Discussion of "China's Rising IQ and Growth: Firm-level Evidence"

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- "China is all over the news on total patents applied and granted: Innovators in China powered global patent applications to a new record in 2015, filing more than a million applications for the first time ever within a single year" – WIPO
- "China-and it's true - is graduating six to eight times as many scientists and engineers as we have. But I challenge you, name me one innovative project, one innovative change, one innovative product that has come out of China," – Joe Biden
- This paper aims to shed light on whether China's "patent boom" is real.

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- Second, is patenting correlated w/ firm outcomes
  - outputs, inputs, TFP, new product, exports
  - robustness: PSM, IV
- Third, differential effect of SOE vs POE (>)

One of the most convincing papers that use SIPO data I have seen so far.

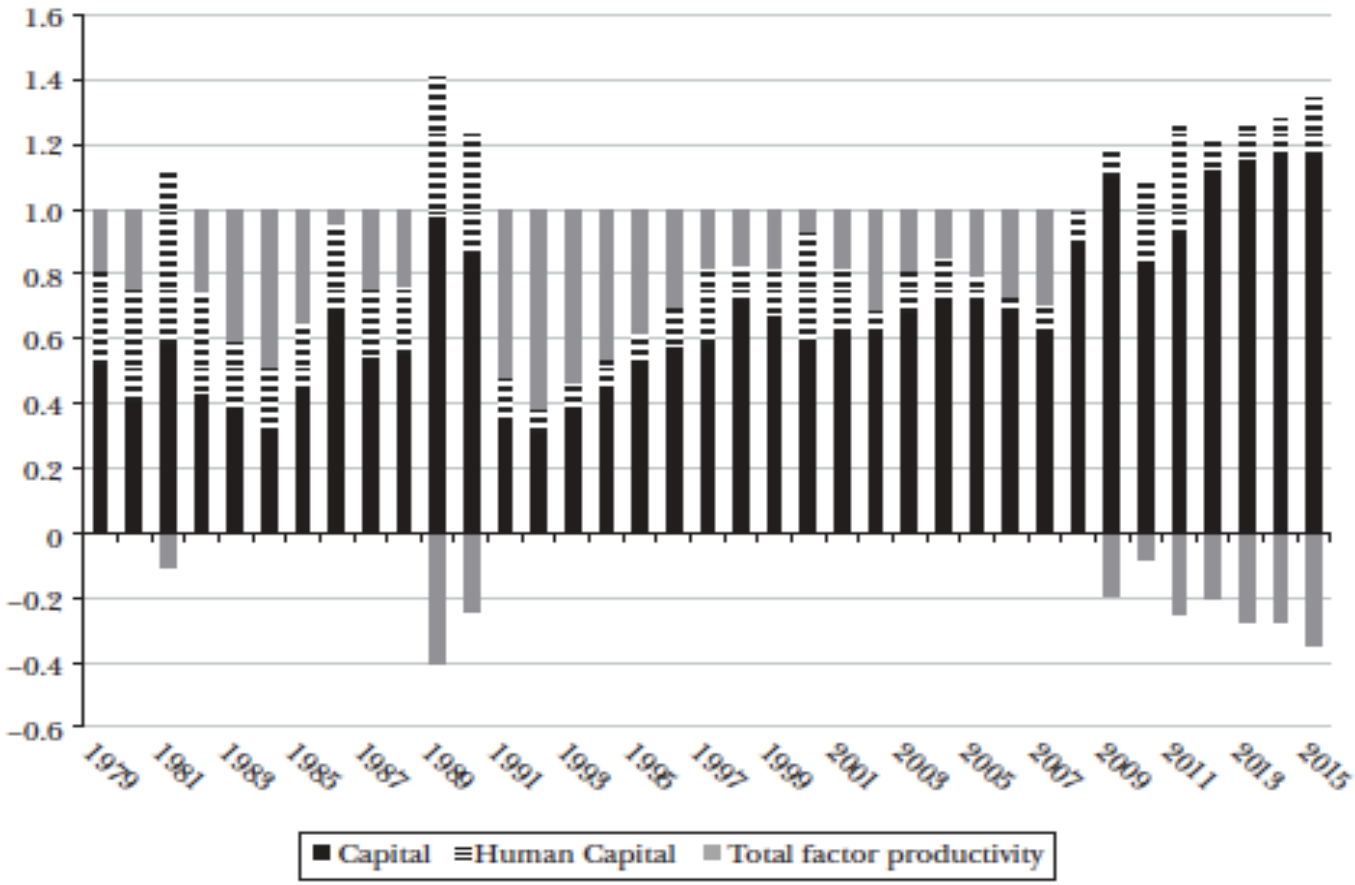
Open question: what contributed to the dramatic rise of patent applications?

Aggregate Facts

Figure 1

Contributions to GDP Growth of Physical Capital, Human Capital, and Total Factor Productivity, 1979–2015

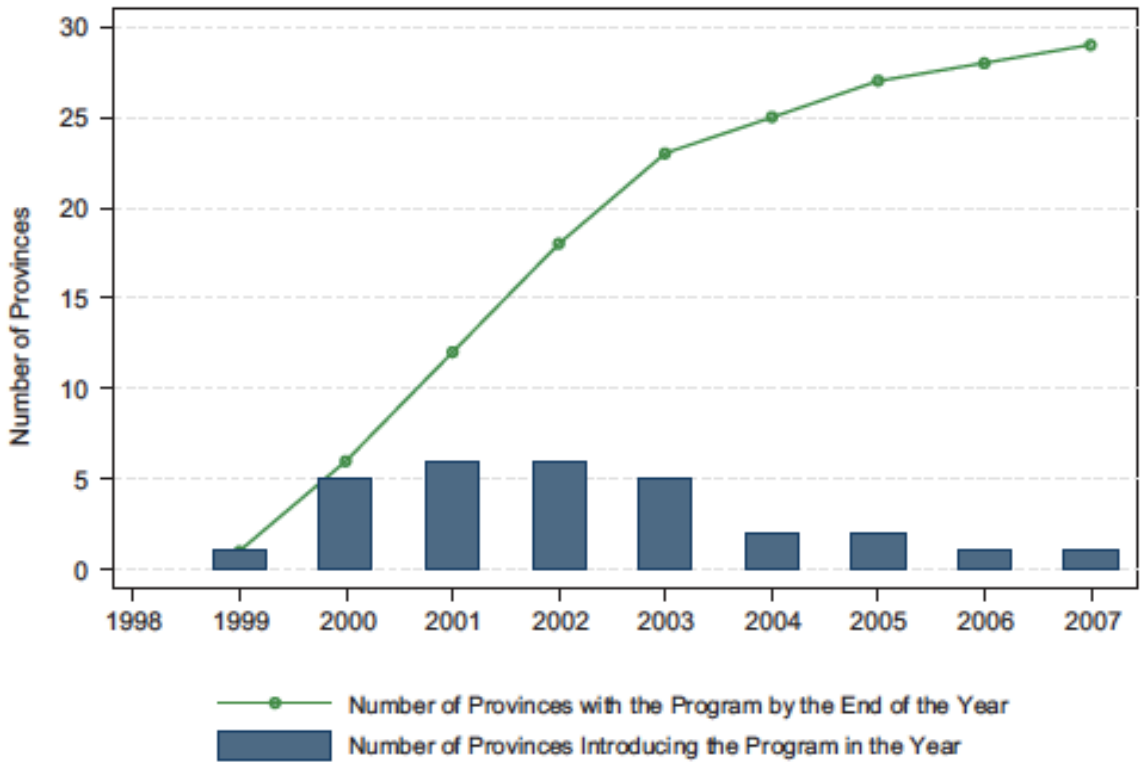
(share)



Source: Authors' calculations based on the methodology and data sources detailed in Online Appendix A.
Note: See Appendix for details of the estimation.

Innovation Policy I

- Patent application subsidies at central/local government level: patent is essentially free to obtain.

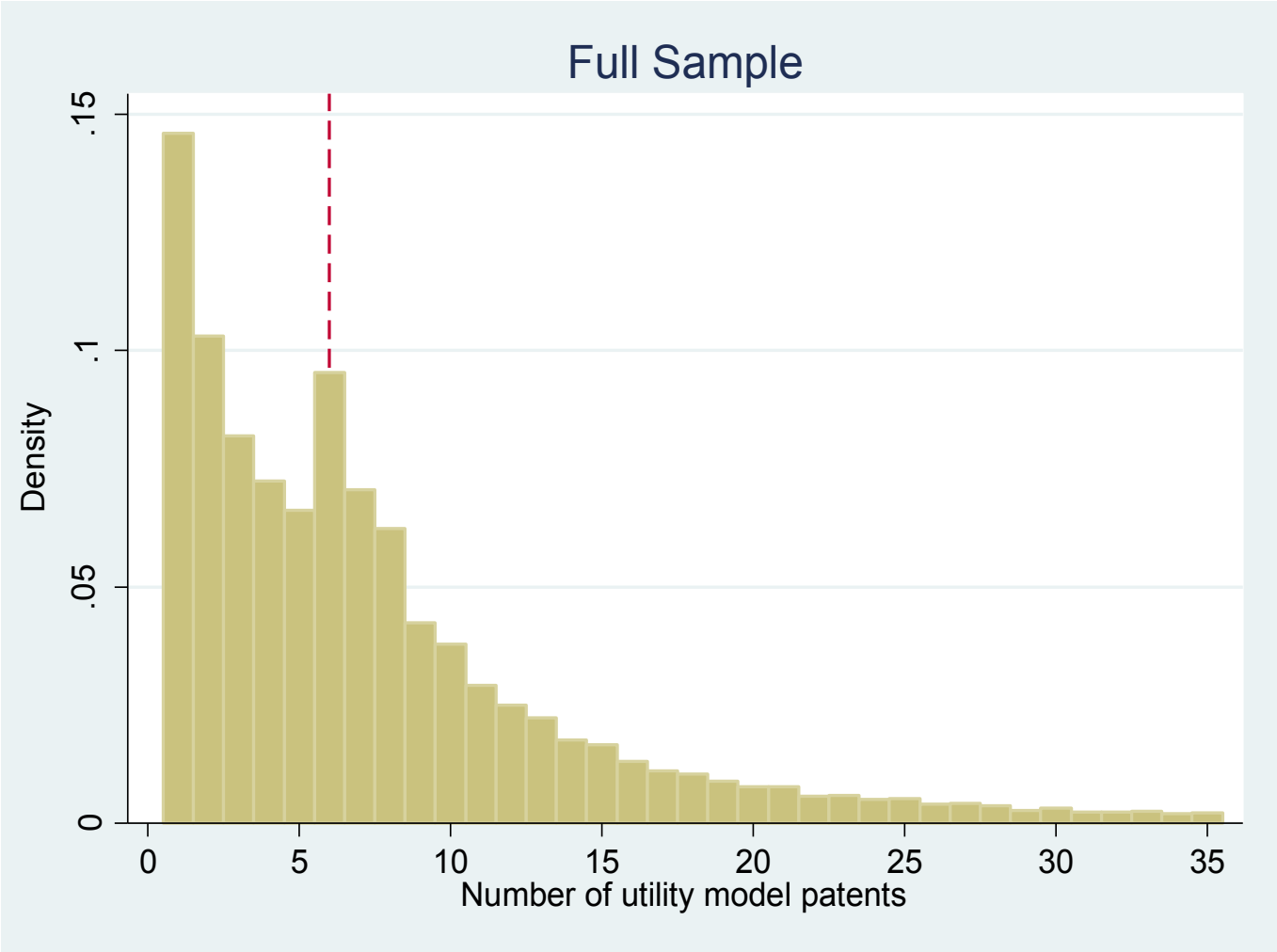


Data Source: The author's collection from Annals of Chinese Intellectual Property Rights (2000-2008).

Fig. 2. Diffusion process of patent subsidy programs among Chinese provincial regions.

Innovation Policy II

- Huge tax break for High Tech enterprises (one invention or six utility patents a necessity after 2008)



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- I am quite convinced by the paper that patent is "real"
- But, there is non-trivial distortions in this whole process...
- Questions:
  - What is the elasticity of firm profitability wrt. patent
  - What is the elasticity of patent wrt. R&D or other innovation inputs
  - How do these numbers compare for China vs. other countries

Suggestion I

- A potential literature to organize the estimation and benchmark towards is the CDM model (Crepon, Duguet, Mairesse).

- Three stage linkages
  - Output: $lnr_{it} = \beta_k lnk_{it} + \beta_v lnv_{it} + \omega_{it} + u_{it}$
  - Productivity evolution: $\omega_{it} = g(\omega_{it-1}, s_{it}) + \epsilon_{it}$
  - Patent evolution: $s_{it} = f(s_{it-1}, rd_{it-1}, \omega_{it-1})$
  - Potentially also model rd_{it-1}

- Identification is closely related to ACF and dynamic panel, which the paper already utilizes.

- Typically rely on innovation surveys in OECD countries

Suggestion II

Investigate mechanisms and their quantitative magnitudes

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- Can we separate out these channels
  - markup: DLW measure not significant, is labor share a good measure? Would prefer variable inputs.
  - export increases much more than domestic: informative about quality/products? (Customs data)

Suggestion III

More work on the patent data

- Invention, Utility, and Design patents have almost identical effects on
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  - TFP
  - Export
- Puzzling given the fact that Invention is a lot more "selective", does the result stand with better empirical strategies? (i.e. IV)

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  - Control for lagged outcomes.

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  - Control for lagged outcomes.
- Explore more the technological field of patent vs a firm's industrial classification.

Suggestion IV

- Patent is one of the most widely used measures of firm's innovation *output*
- Knowledge production function literature often firm-level TFP as another innovation outcome
- Often share the same set of determinants like R&D inputs and other firm-level observables
- Both have a reasonable level of persistence.
- Hard to be bullet-proof, the IV regression seems a promising direction
  - But needs to pay attention to geographical confounding factors (like local economic growth)
  - Needs ideally overtime variation in IPR protection.
  - Could also consider local government subsidies for patent application.