University Based Innovation in Japan

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U-I Policies of Japan

Consistent Supports for U-I collaborations

- 1998: TLO promotion law
- 1999: Japanese Bayh-Dole Act
- 2001: 1000 university spin-outs plan (Hiranuma Plan)
  Subsidy to university startups, incubation facility
- 2005: Supports to university IP offices

Decentralization of strategy implementation

- 2001: Incorporation of national research laboratories (PRIs)
- 2004: Incorporation of national universities

Active patenting and startups from (national) university
NISTEP-RIETI Innovation Process DB for Systematic understanding of co-occurrence of science and innovation

• All disambiguated Japanese inventor records: Identified Academic Inventors (HEIs and PRIs, 53K)+Industry Inventors (1.23M) in 2000-2011 JPO application patents
• Linked with SCOPUS author data for academic inventors (26K linked)
• Linking applicants in JPO data with Economic Census of Japan at firm level
Important role of university in patenting

Growing contribution of author-inventor at university

(Avg. number of linked academic publications per 100 inventors)

Type of Business: Old vs New Ones

2012 and before:
- AI, IoT, Robotics: 50%
- Electronics: 10%
- Software Applications: 10%
- Medical Equipment: 10%
- Biotechnology, Health: 10%
- Material: 10%
- Energy: 10%
- Others: 10%

2013 and after:
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- Medical Equipment: 10%
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- Energy: 10%
- Others: 10%
Dominant role of national universities (shaded ones)

<table>
<thead>
<tr>
<th>University</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tokyo U</td>
<td>245</td>
<td>11.7%</td>
</tr>
<tr>
<td>Kyoto U</td>
<td>140</td>
<td>6.7%</td>
</tr>
<tr>
<td>Tsukuba U</td>
<td>98</td>
<td>4.7%</td>
</tr>
<tr>
<td>Osaka U</td>
<td>93</td>
<td>4.4%</td>
</tr>
<tr>
<td>Kyushu U</td>
<td>81</td>
<td>3.9%</td>
</tr>
<tr>
<td>Waseda</td>
<td>74</td>
<td>3.5%</td>
</tr>
<tr>
<td>Nagoya U</td>
<td>69</td>
<td>3.3%</td>
</tr>
<tr>
<td>Tohoku U</td>
<td>56</td>
<td>2.7%</td>
</tr>
<tr>
<td>TIT</td>
<td>53</td>
<td>2.5%</td>
</tr>
<tr>
<td>Digital Hollywood</td>
<td>52</td>
<td>2.5%</td>
</tr>
<tr>
<td>Keio</td>
<td>51</td>
<td>2.4%</td>
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<tr>
<td>Hokkaido U</td>
<td>49</td>
<td>2.3%</td>
</tr>
<tr>
<td>Ryokoku</td>
<td>43</td>
<td>2.1%</td>
</tr>
<tr>
<td>Hiroshima U</td>
<td>43</td>
<td>2.1%</td>
</tr>
<tr>
<td>Kyushu Π</td>
<td>39</td>
<td>1.9%</td>
</tr>
</tbody>
</table>
Comparing USO to CSO (Ikeuchi and Motohashi, 2018)

• University startups are better in performance in employment growth and patent indicators, but no significant difference in survival rate.

• 2001 samples (before Hiranuma plan) shows better performance in employment growth in national university, but not in 2006 samples (again, selection story works here)

• National university USO is better in employment performance in 2001 sample, and in patent (quantity and quality) performance for all period

• Scientist involvement in firm activities: no effect (potentially both positive and negative effects)
In a nutshell…

Pro innovation policies for universities (particularly for national universities) leads to

• Growing number of patenting activities at scientists (author-inventors) leads to more contribution to industrial innovation

• Growing number of university startups: average quality falls (by lowering startup hurdles at public scientists)

• But still its quality is higher than similar non-university related startups
Public Policy Dominant System?

• Division of labor between national universities (research) and private ones (education)
  – Incorporation of national universities in 2004, but no substantial changes in allocation of institutional funding (difficulty in performance matrix)
  – Institutional Funding (performance based but no changes so far) -> Competitive funding (recent ratio is 2:1) -> increased transaction costs (a large portion of temporary research positions)

• Complex and multiple sources of financial supports to technology based startups (incl. university spin offs)
  – Variety of financial support scheme is available from METI, MEXT, government agencies, local governments
  – 73% of university startups have some public financial supports (vs 23% of them have Angel/VC finance)
A sign of indigenous movements emerged (after 20 years of transitory period)

- Example of University of Tokyo ecosystem
  - Self sustained (independent) TTO function (Todai TLO, private entity)
  - About 15 exited firms affiliated Todai (some of them were invested by Edge Capital LLC, Todai VC)
  - Hongo Valley (Bynkyo-ku, Tokyo around headquarter of U of Tokyo)
  - Benefited by expanding technology opportunities (AI/IoT, robotics, gene editing, new materials…)

- Substantial regional gaps
  - Entrepreneurship activities: quite narrow regional proximity is needed (say 10 km): U of Tokyo headquarter vs its branch in Chiba)
  - Concentrated in Tokyo metropolitan area (about 30 million population): limited role of local governments