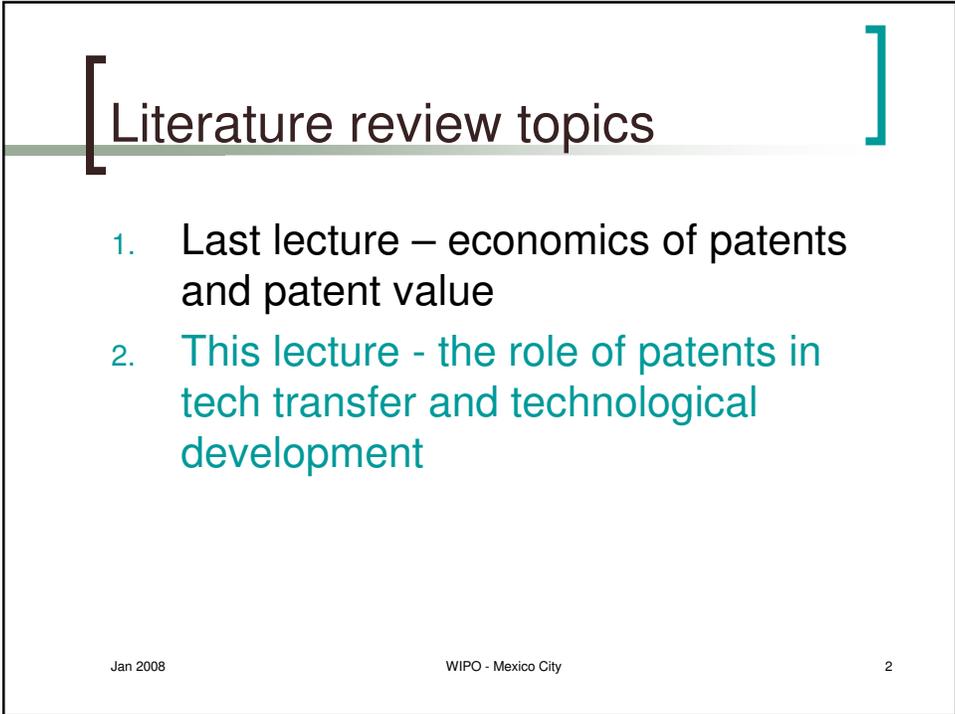


Patents and technology development

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Literature review topics

1. Last lecture – economics of patents and patent value
2. This lecture - the role of patents in tech transfer and technological development

[Two questions]

- Two separate questions whose answers may be at odds with each other:
 - Does stronger patent protection encourage technology transfer (which is assumed to encourage development)?
 - How does it affect behavior of foreign firms?
 - Does stronger patent protection encourage technology development?
 - How does it affect behavior of domestic firms?

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[Two questions (cont.)]

- The first question is easier to answer but the second is more important:
 1. **Foreign firms:** stronger IP protection in the host country should encourage (or at least not discourage) transfer of technology.
 - Note that this may or may not help development.
 2. **Domestic firms:** stronger IP could encourage their innovation, but can also discourage imitation and inhibit learning and catchup.

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Some useful surveys

- **Branstetter, Lee G.** 2004. Do Stronger Patents Induce More Local Innovation? *Journal of International Economic Law* 7(2), pp. 359-70.
- **Maskus, Keith E.** 2004. Encouraging International Technology Transfer, Geneva, Switzerland: ICTSD and UNCTAD Issue Paper No. 7.
- **ICTSD and UNCTAD.** 2003. Intellectual Property Rights, Implications for Development Policy Discussion Paper, Geneva, Switzerland: ICTSD and UNCTAD.

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1. Technology transfer

- Takes place via
 - Technology licensing (but some tacit knowledge needs to be transferred)
 - Foreign direct investment
 - Joint ventures
- Enforceable IPRs should encourage all these activities

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[1. Tech transfer - empirical]

- Mansfield (1994) – survey evidence that US multinationals evaluate IP enforcement before making investment abroad
- Branstetter, Fishman, and Foley (QJE 2006) – royalty payments, affiliate R&D spending, and foreign patent apps increase for US multinationals following IPR reforms in 16 foreign countries (mostly mid-level developing).
- Fosfuri (RP 2004) – country risk more important than IPRs in promoting tech transfer in chemical processing
- See Maskus survey for further evidence.

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[1. Tech transfer - summary]

- Main conclusions from empirical work:
 - Middle income countries that already have innovative capacity or capable of imitation (e.g., Mexico)
 - Both tech licensing and FDI respond to stronger IP regimes
 - Quality of technology transferred rises, and there is a shift toward licensing (markets for technology)
 - Very low income countries see little response
 - IPRs are not very highly ranked as an influence on tech transfer, except for R&D facilities and very advanced technologies.

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2. Technological development

- What is the impact of strengthened IPRs on innovation and development within the country?
 - Theory
 - Cross country evidence (some cited earlier)
 - Individual case studies of patent law changes

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2. IP and Tech development - theory

- Grossman and Lai (AER 2004)
 - In general, non-cooperative equilibria choose more IP protection in developed countries than less developed
- Angeles (BE Macro 2005)
 - Welfare effects depend on relative income levels in North and South
- Scotchmer (JLEO 2004)
 - Innovation provided either by IP or public sponsorship
 - Then national treatment and harmonization both lead to too much IP protection and too little public sponsorship in all countries relative to social welfare optimum
 - Small countries will favor more extensive IP rights than large countries (c.p.) – more CS leakage
 - More innovative countries will favor more extensive IP rights (c.p.)

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2. IP and tech development - empirics

- Lerner (AER 2001), Moser (AER 2005)
- Chen and Puttitanum (JDE 2004)
 - 64 developing countries 1975-2000
 - Shows that IPRs have a positive effect on innovation (patenting in US)
 - Confirms predicted U-shaped relationship between IP strength and development level (first decreases, then increases)
 - However, identification is weak: trade openness and WTO membership assumed to influence IPRs and not innovation

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2. IP and tech development - empirics

- Qian (RE Stat 2007)
 - 85 countries 1978-99 – pharmaceutical patents
 - Uses matched samples and fixed effect estimation – very thorough analysis
 - Patent protection only encourages innovation and R&D at high development levels
- McCalman (JIE 2001)
 - Growth model of bilateral tech transfer
 - Shows large transfers to the US from harmonization of patent rules

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2. IP and tech development – country case studies

- Evidence somewhat mixed
 - Western Europe (UK and Germany) had patent protection during industrial revolution
 - Although episodes of innovation without patents existed – chemicals in 19C Germany (process but not product); Cornish pumping equipment (response to aggressive patent enforcement by Watt); Lyons silk weaving cooperative
- 19C US – no national treatment
 - Encouraged local tech development and learning by imitation
- Japan – see next slide
- Taiwan – little use of IP until imitation strategy successful
 - Patenting in US starts in 1975 and jumps in 1985
- Korea – see Kim (2002) on technology development and weak IP rights in the early stages
 - Patenting in US jumps in 1988

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2. IP and tech development – case study evidence

- Japan – story not so clear
 - Postwar system of one claim per patent, utility models, pre-grant opposition, early disclosure – designed for incremental/adaptive invention
 - MITI's role in negotiating tech transfer licensing agreements
- Introduction of pharma product patents in 1970 did increase R&D in that sector (La Croix and Kawaura, IEJ 1996)
- Branstetter and Sakikabara (2001)
 - Strengthening of system in 1988-93 did not result in increased R&D
- Branstetter and Nakamura (2003)
 - Further reforms in the 1990s did not increase innovative performance (R&D productivity) either

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Conclusions

- Stronger patents encourage patenting in general
- Stronger patents encourage tech transfer to mid-level developing countries
- Difficult to find clear evidence of positive impacts of stronger patents on innovation, except in chemical-related sectors
 - Many other factors matter, so the experiments are often not clear
 - we don't see enough variation in patent systems, and it takes time for firms to adjust
 - It is rare to have an independent measure of innovation (other than patents) so ingenuity is required
- Historically, IP systems have developed in parallel with the innovative part of the economy

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A question

Is the marginal scientist or engineer in a developing country better employed examining patents or doing R&D?

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