The Globalization of R&D: China, India, and the Rise of International Co-invention

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Overview

• Interesting paper – learned a lot, especially about co-invention – highlights:
  – Contrast to Korea and Taiwan is striking
  – Possible lack of spillovers to indigenous enterprises an important finding, confirms some other work on technology development (e.g., Intel in Costa Rica)
  – related to a central innovation policy problem, how best to diffuse technology knowhow and increase learning in developing countries
• Excellent data sources, lots of work putting them together
• Some confirmation from interviews in China (why not India?)
• Discussion (based on paper, not presentation):
  – Summary of results
  – Thoughts on patent system context
  – Additional references, especially for Chinese patent data
Summary of results

• By patent, for domestic invention only:
  – Both co-invented and MNC-owned patents are cited more often than other Chinese origin patents
  – Also true for Indian-origin patents, but co-invention and MNC patents are nearly collinear
  – More recent MNC patents have become more valuable in China and India, as have co-invented patents in India
  – Value? Or knowledge spillover?
Summary of results

• By patent, within MNC, across countries
  – Co-invention and domestic invention do not matter for Chinese patent value, may be negative in India
  – The more experience the firm has in China, the more productive is co-invention and Chinese invention
  – Not true for India, in fact, experience associated with less productive invention in terms of US cites
  – Grant delays and team size suggest higher value, as others have also found
Minor queries & comments

• Technology dummies very coarse – what happens if you use better categories?
• Use only examiner cites to control for “localization” in citing
• Compare results with self-cites, which are associated with private value (HJT 2005)
• Some of the hypotheses are not hypotheses: “might” ...”could”...they are questions
• How do these results fit with those in Arora, Branstetter et al. on Indian pharma & IP?
Context – domestic patent systems

• China (Lei 2012)
  – Modern system introduced 1985, based on German system
  – 1992 – extended scope (pharma), term to 20 years
  – 1994 – joined PCT
  – 2001 – TRIPS, injunctions, damages
  – 2009 – novelty strengthened, China-first filing requirement removed, damages increased,....
  – Combination of hardware & software is patentable

• India (T C James, Ministry of Industry, 2007; Kanwar 2013)
  – Long history of patents, except pharma; based on English system (1856, after 1852 law)
  – 1998 – joined PCT
  – 1999 – mailbox apps for pharma- marketing rights
  – 2002 – several changes for TRIPS compliance (20 years, appellate board)
  – 2005 – first pharma patents available; full TRIPS compliance
  – Software as such not patentable

• Conclusion: India lags China by about 4-5 years in updating their patent law
Things are changing fast...

2. China is receiving the most invention patent applications in the world

SIPO patenting growth - Source: Can Huang (2012), from WIPO data. 
NB: comparison to grant data (180,000 in 2011) suggests 4 year lag.
Some literature (SIPO data)

• Huang (2011) – estimate value of invention & utility patent rights in China 1986-1998, based on renewal data – those owned by foreign firms have higher value

• Lie Yun (2011) – parent MNCs tend to take out invention patents, Chinese subs take out utility model patents.

• Huang & Wu (2011) – nanotech patenting in China driven by the state institutions, not firms

• Lei, Wright & Sun (2012) – patent subsidies at local & central level increase patenting significantly
Some literature (USPTO data)

• Eberhardt, Helmers & Yu (2012) – match USPTO & SIPO patents to Chinese Census of Manufacturing
  – Chinese firm patenting accounted for by a tiny, highly select group of Chinese companies in the ICT sector (Foxconn, Huawei, ZTE, etc)
  – These companies account for nearly all Chinese USPTO patent filings as well as the vast majority of domestic SIPO invention patents
  – They are younger, larger and substantially more export-oriented than firms patenting exclusively in China.

• Zheng (2011) – similar analysis of industry & technology trends as this paper, using USPTO data

• He & Tong (2013) – match USPTO patents to traded Chinese firms – so far they have created a dataset, but not analyzed it.
Some literature (QPML)

• Consistency result:

• Application to patents, including efficient QPML