PRINCETON
UNIVERSITY

Trade and Innovation

Adrien Matray

The Plan

- Some definitions
- Imports of final products by foreign firms
- Imports of inputs
- Imports of final products by domestic firms: offshoring
- Exports

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Why should we care?

Shu, P., & Steinwender, C. (2019). The Impact of Trade Liberalization on Firm Productivity and Innovation. *Innovation Policy and the Economy*

A Categorization of Trade Shocks

		Direction	
		Increased Competition in Domestic Market	Increased Access to Foreign Market
Target Market	Output Market	**Import competition**	**Export opportunities**
	Input Market	**Foreign input competition**	**Access to imported intermediates**

How does innovation affect firm performance?

- Product differentiation (Sutton, 1991)
- Productivity (Grossman-Helpman, 1991; Aghion-Howitt, 1992)
- Hombert and Matray (2018)
  - Both *unconditional* ↑ profit
  - Opposite effects *conditional* on intensity of competition

Measuring innovation

- Mostly productivity
- Management of product portfolio (Bernard-Redding-Schott, 2011 ; Mayer-Melitz and Ottaviano, 2014, 2016)
- Innovation: patents, R&D, “tech” workers

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“Workhorse” framework

- Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and Innovation: An Inverted-U Relationship. *Quarterly Journal of Economics*, *120*(2), 701–728.

The logic

- Schumpeter (1943): Competition reduces post-innovation rents
  - The relative performance of innovative firms decreases when competition increases
- Arrow (1962): Competition reduces pre-innovation rents
  - The relative performance of innovative firms increases when competition increases
- Conclusion: ”Inverted U-shape”

Mapping the theory to the data

- Traditional approach: “reveal preference” argument

$$Innovation_{ijt} = \beta\, Import_{jt} + \alpha_i + \delta_t$$

- But what is it that we are measuring exactly?

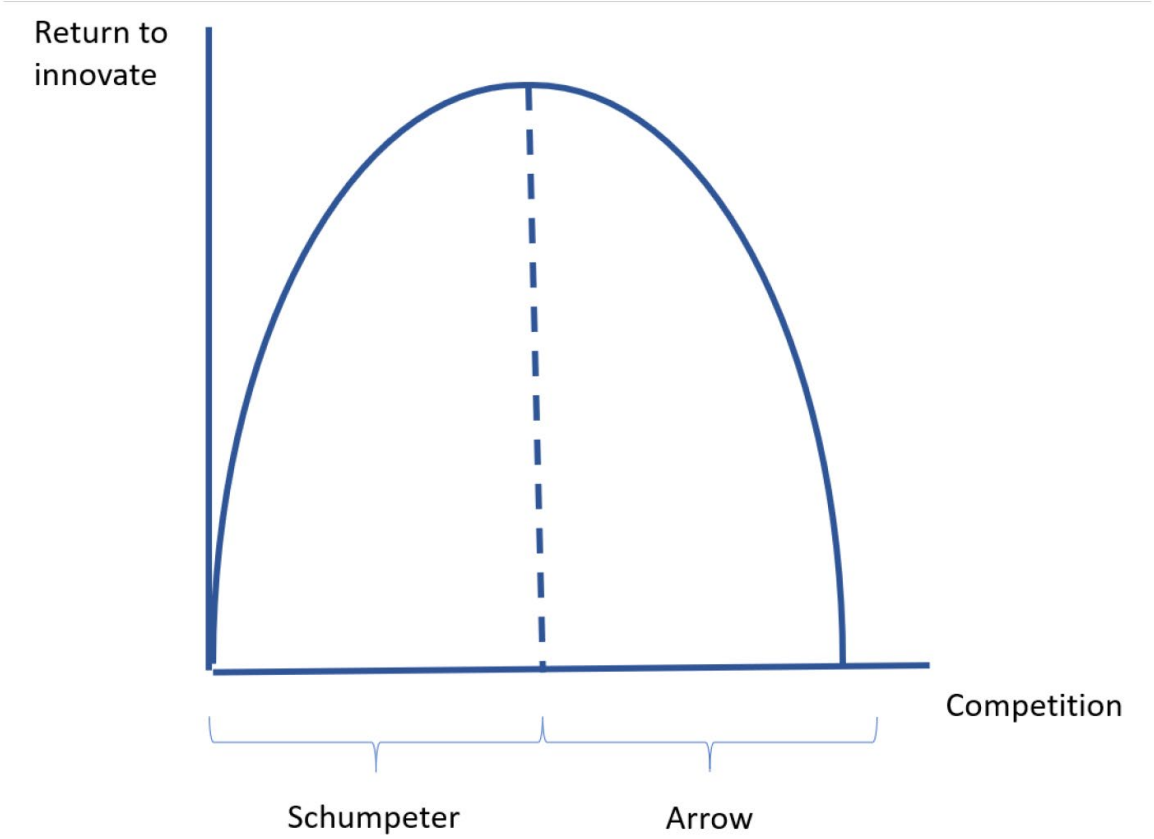
Mapping the theory to the data

- What is the elasticity between innovation and competition?
  - We ”just” need exogenous variations in competition

- How does the return to innovation Δ with competition?
  - Perfect competition shocks **not** enough

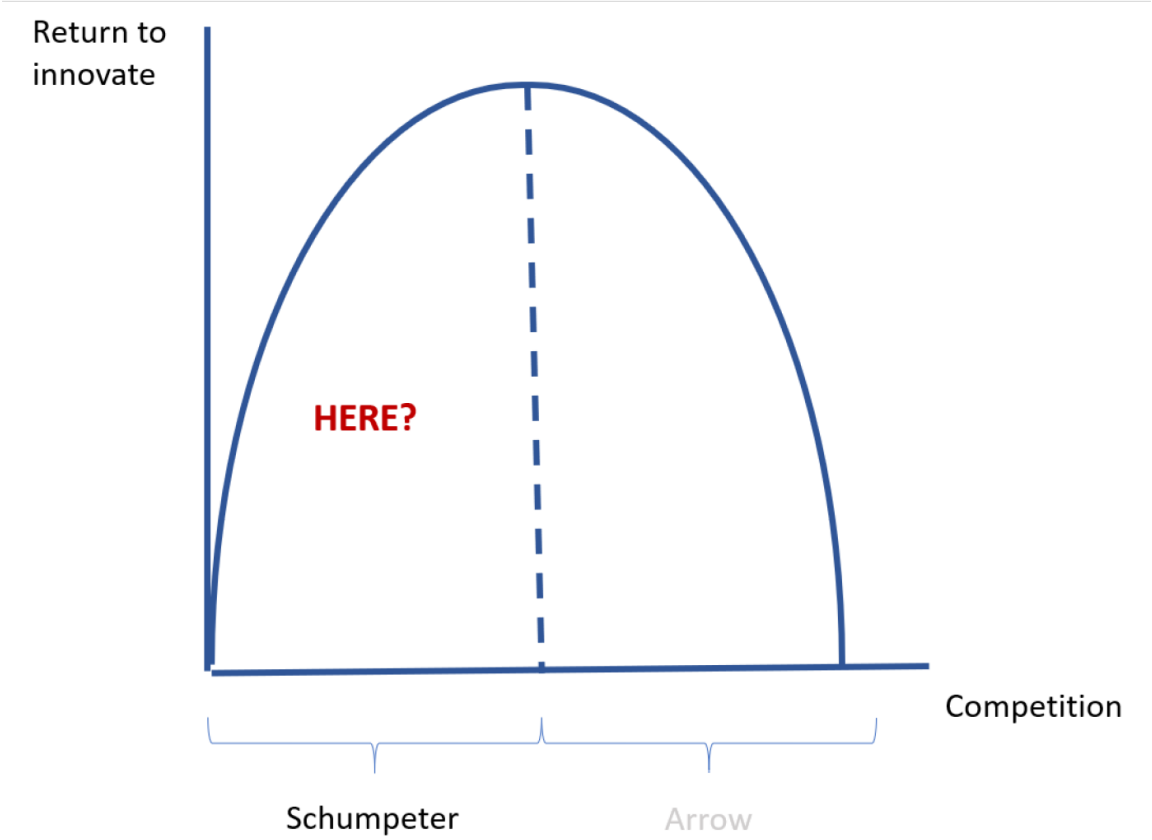
The upside: you can reconcile all the literature

Inverted U-Shape



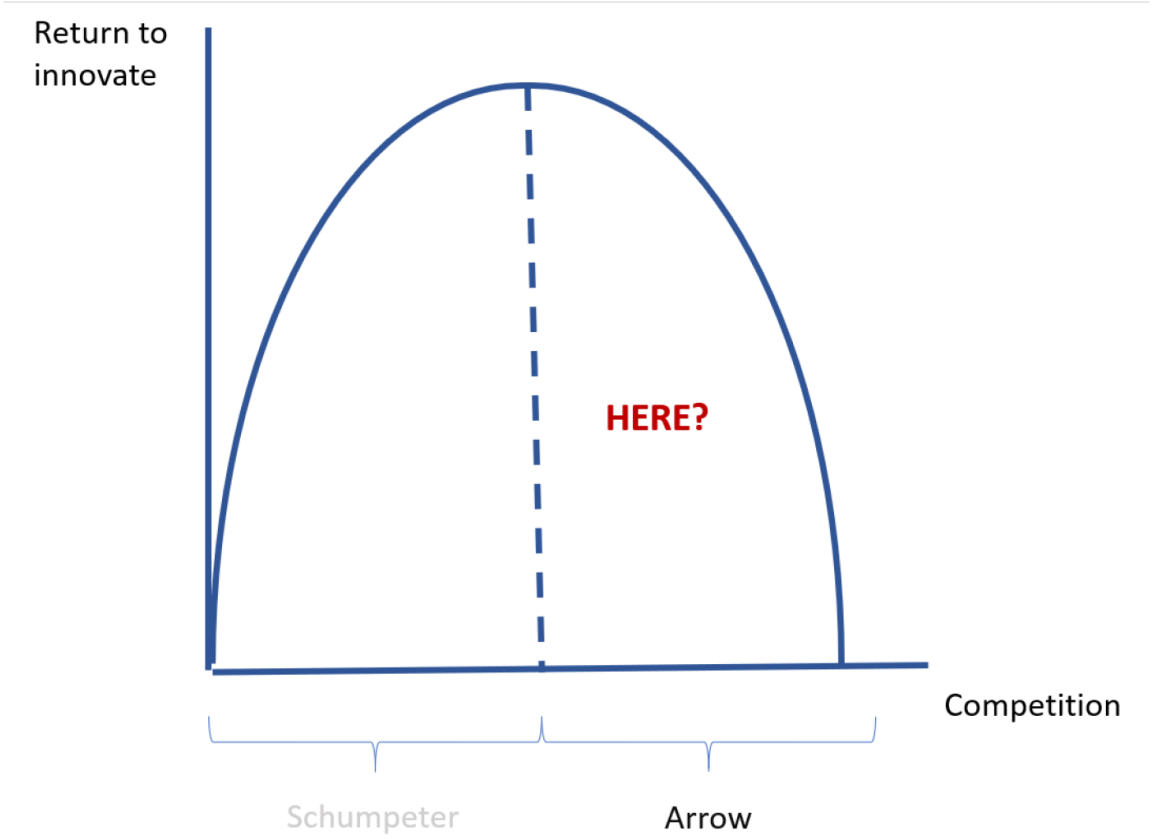
The upside: you can reconcile all the literature

Inverted U-Shape: Where is your economy / industry / period?

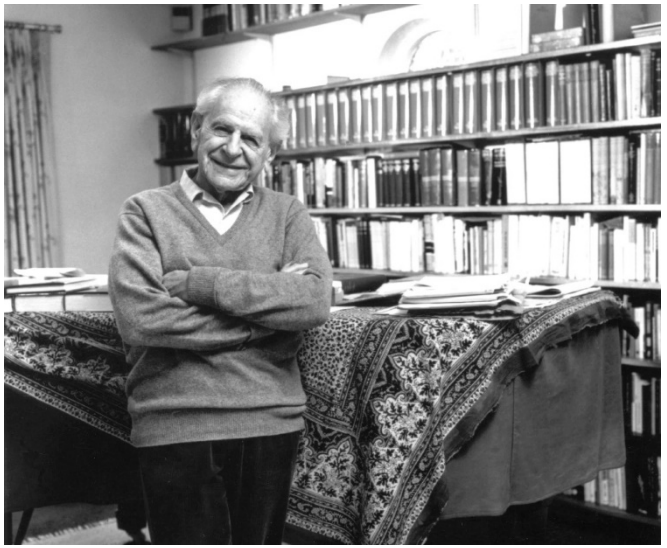


The upside: you can reconcile all the literature

Inverted U-Shape: Where is your economy / industry / period?



- “In so far as a scientific statement speaks about reality, it must be falsifiable: and in so far as it is not falsifiable, it does not speak about reality.” — Karl R. Popper, The Logic of Scientific Discovery



- “A theory that explains everything, explains nothing” — Karl Popper

A more general framework: Hombert and Matray (2019)

Ex-post R&D investment *following* competition ("revealed preference"): **BUT**

- **Partial** estimate
  - Elasticity = f(Returns, Cost structure)
- **Biased** estimate
  - *Exogenous* trade shock **other constraints** to R&D
  - ↓ R&D spending even if NPV>0 project

➔Important policy implications + confusion in the lit so far

Some additional mechanisms

- Preference effect (Chen and Steinweider, 2019)
- Trapped factor (Bloom et al)
- Learning by doing (“infant industry”): Juhász (2018)

Evidence: see Shu, P., & Steinwender, C. (2019)

- Overall >0 for developing countries
  - Mostly for large and technologically advanced
- Must read:
  - Pavcnik 2002
  - Topalova and Khandelwal [2011]
- Survey:
  - Harrison, A., & Rodríguez-Clare, A. (2010). Chapter 63 - Trade, Foreign Investment, and Industrial Policy for Developing Countries

Evidence: see Shu, P., & Steinwender, C. (2019)

- For developed countries… (spoiler: this is messy)
- *Just* looking at China shock:
  - In Europe:
    - > 0 (Bloom et al. 2015)
    - < 0 (Campbell and Mau, 2019)
  - In the US:
    - > 0 (Chakravorty et al. 2017, Xu and Gong, 2017, Lie-Yang, 2017)
    - < 0 (Autor et al., 2020)
- Other import shock: similar inconclusive results

- Hombert, J., & Matray, A. (2018). Can Innovation Help U.S. Manufacturing Firms Escape Import Competition from China? *Journal of Finance*, *73*(5), 2003–2039

- See supporting slides

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Mechanisms

Good

- Higher efficiency of the production process
  - Complementarity with better inputs ➔ more goods
  - Higher profit margins ➔ invest more in R&D
- Learning

Bad

- ↓ need for process- improving technologies
  - No evidence for that yet [Hon?]

Evidence

- Must read:
  - Goldberg, P. K., Khandelwal, A. K., Pavcnik, N., & Topalova, P. (2010). Imported Intermediate Inputs and Domestic Product Growth: Evidence from India. *Quarterly Journal of Economics*

- Mostly on developing countries
  - Some contrast with developed countries

  ➔ Potential interesting future research

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- Theory
  - Acemoglu, D., Gancia, G., & Zilibotti, F. (2015). Offshoring and Directed Technical Change. *American Economic Journal: Macroeconomics*, *7*(3), 84–122.
  - Naghavi, A., & Ottaviano, G. (2009). Offshoring and product innovation. *Economic Theory*, *38*(3), 517–532.
- Empirics
  - Bernard, A. B., Fort, T. C., Smeets, V., & Warzynski, F. (2020). Heterogeneous Globalization: Offshoring and Reorganization. *NBER Working Paper*
  - Branstetter, L., & Chen, J.-R. (2017). Does offshoring manufacturing harm innovation in the home country? Evidence from Taiwan and China. *Working Paper*, 1–34.

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Mechanisms

- Market size effect: ↑ potential rent captured from innovating

- Competition effect: ↑ domestic entry ➔ ↑ competition
  - Differential effect high productivity / low productivity

- Learning by exporting [Hon, any good theory paper on that? CX: not that I know of; there's a baby model in Atkin Khandelwal Oster…]
  - Firm receives knowledge related to export market
    - No investment in innovation-related activities needed
    - Innovation occurs *after* exporting

Evidence

- Aghion, P., Bergeaud, A., Lequien, M., & Melitz, M. J. (2019). The Heterogeneous Impact of Market Size on Innovation: Evidence from French Firm-Level Exports. *NBER Working Paper*

- Evidence of learning by exporting