Global innovation networks and regional dynamics

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Lund University
The questions

- Why should you care about globalization of innovation? i.e. is Globalization of innovation old wine in new bottles or something really new?
- What are the advantages of going global for innovation?
- What does it take to globalize innovation activities?
- What about the foreign technology driven investments in our region? Will the impact be negative?
Outline

1. Presentation
   Part I
2. Background
3. Overview of changes
4. Impact of outward global innovation networks
5. Drivers of outward global innovation networks
   Part II
6. Overview of inward global innovation networks
7. Impact of inward global innovation networks
8. Conclusions
1. Presentation

- Prof. in Innovation studies at Circle (Lund University) until August 2016
  - Head of the research platform on globalization of innovation
- Currently
  - Prof. in Innovation studies at Economic History, LUSEM, Lund University
  - Research group on Globalization, Innovation and Sustainability
- Main research topic
  - Globalization of innovation
  - Innovation in emerging economies and developing countries
  - Innovation policy
PART I
GENERAL OVERVIEW OF CHANGES AND OUTWARD INNOVATION NETWORKS
The question

Why should you care about globalization of innovation? i.e. Is Globalization of innovation old wine in new bottles or something really new?
2. Background

- Innovation networks have become truly global (UNCTAD, 2005)
  - Increased globalization in parallel with a growing role of certain regions around the world
  - Global innovation networks pinned down to certain regions around the globe
- Suggests that regional dynamics affect and are affected by global innovation networks
  - How??
2. Background

Globalization of innovation as a research field

Extremely fragmented literature

- Economic Geography
  - Concept: Globally distributed knowledge bases;
- International business
  - C: Internationalization of R&D, offshoring of R&D
- Innovation studies
  - C: Techno-globalism; Global innovation networks
- Development studies
  - C: Global value chains
2. Background

- What we know about internationalization/globalization of innovation...
  - Innovation has long been an international phenomenon but hardly a global one.

SO, WHAT HAS CHANGED?

- Internationalization of innovation towards South is more related to adaptation to markets (D) than to development of new products or services (R).

- Internationalization of innovation – hollow out
Outline

1. Presentation

Part I
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5. Drivers of outward global innovation networks

Part II
6. Overview of inward global innovation networks
7. Impact of inward global innovation networks
8. Conclusions
3. Overview of changes

What has changed is (at least):

1. The **geography** of the flows: from innovation within the Triad (Japan, US, Europe) to global innovation (China, India)

2. The **nature** of innovative activities, particularly in some emerging economies: from D to R

3. The **actors**, from large multinational companies, to SMEs and standalone
3. Overview of changes

- Analysis presented today is based on
  - **Survey:** INGINEUS database (survey in 9 countries in Europe & BICS)
  - **Secondary data:** fDi markets data – Financial Times, All greenfield investments, mergers and acquisitions and minority investments from MNEs from emerging countries (EMNEs)
  - **Interviews:** Firm-based interviews in China, India and Europe

- 2 mechanisms
  - Cross border **R&D investments** – greenfield FDI
  - **Global research collaboration**
3. Overview of changes
Changing geography

Based on UNCTAD (2005) FDI report
### 3. Overview of changes

**Changing geography**

**Offshoring of R&D, by destination**

Cross-border investment projects in R&D-related and manufacturing activities, by country of destination *(January 2003 - August 2012)*

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Design, development and Testing</th>
<th>% share</th>
<th>Rank</th>
<th>Country</th>
<th>R&amp;D</th>
<th>% share</th>
<th>Rank</th>
<th>Country</th>
<th>Manufacturing</th>
<th>% share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>20.3%</td>
<td></td>
<td>1</td>
<td>China</td>
<td>16.9%</td>
<td></td>
<td>1</td>
<td>China</td>
<td>16.3%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>12.8%</td>
<td></td>
<td>2</td>
<td>India</td>
<td>14.7%</td>
<td></td>
<td>2</td>
<td>US</td>
<td>9.1%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>US</td>
<td>7.9%</td>
<td></td>
<td>3</td>
<td>US</td>
<td>7.9%</td>
<td></td>
<td>3</td>
<td>India</td>
<td>6.1%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>UK</td>
<td>6.6%</td>
<td></td>
<td>4</td>
<td>UK</td>
<td>5.9%</td>
<td></td>
<td>4</td>
<td>Russia</td>
<td>4.3%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Germany</td>
<td>3.5%</td>
<td></td>
<td>5</td>
<td>Singapore</td>
<td>4.8%</td>
<td></td>
<td>5</td>
<td>Brazil</td>
<td>3.5%</td>
<td></td>
</tr>
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<td></td>
<td>……</td>
<td>……</td>
<td>……</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Sweden</td>
<td>1.0%</td>
<td></td>
<td>27</td>
<td>Sweden</td>
<td>0.7%</td>
<td></td>
<td>43</td>
<td>Sweden</td>
<td>0.4%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
<td>(3980)</td>
<td>Total</td>
<td></td>
<td>100%</td>
<td>(3162)</td>
<td>Total</td>
<td></td>
<td>100%</td>
<td>(30554)</td>
</tr>
<tr>
<td>Top 5</td>
<td></td>
<td>51.2%</td>
<td></td>
<td>Top 5</td>
<td></td>
<td>50.2%</td>
<td></td>
<td>Top 5</td>
<td></td>
<td>39.3%</td>
<td></td>
</tr>
<tr>
<td>Top 20</td>
<td></td>
<td>78.7%</td>
<td></td>
<td>Top 20</td>
<td></td>
<td>83.4%</td>
<td></td>
<td>Top 20</td>
<td></td>
<td>73.5%</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Castelli and Castellani (2013)*
### Cross-border investment projects in R&D-related and manufacturing activities, by country of origin (January 2003-August 2012)

<table>
<thead>
<tr>
<th>Design Development &amp; Testing</th>
<th>R&amp;D</th>
<th>Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Country</td>
<td>% share</td>
</tr>
<tr>
<td>1</td>
<td>US</td>
<td>45.3%</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>9.7%</td>
</tr>
<tr>
<td>3</td>
<td>UK</td>
<td>7.0%</td>
</tr>
<tr>
<td>4</td>
<td>Japan</td>
<td>6.9%</td>
</tr>
<tr>
<td>5</td>
<td>France</td>
<td>5.5%</td>
</tr>
<tr>
<td>6</td>
<td>India</td>
<td>3.3%</td>
</tr>
<tr>
<td>7</td>
<td>Switzerland</td>
<td>2.9%</td>
</tr>
<tr>
<td>8</td>
<td>Netherlands</td>
<td>2.1%</td>
</tr>
<tr>
<td>9</td>
<td>Canada</td>
<td>1.9%</td>
</tr>
<tr>
<td>10</td>
<td>Sweden</td>
<td>1.3%</td>
</tr>
<tr>
<td>11</td>
<td>China</td>
<td>1.3%</td>
</tr>
<tr>
<td>12</td>
<td>Spain</td>
<td>1.2%</td>
</tr>
<tr>
<td>13</td>
<td>Finland</td>
<td>1.2%</td>
</tr>
<tr>
<td>14</td>
<td>South Korea</td>
<td>1.1%</td>
</tr>
<tr>
<td>15</td>
<td>Denmark</td>
<td>0.9%</td>
</tr>
<tr>
<td>Other countries</td>
<td>8.50%</td>
<td>Other countries</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>Total</td>
</tr>
<tr>
<td>(3980)</td>
<td>(3162)</td>
<td>(30,554)</td>
</tr>
</tbody>
</table>
3. Overview of changes

Changing geography

Research collaboration

- OECD firms engaged in international research collaboration by partner country (OECD, Science and Technology indicators, 2012)
3. Overview of changes
Changing actors

- And this in not only a "large firm" phenomenon…
  In Sweden 19% of the innovative firms with less than 50 employees that collaborate for innovation, do so with Chinese and Indian partners

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Sweden</th>
<th>Other Europe</th>
<th>USA</th>
<th>China and India</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-49 employees</td>
<td>30</td>
<td>95</td>
<td>54</td>
<td>24</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>50-249 employees</td>
<td>36</td>
<td>99</td>
<td>72</td>
<td>28</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>More than 250</td>
<td>62</td>
<td>98</td>
<td>83</td>
<td>50</td>
<td>40</td>
<td>36</td>
</tr>
</tbody>
</table>

Source: Swedish innovation survey (2012-2014)
http://www.statistikdatabasen.scb.se
3. Overview of changes

Changing actors

- Developing countries are playing a much more important role in these global innovation networks (Barnard and Chaminade, 2012)
  - Based on firm-based survey in European and middle-income countries (9 European and BRICS)
  - Firms involved in research collaboration networks that are highly global, networked and innovative
    - Mainly standalone firms (!)
    - Mainly SMEs (between 50-250 employees)
    - Mostly located in middle-income countries
3. Overview of changes

Changing nature

Cross-border R&D investments by country of destination and type of investment (2003-2011). Selection of industries

<table>
<thead>
<tr>
<th></th>
<th>Design, Development and Testing</th>
<th>R&amp;D</th>
<th>Total DDT (number)</th>
<th>Total R&amp;D (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT &amp; Electronics</td>
<td>China (12.57) India (26.475)</td>
<td>China (17.60) India (20.03)</td>
<td>1949</td>
<td>1148</td>
</tr>
<tr>
<td>Life sciences</td>
<td>11.94</td>
<td>12.313</td>
<td>8.60</td>
<td>10.62</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>22.61</td>
<td>18.261</td>
<td>33.57</td>
<td>10.00</td>
</tr>
<tr>
<td>Creative Industries</td>
<td>6.99</td>
<td>11.397</td>
<td>20.83</td>
<td>16.67</td>
</tr>
<tr>
<td>Environmental Tech</td>
<td>8.60</td>
<td>6.452</td>
<td>13.86</td>
<td>6.93</td>
</tr>
</tbody>
</table>

Source: Chaminade et al (2013)
3. Overview of changes

- What we know about internationalization/globalization of innovation...
  - Innovation has long been an international phenomenon but hardly a global one
    - The majority of R&D is conducted close to headquarters
    - When internationalized is usually in neighbor countries (within EU, for example)
  - Globalization of innovation is associated almost exclusively to large multinationals
  - Internationalization of innovation towards South is more related to adaptation to markets (D) than to development of new products or services (R)
3. Overview of changes

- Is Globalization of innovation something really new?

Yes!
IMPACT OF OUTWARD GLOBAL INNOVATION NETWORKS

- What are the advantages of going global for innovation?
Outline

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8. Conclusions
4. Impact of outward global networks - Collaboration

- Research collaboration and offshoring of innovation (FDI) globally is related to **new to the world innovations** (Chaminade and Harirchi, 2014; Plechero and Chaminade, 2016a)
  - And this is valid also for SMEs (Aslensen and Harirchi, 2013)
  - This is particularly the case for market partners, no matter where are they located!
4. Impact of outward global networks – R&D offshoring

- In general, R&D offshoring is associated with higher productivity growth in EU regions (Pieri and Castellani, 2013)

- Innovation abroad complements innovation at home!
  - Complementary effect and NOT substitution effect as when production is offshored
4. Impact of outward global networks – R&D offshoring

- The impact varies significantly depending on country of destination (Pieri and Castellani, 2013)
  - Effect is larger if R&D offshoring to South-East Asia
  - Positive if offshoring to China
  - Significantly lower productivity growth rates in regions offshoring R&D to India
4. Impact of outward global networks – R&D offshoring

- Possible explanation: combination of country and sector specificities (Pieri and Castellani, 2013)
  - R&D offshoring to South-East Asia concentrated in *high-tech manufacturing* (43% of all R&D projects)
  - R&D towards India concentrated in knowledge intensive *services*
  - Orchestrating value chain in knowledge-intensive activities (services) more complex than in manufacturing (Mudambi and Venzin, 2010)
### 4. Impact of outward global networks – R&D offshoring

**A look into Sweden**

<table>
<thead>
<tr>
<th>Region</th>
<th>Design, Development and Testing</th>
<th>R&amp;D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EU 27</td>
<td>Sweden</td>
</tr>
<tr>
<td>EU15</td>
<td>21.3%</td>
<td>22.7%</td>
</tr>
<tr>
<td>Developed (US, Canada, Japan)</td>
<td>18.7%</td>
<td>17.0%</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>7.6%</td>
<td>2.3%</td>
</tr>
<tr>
<td>China</td>
<td>11.2%</td>
<td>13.6%</td>
</tr>
<tr>
<td>India</td>
<td>13.7%</td>
<td>15.9%</td>
</tr>
<tr>
<td>TOTAL (number projects)</td>
<td>1560</td>
<td>88</td>
</tr>
</tbody>
</table>

(Chaminade et al, 2015)
What are the advantages of going global for innovation?

- Breakthrough innovations
- Higher productivity in the region
DRIVERS OF OUTWARD GLOBAL INNOVATION NETWORKS

- Ok, so if going global has a positive impact, what does it take?
Outline

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8. Conclusions
5. Drivers of outward global innovation networks (GINs)

GIN dynamics are affected by:

- Type of innovation and lifecycle of the innovation project (Moodysson, 2008; Herstad et al, 2014)
- Industry lifecycle (Chen et al, 2014; Balland et al, 2013)
- Firm based characteristics (size, age) (Powell et al, 1996) – liability of newness or outsidership
- Region
5. Drivers of outward global innovation networks

- Network dynamics are affected by:
  - Type of innovation and lifecycle of the innovation project (Moodysson, 2008; Herstad et al, 2014)
  - Industry lifecycle (Chen et al, 2014; Balland et al, 2013)
  - Firm based characteristics (size, age) (Powell et al, 1996) – liability of newness or outsidership
  - Region
5. Drivers of outward global innovation networks

Firms´ internal competences are significant and positively related to global research collaboration and R&D offshoring.

- Global Research Collaboration
  - Employees with postgraduate degree (SE)
  - R&D employees (SE)
  - Diversity of the labor force (SE) !!
  - Intramural R&D (SE)
  - Sophistication of machinery and equipment

- Offshoring of innovation
  - Advanced production systems (SE)
    - (just in time production, quality systems…)

Own technological capabilities (R&D, machinery, human capital)

Process innovations

Source: Plechero and Chaminade (2016a), Grillitsch and Chaminade (2016)
5. Drivers of outward global innovation networks

- Network dynamics are affected by:
  - Type of innovation and lifecycle of the innovation project (Moodysson, 2008; Herstad et al, 2014)
  - Industry lifecycle (Chen et al, 2014; Balland et al, 2013)
  - Firm based characteristics (size, age) (Powell et al, 1996) – liability of newness or outsidership
  - Region
5. Drivers of outward global innovation networks

• Role of the region in the propensity to engage in global innovation networks
  • Direct effect
    • Organizational thickness
    • Specialization
    • Industrial structure
  • Indirect effect
    • Firm capabilities
5. Drivers of outward global innovation networks
Understanding how regions affect GINs - Direct effect

1. Organizational thickness of a region affects engagement in GINs
   - Firms located in regions that are neither organizationally too thick nor too thin are those that engage more in GINs (Tödling et al, 2011; Plechero and Chaminade, 2015) – compensation mechanism
   - Increasingly innovation is occurring outside the urban agglomerations (Rodriguez –Pose and Wilkie, 2015)
5. Drivers of outward global innovation networks

Understanding how regions affect GINs - Direct effect

2. Regional **specialization** affects engagement in GINs

- Higher specialization, more importance of regional linkages (Plechero and Chaminade, 2016b)
5. Drivers of outward global innovation networks
Understanding how regions affect GINs - Direct effect

3. **Industrial structure of the region** affects engagement in GINs (Ebersberger et al, 2014; Martin, 2011)
   - Regions specialized in industries dominated by scientific knowledge-bases engage more in international networks
5. Drivers of outward global innovation networks
Understanding how regions affect GINs - Indirect effect

Regions affect the innovative capabilities of local firms

- Firms’ own knowledge reservoir and innovative performance is influenced by regional framework conditions (Srholec, 2008)
- Firms with strong in-house capabilities can use international networks to compensate for a weak RIS (Grillitsch and Nilsson, 2015; Rodriguez-Pose and Fitzar, 2014)
Ok, so if going global has a positive impact, what does it take?

- Internal competences
  - Qualified and diverse labor force
- Location, location, location
  - Thick regions – local networks more likely
  - Thin regions – global networks more likely
    - BUT globalization is complex – competences needed
And now…time to refuel the brain!

Second part coming soon…
PART II

- INWARD GLOBAL INNOVATION NETWORKS – INWARD FLOWS TO EUROPE
Outline

1. Presentation
   Part I
2. Background
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7. Impact of inward global innovation networks
8. Conclusions
Technology-Driven FDI by Emerging Multinationals in Europe

Source of data:

ALL investments by emerging Multinationals in Europe from 2003-2011 – fDi Markets
6. Overview of inward innovation flows

Emerging countries FDI to Europe (2003-2011) (# of deals)

Source: Chaminade et al (2015) based on Fdi Markets
6. Overview of inward innovation flows

Emerging countries FDI to Europe & rest of the world (2003-2001) (# of deals)

Source: Chaminade et al (2015) based on Fdl Markets
6. Overview of inward innovation flows

Chinese, Indian and Brazilian FDI to Europe (2003-2011)

Source: Chaminade et al (2015) based on FDI Markets
6. Overview of inward innovation flows

- Manufacturing (ICT, auto and industrial machinery) to Germany
- Services and Pharma to UK
- Financial services and Manufacturing to Portugal and Spain
6. Overview of inward innovation flows
(Chaminade et al, 2015)

- Why do EMNEs invest in Europe?
  - To access intangible assets (i.e. technology, knowledge, brands, commercial networks)
  - To generate knowledge
  - To exploit economies of scale and scope
  - To gain legitimacy and reputation

- How do EMNEs invest in Europe?
  - Greenfield investments are the preferred mode of entry
  - Acquisitions are preferred when the objective is (rapidly) acquiring technological competences
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The question

- What about technology driven foreign direct investment in Europe...will they buy our companies, copy the technology and closing them down?

“The asset stripping syndrome”
7. Impact of inward innovation flows
(Chaminade et al, forthcoming)

Method

○ Comparative analysis of 6 MNES from China and India
○ 8 technology driven investments in Europe
○ Selection of cases
  ● Purposive sample from EMENDATA
    • At least one greenfield and one acquisition
    • Not largest ones
    • Operating in a similar subsector
○ Data collection
  ● Semi-structured interviews with CEO in headquarter and subsidiaries
7. Impact of inward innovation flows (Chaminade et al, forthcoming)

Cases

- **Auto1**: Indian car manufacture. Acquisition TFDI in emission control followed by greenfield.
- **ICT1**: Indian ICT service provider. Multiple TFDI in Europe (acquisitions).
- **ICT2**: Indian Telecommunication company. Two TFDIs in Europe (acquisitions).
- **ICT3**: Indian Telecommunication service provider. Two TFDIs in Europe (acquisitions).
- **CLEANT1**: Chinese wind turbine. Greenfield TFDI in Europe.
- **CLEANT2**: Indian wind turbine. Greenfield and acquisition TFDI Europe.
7. Impact of inward innovation flows

- 4 possible outcomes

- **Asset stripping**: Purchase of a company because of the IP and then close down

- **Asset withering**: Purchase of a company and IP and failure to maintain tech capabilities

- **Asset maintenance**: Purchase of a company and IP and maintenance of level of tech capabilities

- **Asset development**: Purchase of a company or greenfield and development of technological capabilities
No generalized predatory behavior! (in line with Giuliani et al, 2016)
- Asset stripping is the exception, not the rule
- Complementarities exist (technology, capital, customer base)

Subsidiary’s degree of autonomy matters
- Technology strategy
- Clients, procedures, networks

Time matters

EMNEs more likely to create win-win situations than MNEs from advanced countries (AMNEs) (Giuliani et al, 2014)
The question

- What about technology driven foreign direct investment in Europe...will they buy our companies, copy the technology and closing them down?

“The asset stripping syndrome”
7. Impact of inward innovation flows

...and more findings
(Chaminade et al, 2015)

- Management has a great influence on impact
  - Awareness of cultural differences HQ-S
  - Awareness of gap between technical competences of subsidiary and HQ
    - Autonomy needed
  - Awareness of gap between dedicated customer base of subsidiary and global base of the HQ
  - Awareness of importance of local networks
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8. Conclusions & policy implications

The questions

1. Why should you care about globalization of innovation? i.e. is Globalization of innovation old wine in new bottles or something really new?
2. What are the advantages of going global for innovation?
3. What does it take to globalize innovation activities?
4. What about the foreign investments in our region? Will the impact be negative?
The questions

1. Why should you care about globalization of innovation?
   - The geography and nature of the internationalization of R&D and other innovation activities is changing
   - Internationalization of innovation activities is no longer a phenomenon exclusive of large firms (SMEs still marginal, but growing)
   - Sweden is one of the EU countries with the highest engagement in international and global innovation networks – more likely to be influenced by these global changes
2. What are the advantages of going global for innovation?

- Global research collaboration positively associated with new to the world innovations
- Offshoring of R&D is positively associated with home country region productivity growth
  - Complementing rather than hollowing-out
  - Particularly good for R&D offshoring towards East Asia
  - Caution with R&D offshoring towards India (SWEDEN)
8. Conclusions & policy implications

3. What does it take to globalize innovation activities?

- Access to **competences** is critical, particularly for those firms that need or want to internationalize
  - Technological capabilities (hard)
  - Management techniques for international business and cross-cultural communication (soft)
  - Diversity of the workforce
  - Mobility of highly skilled human resources (smart use)
- The **region** where the firm is located is key! Complex linkages between global network and regional dynamics
8. Conclusions & policy implications

4. What about the foreign investments in our region? Will the impact be negative?
   - No generalized predatory behavior!
   - EMNEs more likely to create win-win situations than MNEs from advanced countries (AMNEs)
   - Autonomy, knowledge of the business and managerial capabilities are key
THANKS!!!
TACK SÅ MYCKET!!!

So, if you have NOT been browsing funny cat videos during the presentation…

ANY QUESTIONS?

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Itchy to know more?
Original publication sources


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