

# Immigration, Innovation, and Growth

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November 2024

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Hoover Institution *Conference on the Economics of Immigration*

# What they do and find

- U.S. counties 1975–2010 (5 year intervals)
  - ▶ Data on patents, wages, and immigrants
- Identification strategy: shift-share approach
  - ▶ Step 1: Predict ancestry from  $o$  who reside in  $d$  at  $t$  using push and pull shocks with a rigorous leave out strategy
  - ▶ Step 2: Predicted immigration to  $d$  from  $o$  = predicted ancestry from  $o$  in  $d$  · contemporaneous U.S.-wide immigration from  $o$
- They find that 10,000 more immigrants (10% of median pop) to a county:
  - ▶ Raises patenting 25% (80% by natives)
  - ▶ Boosts wages by 8% (5x more for college educated)
- Spatial semi-endogenous growth model with migration decisions
  - ▶ Without the 1965 INA, 5% lower aggregate wages by 2010

- Use of the model to elucidate endogeneity problems
- Clever identification (and model validation of its coherence)
- A quantitative GE lens on “immigrants are more innovative”
- Highly relevant to policy debates about legal immigration
- Should stimulate a raft of follow-up work on the mechanism

- 1 Mechanism
- 2 Magnitude
- 3 Spillovers
- 4 Patents

# Comment 1: What is the mechanism?

- Immigrant inventors?
  - ▶ Arkolakis, Lee, and Peters (2023) early 20th century
  - ▶ Prato (2024) EU to US in recent decades
  - ▶ And most of the increased patenting is among native inventors
- Immigrant entrepreneurs?
  - ▶ Azoulay, Jones, Kim and Miranda (2022 AER:Insights)
  - ▶ No evidence in this episode though
- Scale of the local market?
  - ▶ Waugh (2018)
  - ▶ Induced entry and innovation would need to be skill-biased

## Comment 2: Magnitude?

New patent production in the model:

$$N_{d,t} = L_{N,d,t}^{\gamma} Q_{d,t}^{1-\gamma}$$

The paper estimates  $\hat{\gamma} = 0.781$ .

- But the exponent on  $Q$  need not equal  $1 - \gamma$ .
- Assuming so implies the long run elasticity of  $Q$  wrt  $L$  is 1.
- Bloom, Jones, Van Reenen and Webb (2020 AER) say it is only 1/3.
- And Peters and Walsh (2024 JPE-Macro) say it is only 1/4.

Upshot: The GE wage stimulus might be closer to 1.5% than 5%.

## Comment 3: Geographic scope of knowledge spillovers?

The model's spillover involves  $Q_{d,t}$  — the *local* stock of patents

In the spirit of Jaffe, Trajtenberg, and Henderson (1993 QJE)

But there are many channels for knowledge spillovers across counties:

- Patent citations (Bloom, Hassan, Kalyani, Lerner, Tahoun, 2021)
- Worker flows (Jarosch, Oberfield, Rossi-Hansberg, 2021 ECMA)
- Inventors (Akcigit, Grigsby, Nicholas, Stantcheva, QJE 2022)
- Trade in intermediates and capital (Peters, 2022 ECMA)
- Multi-location firms (Wal-Mart, Kleinman 2023)

## Comment 4: Patents as a proxy for innovation

- 90% of patents are in manufacturing
- Only 5% of manufacturing firms patent
- Only 12% of GDP is in manufacturing
- ~20% of measured TFP growth from manufacturing

Sources: USPTO, NSF, BEA, BLS

Shares are in 2012 except for TFP growth (1987–2014)