

# TRIPS at 20: Evidence on Innovation, Use, and International Technology Flows

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# Globalization of the IP system

- TRIPS, WIPO efforts, RTAs, BITs, and unilateral reforms have had large impacts on measured levels of patent strength.
- There have also been large changes in copyrights, trademarks and plant variety legal protection.
- More recently we've seen significant legislative reforms in geographical indications.
- By some measures patent reforms were stronger than trade liberalization since 1995.

# What is this reformed system supposed to accomplish?

- Reduce apparent distortions to trade arising from highly variable IP systems.
- Expand trade in high-technology goods.
- Support markets for international knowledge transfer and diffusion.
- Improve global and national innovation incentives.
- Encourage R&D in technologies for the needs of poor countries.
- Improve consumer guarantees of product origin, thereby raising safety and investments in quality.
- Build and support global markets for creative activities.
- Facilitate price differentiation across markets.

# Technology transfer and innovation: indirect evidence

- The period since TRIPS has seen growth in technology exports of major emerging economies (Table 1).
- Also have observed large increases in the participation of developing countries in global IP registrations:
  - DC patent apps abroad: 11,459(1995) to 95,168(2010)
  - DC TM apps abroad: 275,647(1995) to 478,718(2010)
  - DC PVP apps total: 671(1995) to 5,119(2010)
- And relatively fast growth in weighted R&D/GDP ratios (2000-2010):
  - 26 developing countries: 3.7% per year;
  - 35 emerging countries without China: 2.8% per year;
  - China: 9.5% per year;
  - 28 developed countries: 1.3% per year.

**Table 1 Indicators of Technology Transfer to Selected Countries**

	High-Technology Imports				High-Technology Exports				Inward FDI Stock		Outward FDI Stock	
	\$b	% mfg	\$b	% mfg	\$b	% mfg	\$b	% mfg	\$b	\$b	\$b	\$b
	1995	1995	2005	2005	1995	1995	2005	2005	2000	2008	2000	2008
<b>Brazil</b>	8.7	22.3	16.3	29.1	2.4	8.9	8.4	13.1	122.3	287.7	51.9	162.2
<b>Mexico</b>	18.9	31.9	59.6	31.5	22.9	36.4	63.8	38.2	97.2	294.7	8.3	45.4
<b>Rep. of Korea</b>	24.3	25.7	56.2	33.8	44.4	13.7	98.5	21.1	38.1	90.7	26.8	96.5
<b>China</b>	21.9	20.7	209.4	41.1	24.4	19.2	284.8	40.1	193.3	378.1	27.8	147.9
<b>India</b>	2.9	13.9	20.1	26.8	1.5	6.5	5.5	7.4	17.5	123.3	1.9	61.8
	Technology Balance of Payments											
	payments	receipts	payments	receipts								
	\$m	\$m	\$m	\$m								
	1995	1995	2005	2005								
<b>Brazil</b>	529	32	1,404	102								
<b>Mexico</b>	484	114	654	171								
<b>Rep. of Korea</b>	2,385	299	4,561	1,908								
<b>China</b>	1,281 <sup>a</sup>	80 <sup>a</sup>	5,321	157								
<b>India</b>	90	1	672	206								
<b>Source: UN Comtrade, UNCTAD World Investment Report, World Development Indicators</b>												
<b>High-technology trade includes pharmaceuticals, electronic machinery and aerospace equipment</b>												
<sup>a</sup> data for 2000												

# Caveats

- These changes are concentrated in a few countries and industries.
- There is little evidence of such changes among the poorest developing economies.
- Patent and TM statistics are imperfect measures.
- We need more systematic evidence based on extensive data and statistical analysis.
- Following is a brief review of recent econometric evidence.  
Qualifications:
  - Research is difficult due to data scarcity, measurement problems, causation issues, and confounding factors.
  - Relatively little research focuses on TRIPS itself.
  - Conclusions are already somewhat dated.

# Patent reforms and innovation: mixed messages

- It is remarkable how little is known about this basic question.
- Early studies were pessimistic about impacts in DCs:
  - Reforms raise patenting in the US by developed countries (MCs) but reduce it by developing countries (DCs) (Schneider JDE 2005).
  - Multinational firms expand R&D and local patenting in MCs, no impact in DCs (Allred-Park JIBS 2007).
  - Non-resident patenting rises after reforms in middle-income countries; resident patenting rises does not (Branstetter et al QJE 2006).
  - Patent applications in US rose from middle-income economies with high secondary education (Chen-Puttitanun JDE 2005).

# Patent reforms and innovation: mixed messages

- Later studies are more optimistic:
  - Pharma patent applications in US rose from middle-income DCs with higher skills and economic freedom (Qian REStat 2007).
  - US MNEs expand technological economic activities of local affiliates in larger developing countries after reforms (Branstetter, et al JIE 2011).
  - R&D/Sales for largest Indian pharma firms quadrupled 2000-05 *in anticipation of patent reforms* (Arora et al 2011).
- Exception: there is little evidence that reforms have raised private R&D aimed at needs of poor countries (Kyle and McGahan REStat 2014).
- Patent rights do play a positive role in such work in universities, foundations, and international organizations.



# IPR reforms and international technology transfer

- This is the primary area of inquiry for international trade economists.
- Development economists largely expected negative impacts.
- But IPRs should address market-information problems in ITT via:
  - raising appropriability where imitation costs are low;
  - reducing contracting costs and raising legal certainty;
  - reducing opportunism through lower transactions costs;
  - Supporting markets for technology brokers.
- What are the channels of ITT?
  - High-technology input trade;
  - Foreign direct investment (FDI);
  - Technology licensing;
  - Skilled-labor mobility;
  - Information flows within production and research networks.

# IPR reforms and ITT

- Casual evidence (ignoring great recession years):
  - N-S Trade in high-tech, intra-firm inputs continues to rise faster than total trade (vertical production).
  - N-S FDI and licensing volumes also rise relatively rapidly.
  - Rapid emergence of global innovation networks.
  - Little evidence of growth in ITT to poorest countries.

# IPR reforms and ITT

- Econometric studies with recent data:
  - Patent laws matter to OECD firms in IPR-sensitive sectors in choosing production locations in Eastern Europe (Javorcik EER 2004).
  - OECD exports of high-technology goods rose faster to DCs with larger patent reforms post-TRIPS (Ivus JIE 2010).
  - Manufacturing exports from middle-income economies rose significantly over time in TRIPS period (Maskus-Yang working paper 2015).
  - This study also finds that inward patent applications seem to support export growth.

# IPR reforms and ITT

- Affiliate licensing, value added, sales, employment, and exports of US MNEs rose post-reforms (Branstetter et al JIE 2011).
- Licensing by Japanese firms to affiliates and unaffiliated partners rise with patent strength (Wakasugi-Ito JTT 2009).
- IPRs positively offset the costs of distance in monitoring affiliate sales, so high-tech sales rise with patent rights (Keller and Yeaple AER 2013).
- IPR reforms above a threshold income level shift ITT from exports to FDI then to licensing (composition effect); (several studies).

# Reasonably robust conclusions about ITT

- There does seem to be a positive and strong causal impact of IPR reforms on inward ITT.
- But not yet in the poorest countries.
- And in middle-income and emerging economies there are threshold and complementarity effects:
  - Education and human capital;
  - Effective domestic competition;
  - Adequate governance and infrastructure.
- All of this suggests that reforms are strongly supporting technology diffusion, if not fully across countries.
- And countries need to invest in complementary supports to maximize this access to information.

# Brief concluding observations

- The data and evidence suggest that WTO members have seen:
  - Substantial legal reforms in IPRs;
  - Increasing engagement with the utilization of IPRs;
  - Growing market transactions in technological information protected by IPRs.
- The extent of this engagement varies by income grouping.
- But there are many more issues to study, such as
  - Copyrights and creativity in developing economies;
  - How should we measure trade in intangibles?
  - How have patent reforms affected competition and pricing in pharmaceuticals and other goods?
  - Have IP reforms supported price segmentation and how has this affected product availability?