Open Innovation meets Markets for Technology and Division of Innovative Labor
Open Production v Open Innovation

- A producer does not carry out all the steps inside the firm
  - buys inputs from others and sells outputs to other producers
- Transactions facilitated by contracts and by property rights
  - But also commercial relationships, reputation,
- This is normal
  - a guy did so 230 years ago

- Open innovation: innovator does not carry out all the steps
  - Buys (or obtains) inputs from others
  - Sells (or provides) output to other producers
- Transactions facilitated by contracts and property rights
  - ‘but also business models where inputs are given away free
- Why isn’t this normal?
The Knowledge Economy or “knowledge as commodity” Economy?

- The distinctive feature of the last two decades has been the emergence of knowledge as a tradable asset.
  - Technology market places
  - Active technology licensing by manufacturing corporations – IBM, TI, Dow, P&G, …
  - Specialized technology suppliers
  - Specialized intermediaries
  - Management Gurus writing on IP

- Patents are not the sole cause but are an important facilitator.

- This s*** ain’t new – it has happened before
  - Cf. Maharishi Merges, Lamoreaux and Sokoloff; Khan and Sokoloff
Division of labor is limited by the extent of the market

- **Division of innovative labor**\(^{TM}\) is limited by the extent of the *market for technology*
  - Market for technology – licensing, R&D contracts, …

- The market for technology is conditioned by the intellectual property environment
  - patents: crisp, not big
# Estimates of technology licensing in the US, 2002 (IRS + BEA data)

## Distribution of IRS Receipts for Types of IP-Licensing Service Commodities across Industry Sectors, 2002, Billions of Dollars

<table>
<thead>
<tr>
<th>Sector</th>
<th>Licensing of Rights to Use IP Protected as Industrial Property</th>
<th>Licensing of Rights to Use IP Protected by Trademarks</th>
<th>Licensing of Rights to Use IP Protected by Copyright</th>
<th>Licensing of Rights to Use a business format under a franchise</th>
<th>Payments for rights to use Natural Resources and Other intangibles</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>59.5</td>
<td>9.4</td>
<td>1.0</td>
<td>2.9</td>
<td>-</td>
<td>72.8</td>
</tr>
<tr>
<td>Distributive Services</td>
<td>1.0</td>
<td>6.9</td>
<td>0.1</td>
<td>5.1</td>
<td>-</td>
<td>13.1</td>
</tr>
<tr>
<td>Information</td>
<td>1.9</td>
<td>4.9</td>
<td>6.6</td>
<td>0.0</td>
<td>0.1</td>
<td>13.5</td>
</tr>
<tr>
<td>Finance and Insurance</td>
<td>0.2</td>
<td>0.7</td>
<td>0.0</td>
<td>1.4</td>
<td>0.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Professional and Business Services</td>
<td>3.0</td>
<td>0.2</td>
<td>1.6</td>
<td>1.5</td>
<td>0.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Other Industries</td>
<td>1.0</td>
<td>0.7</td>
<td>0.1</td>
<td>4.8</td>
<td>0.8</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>66.6</strong></td>
<td><strong>22.8</strong></td>
<td><strong>9.4</strong></td>
<td><strong>15.7</strong></td>
<td><strong>1.3</strong></td>
<td><strong>115.9</strong></td>
</tr>
</tbody>
</table>

*$30-40Bn for mid 1990s*

Carol Robbins, Dept. of Commerce, 2006, tab 7
Growth of patents and MFT coincide after 1980s

Fig. 2. Growth in non-US held patents and worldwide royalty and license revenues.
Distribution of Patent Values (Gambardella, Harhoff and Verspagen, “Value of patents”, 2005)

Patent value distribution is skewed but high average value between 300K and 1 million Euro
Patent protection is valuable, and stimulates R&D, even in industries that do not patent a lot.

(source: Arora, Ceccagnoli and Cohen, 2003, NBER)
Patents promote entry of specialized design firms in semiconductors

U.S. semiconductor mfg. and design firms, by year

The division of innovative labor
Patents promote entry of specialized tech suppliers in chemicals

Average # of Specialized Engineering Firms by process category, 139 process technologies (1980-90)

Source: Arora, Fosfuri & Gambardella, “The division of inventive labor”, 2003
Competition in market for technology market increases licensing by all technology holders i.e., more open innovation.

Presence of specialized technology suppliers induces chemical MNCs to license their technology rather than invest directly in for.

Arora and Fosfuri, 2001
**Patents and market for technology: Patents promote licensing by small firms**

- Based on CMU Survey, 1991-93
- Patents are used for licensing by smaller firms lacking complementary assets, and for commercialization by larger firms.
- Patents support entry by smaller, research oriented firms

10% increase in Patent Effectiveness Leads to:

<table>
<thead>
<tr>
<th></th>
<th>Small Firm</th>
<th>Large Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>% increase in licensing propensity</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>% increase in the propensity to license patented innovations</td>
<td>1%</td>
<td>-3%</td>
</tr>
</tbody>
</table>

Source: Arora and Ceccagnoli. 2005