TECHNOLOGY TRANSFER AND...
INTELLECTUAL PROPERTY RIGHTS IN DEVELOPING COUNTRIES

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January 2010
ISSUES

- How IPRs affect inward technology transfer
  - Particularly technology-intensive goods, services, and capital
  - ... beyond sales & distribution, low-wage production

- Effect of inward technology transfer on local innovation
  - Foreign technology as an input into local innovation

- Effect on capacity for outward technology transfer
  - Capacity of local firms to engage in outward technology transfer
Article 66.2 of TRIPS Agreement
- Obligation of Developed Countries to assist in technology transfer to Least Developed.

Modes of technology transfer
- Foreign Direct Investment (FDI), Trade (Merchandise & Services), and International Licensing

Trends Across Country Groups
- Developed, Developing, and Least Developed (United Nations Classification)
## TRENDS IN TECH. TRANSFER

<table>
<thead>
<tr>
<th>Country Group</th>
<th>Mode</th>
<th>Mean 2005 ($billions)</th>
<th>% Δ since 1995</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Developed</strong></td>
<td>Inward FDI Stock</td>
<td>$244.9</td>
<td>169.8%</td>
</tr>
<tr>
<td></td>
<td>Merchandise Imports</td>
<td>$236.2</td>
<td>56.2%</td>
</tr>
<tr>
<td></td>
<td>Service Imports</td>
<td>$58.4</td>
<td>53.4%</td>
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<tr>
<td><strong>Developing</strong></td>
<td>Inward FDI Stock</td>
<td>$35.8</td>
<td>234.3%</td>
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<tr>
<td></td>
<td>Merchandise Imports</td>
<td>$47.3</td>
<td>91.4%</td>
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<tr>
<td></td>
<td>Service Imports</td>
<td>$9.2</td>
<td>70.4%</td>
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<tr>
<td><strong>Least Developed</strong></td>
<td>Inward FDI Stock</td>
<td>$2.05</td>
<td>262.8%</td>
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<tr>
<td></td>
<td>Merchandise Imports</td>
<td>$2.2</td>
<td>103.8%</td>
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<tr>
<td></td>
<td>Service Imports</td>
<td>$0.92</td>
<td>91.1%</td>
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</table>
% Composition of Merchandise Imports of Developing & Least Developed Countries

2005

- Pharmaceuticals, 1.87%
- Electronic & Electrical Equipment, 22.5%
- Office & Telecom Equipment, 21.3%
- Chemicals, 3.71%
- Optics & Precision Equipment, 4.02%
- Aerospace, 7.3%
- Other, 39.3%
% COMPOSITION OF ASSETS OF FOREIGN AFFILIATES OF U.S. MNCs IN DEVELOPING & LEAST DEVELOPED COUNTRIES

2005

- Chemicals, 2.77
- Machinery, 1.53
- Electrical Equipment, 1.51
- Professional Services, 2.31
- Computers and Related, 12.8
- Information Goods, 2.38
- Other, 76.7
CONCEPTUAL FRAMEWORK

- Global Perspectives
  - North-South

- Trade, FDI, and Licensing as a “vehicle” for technology diffusion

- IPRs and Trade, FDI, Licensing
  - Market Expansion vs. Market Power
    - Role of Imitative Capacity
  - Ownership, Location, and Internalization (OLI)
  - Volume & Composition of Technology Transfers
PREVIOUS EVIDENCE

- Fink and Primo Braga (1998, 1999)
- Smith (1999, 2001)
- Javorcik (2004)
- Nunnenkamp and Spatz (2004)
- Park and Lippoldt (2005)
- Branstetter et al. (2006, 2007)
GAPS IN PREVIOUS WORK

○ Dated
  ▪ Location vs. Volume of transfers

○ Unresolved Issues
  ▪ Have FDI to developing countries been technology-intensive?
  ▪ Vintage of technology?
  ▪ Controls for other institutional factors
Measures of intellectual property rights
- Patent Protection
- Copyrights
- Trademarks
- IPR Survey (perceptions of enforcement adequacy)

FDI, Trade by sector breakdown
- Do IPRs stimulate technologically-intensive technology transfers?

Other institutional controls
- Property rights in general, legal effectiveness, ‘Doing Business’ index, governance, trade policy
## Global IPR Developments

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<tr>
<td>Developed</td>
<td>4.4</td>
<td>0.80</td>
<td>0.70</td>
<td>5.5</td>
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<td></td>
<td>(10%)</td>
<td>(14.3%)</td>
<td>(16.7%)</td>
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<tr>
<td>Developing</td>
<td>3.3</td>
<td>0.60</td>
<td>0.60</td>
<td>3.5</td>
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<td></td>
<td>(37.5%)</td>
<td>(20%)</td>
<td>(20%)</td>
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<tr>
<td>Least Developed</td>
<td>2.4</td>
<td>0.42</td>
<td>0.36</td>
<td>2.7</td>
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<td></td>
<td>(26.3%)</td>
<td>(0%)</td>
<td>(33.3%)</td>
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### Correlations

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<tr>
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<th>IPR Survey</th>
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<tr>
<td>Copy</td>
<td>0.53</td>
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<tr>
<td>T Mark</td>
<td>0.57</td>
<td>0.58</td>
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<tr>
<td>IPR Survey</td>
<td>0.62</td>
<td>0.36</td>
<td>0.37</td>
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</table>
The vertical bar indicates the advent of the TRIPS Agreement.
Dataset
- 122 countries
- 1990 - 2005

Dependent Variables of Interest
- Inward FDI (acquisition, expansion of facilities)
- Merchandise Trade (source of capital goods)
- Services Trade (FDI is conduit for services)

Perspectives
- Different types of IPRs
- Different groups of countries
- Different industries
RESULTS

- Patent rights important to FDI, trade
  - Copyright, trademark not statistically significant
  - Enforcement adequacy also important

- Across country groups
  - Quantitative impact larger in Developed countries (role of complementary factors)
  - IP Statutes important in Least Developed countries (more than perceptions of enforcement)
  - IP has ‘market power effects’ in smaller markets
  - Developing country group is relatively most heterogeneous
Assessing Technological Content of Technology Transfers in Developing Countries

Approach 1: Sector
- FDI: IPR -> Expansions in Chemical, Service, & Information Industries. Not in electronics & computers
- Merchandise Imports: IPR -> Pharmaceuticals, chemicals, office & telecom, precision equipment
- Service Imports: IPR -> Communication & computers, Licensing of Intangible Assets

Approach 2: Impact on Local R&D, Resident Patenting, and Non-Resident Patenting
- Foreign technologies as inputs into innovation
- Foreign technology owners filing for patent protection
CASE STUDIES

- Brazil, Russian, India, & China (BRIC)
  - IP Developments
  - Inward Technology Transfer
  - Local Innovation & Joint Research Ventures

- South Korea
  - Source of outward technology transfers
RATIO of Outward FDI to Inward FDI Stock

- S. Korea
- BRIC
RATIO of Licensing Receipts to Licensing Payments
(Balance of Payments)
Technology Transfers
- Important to distinguish between overall level and composition (i.e. substitution effects)

IPR (patent protection)
- Is one determinant of technology transfer, among others
- IP effects on Technology transfer vary by sector, level of development, imitative capacity, absorptive capacity

Policy Relevance
- IPRs have potential to influence technological content of technology transfers
- Inward technology transfers can provide innovation inputs