prevents frontier learning
- Threat of creative destruction? Reallocate external to internal innovation
- But internal innovation is less productive: "ideas harder to find"

Endogenous growth theory

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In this paper:

$$\text{R\&D productivity} \quad \approx \quad \text{mix of internal vs external R\&D} + \text{chance of success}$$

- External R&D has higher social rate of return if successful
- But internal R&D reduces the probability of success as firms build moot

Comments

Overview

Great paper + very exciting to discuss

- Main impression: intuitive mechanism to answer a first-order question
- Well written and very complete: model, micro evidence, quantification
- Elegant way to introduce defensive innovation in Akcigit & Kerr (2018)

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Three comments:

1. Contribution: Add direct evidence for their mechanism?
2. Quantification: How effective is defensive innovation?
3. Mechanism: What's the main driver of competition - growth link?

Contribution

A lot of recent work explaining slowdown of productivity through "moots":

- Akcigit and Ates (2023)
  - Market leaders increasingly engage in defensive patenting
  - Prevents knowledge diffusion by limiting access to technology
- Olmstead-Rumsey (2020, R&R Restud)
  - Probability of large innovations by laggards has fallen
  - Harder for smaller firms and laggards to become market leaders

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  - Probability of large innovations by laggards has fallen
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- De Ridder (2024)
  - Incumbents w/ high use of fixed-cost intangibles undercut entrants on price

Contribution

Common thread: actions by incumbents reduce prob. of creative destruction

- "Competition, Firm Innovation, and Growth under Imp. Tech. Spillovers"

Current contribution of the paper:

- Authors offer additional micro foundation (internal innovation + learning)

Can the authors provide direct evidence of this?

- Particular prediction: internal innovation comes with lower CD risk
- Look at (e.g.) exit rates, changes in product portfolio, employment flows

Quantification: are the results an upper bound?

How effective is defensive innovation? Answer: very $\rightarrow$ winner takes all

- Each product is produced by one firm due to Betrand competition
- A firm that escapes through defensive innovation faces no destruction
- Alternative: imperfect substitution as in Cavenaile, Celik and Xu (2023)
  - Output of different firms within a sector is imperfectly substitutable
  - Market share of firms is determined by relative quality
  - Internal innovation would **not** prevent entry, but make entrant smaller
- What is more likely to happen in practice?

Mechanism: what's the main channel?

The paper: direct negative relationship between concentration and growth

- Firms of any size develop at most 1 new product, same FOC
- Hence it violates Gibrat's law: firm size is independent of firm growth
- Usually a standard test for firm dynamics theories (Klette and Kortum)

In this paper, probability of improving a product does not depend on firm's size

- Hence strongly negative relationship between firm size and growth

$$\underbrace{X_t}_{\text{Klette Kortum}} = x_t \times N \quad \Leftrightarrow \quad \underbrace{X_t}_{\text{Jo and Kim}} = x_t \times M_t$$

- Mass M_t of incumbents drives growth: concentration lowers growth
- Mechanically: strong negative effect of a technology that reduces entry

Conclusion

Conclusion

This paper:

- Higher creative destruction risk increases incentives for internal innovation
- International innovation has low social returns + externalities
- Hence complicated interaction between competition and growth

Review:

- Great paper: important question, intuitive modeling, very complete
- Could add direct evidence to distinguish itself from other papers
- Some modeling choices might make it capture an upper bound