



The Anatomy of Chinese Innovation: Insights on Patent Quality and Ownership

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Overview

- China's patenting activity has grown tremendously – 23.5% averaged annual growth rate (2000-2019).
- But how about **patent quality**? What kinds of firms and organizations are filing patents? The role of foreign entities?
- Using a Large Language Model (LLM), the paper generate embeddings for the abstracts of every Chinese patent filed at China's National Intellectual Property Administration to examine 4 key dimensions of the evolution of patenting in China from 1985 to 2019:
 - An innovation way to measure patent quality
 - Ownership
 - Dependence on foreign knowledge
 - Technological similarity between Chinese and foreign patents.



Key findings

1. Patents that are important for innovation have become less important on average.
2. Knowledge within China has become more important than knowledge outside of China for directing innovation in China.
3. Knowledge produced by Chinese entities within China has become more important than knowledge produced by foreign entities.

Figure 2.1: Patent shares by patentee type

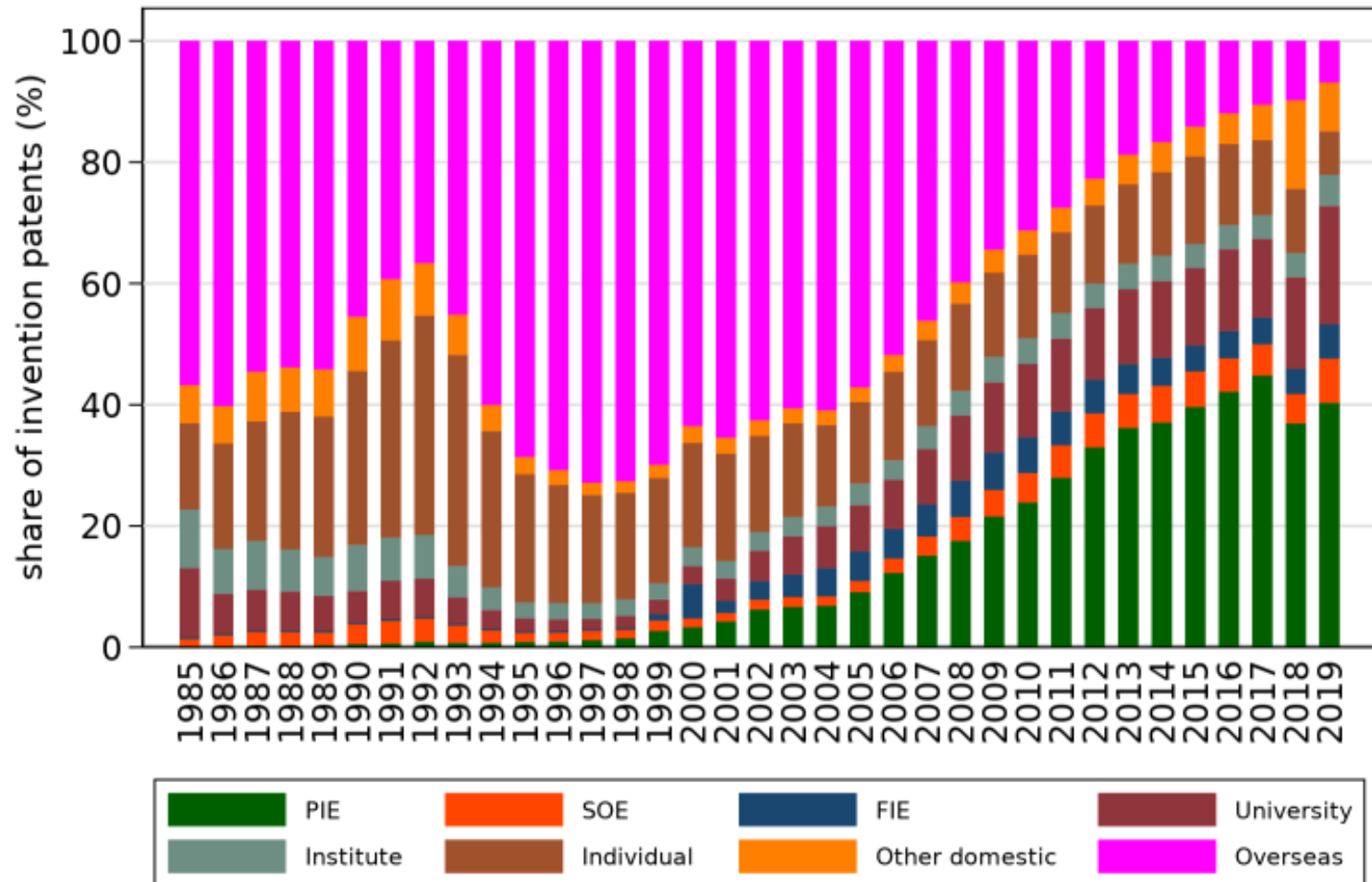


Figure 6.2: Innovativeness and crowdedness of Chinese patenting

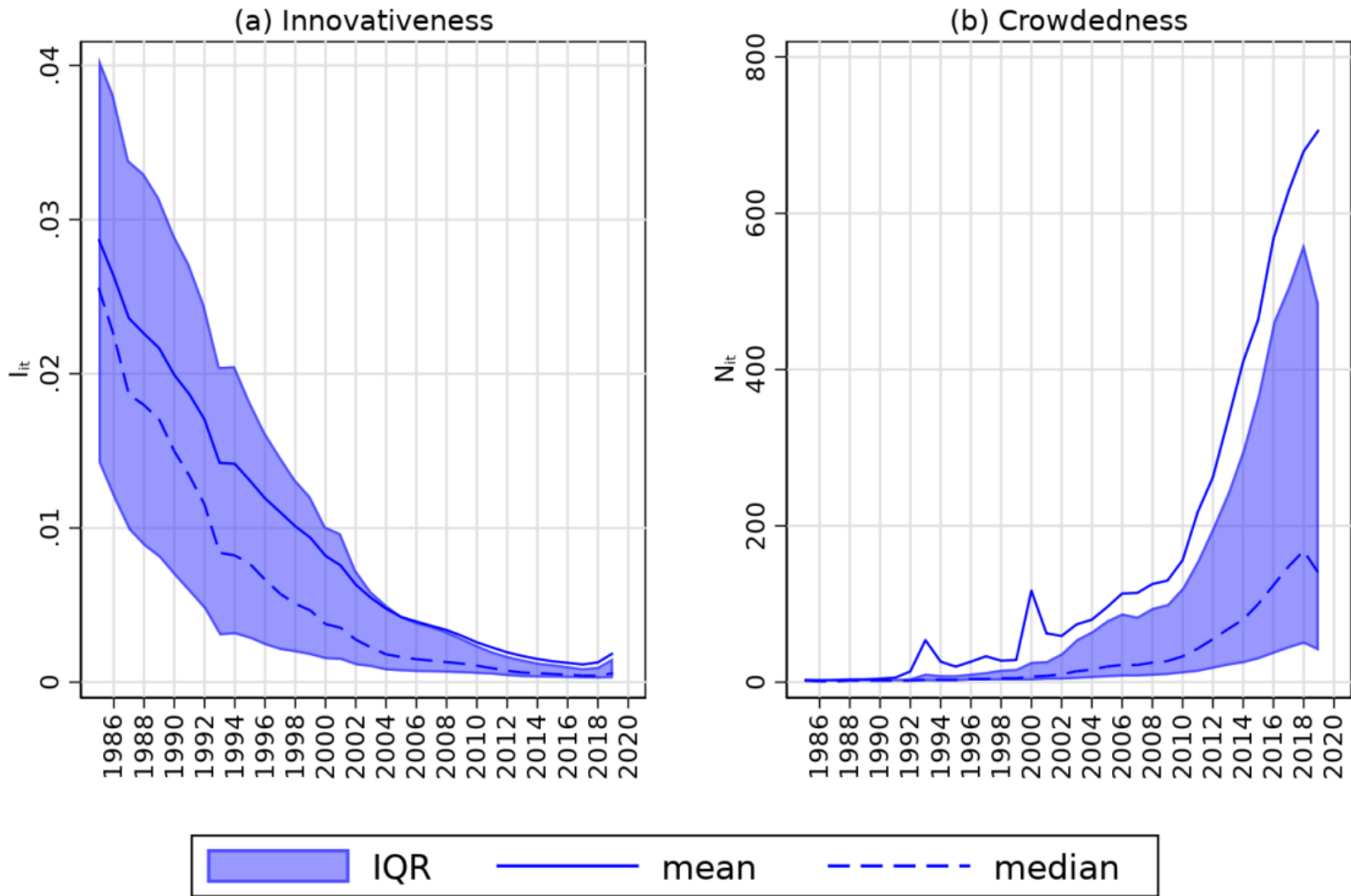
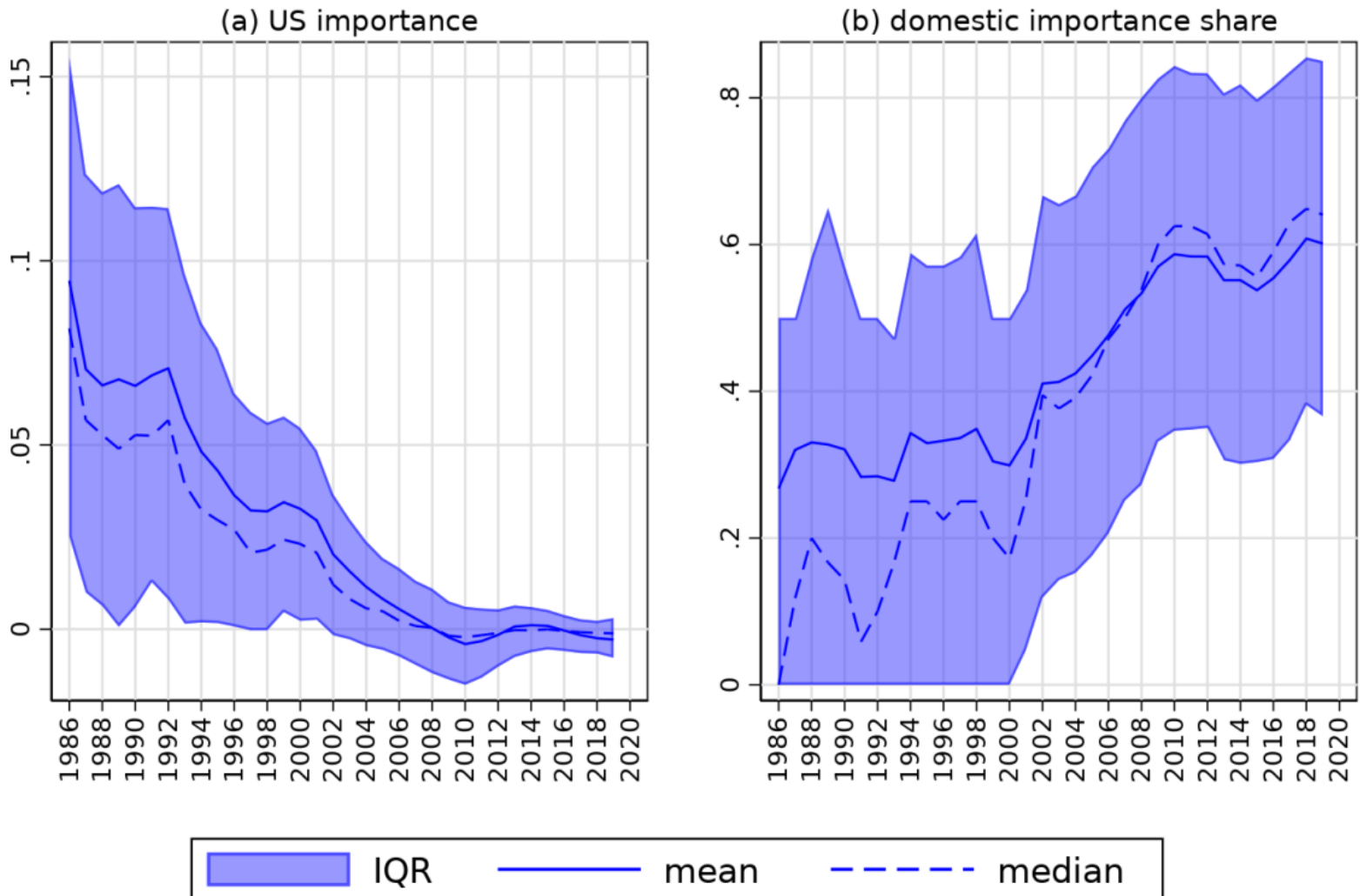


Figure 6.3: US importance and the domestic importance share





Question 1

What drove private enterprises' patenting?

- Governments' industrial policy (e.g., Made in China 2025, different 5-year plans)
 - Fang et al. (2024) "Decoding China's Industrial Policy"
- Specific policy incentives (e.g., tax rebates for R&D expenditure)
 - Daniel Xu et al. (2021) "Notching R&D Investment with Corporate Income Tax Cuts in China"
- The role of financial institutions - investments funds, venture capitalists, etc.
- Foreign firms' role in the past? Technology spillover? The roles of joint ventures?



Question 2

What triggered the reduced dependence on foreign innovation?

- The role of government policy to achieve technological independence?
- Josh Lerner, David Yang et al. (2024) “Appropriate Entrepreneurship? The Rise of China and the Developing World”
 - Little overlap between US and China’s VC activities across sectors.
- Did the Chinese governments strategically promote specialization in different technology classes and sectors?
 - EV, solar panels, new material,
- **Are these patents related to China’s dominance in global production?**



Question 3

What are the relationships between different patentee types?

- Between universities and private firms
 - Division of labor, specialization, university and industrial clusters
- Between SOEs and private firms
 - Government's rising concerns about various types of security and technology independence has strengthened the dominance SOEs, including their R&D expenditure.
 - Crowding out, or collaboration?
 - World Bank's World Development Report (2024)
- Between big versus small private firms
 - Huawei or tech start-ups?



Question 4

Has the Chinese patent office become more stringent over time?

- Initial stage: KPI is to maximize innovative activities
 - Various studies by Daniel Xu, Shangjin Wei, and others have shown that policy incentives to promote innovation are not always efficient, and can be distortive
- Compare the changing quality between granted and filed patents?
- Any changing behavior of the patent office towards different types of patentees (a political economy paper).



Concluding remarks

- A very innovative study about China's innovation capacity over the years.
- Ideas are more difficult to get (Bloom et al., 2020).
- The role of industrial policy, SOEs, foreign firms, and universities.
- China's innovation has become more reliant on home-grown innovation and technology.
- Did China pursue a different path of innovation as compared to the West? Acemoglu's idea about appropriate technology
- I am probably asking for too much and suggesting the authors to write another paper, titled "Innovating like China".



Thank You