THE IMPACT OF CORPORATE GROUP AFFILIATION AND KNOWLEDGE BASES ON INNOVATION COLLABORATION ABROAD

SVERRE J. HERSTAD, CIRCLE Lund University & NIFU, Oslo
BERND EBERSBERGER, Management Center Innsbruck
BJØRN ASHEIM, CIRCLE Lund University

December 2012

sverre.herstad@nifu.no / bernd.ebersberger@mci.edu / bjorn.asheim@circle.lu.se
Motivation

- Innovation is becoming globally distributed

- What is the role of the MNE in this respect?
  - Beyond intra-group technology transfer

- All-encompassing or conditioned by the nature of technology and knowledge involved?
Plan for the presentation.

- Motivation
- Conceptual building blocks
- Hypotheses
- Data & measures
- Findings
BUILDING BLOCKS.
International innovation collaboration

- Allows the firm to tap distant knowledge assets
  - Disembodied and evolving

- (Cognitive) breadth
  - The number of different partner types with which a collaborative linkage is maintained

- Contingent on prior search (opportunity identification) and absorptive capacity (transfer & assimilation)
Distance (geographical, cultural, institutional) reinforces constraints of search, knowledge transfer and absorptive capacity

Constraints are dependent on the **knowledge base** of the focal firm

- Analytical (science-based; know-why)
- Synthetic (engineering-based; know-how)
- Symbolic (designs, images and symbols; know-who)

Constraints are specific to various **network configurations**

- Inter-regional scope versus intra-regional breadth
Analytical knowledge base

- Knowledge development is based on ‘learning-by-studying’ and **inputs from the science system**
  - E.g. biotechnology, chemicals

- The process of identifying such inputs is enabled by the flow of information in global ‘epistemic’ communities

- Engaging with other analytical knowledge base partners at a distance is lubricated by commonly **accepted professional languages**
  - Supportive of geographical scope

- **Search spaces** and organizational routines are **rather narrow** which reflect specific form of knowledge development
  - Constraint on network breadth
Synthetic knowledge base

- Integrative knowledge development drawing on *various inputs* from scientific and non-scientific sources; innovation activities focused on *attaining* specific *functional goals*

- Knowledge is created in an *inductive process* of testing, experimentation and other forms of ‘situated’ practical work

- Partner identification is contingent exposure to information which may be highly localized; and *tacit knowledge* may require proximity during interaction
  - Constraint on geographical scope

- Organizational routines evolve through *broad partner interaction*
  - Supportive of further network broadening
Symbolic knowledge base

- The **creation of meaning and desire** as well as aesthetic attributes of products, such as designs, images and symbols
  - E.g. advertising, fashion, media, design

- Inputs are **aesthetic** rather than technological

- Requires specialized abilities in creativity and interpretation of signals which are **highly specific to social & cultural contexts**
  - Strong constraint on geographical scope; breadth contingent on (cultural & institutional) proximity
Multinational companies.

- MNCs are networks of companies with a complex set of relational ties
  - through international presence
  - spanning different cultural and business contexts

- From the perspective of a domestic affiliate two modes of presence in a world region
  - strong presence / strong linkages – collaborative linkages with another subsidiary in that region
  - weak presence / weak linkage – HQ is located in that region
Research question.

- Does the presence of a Norwegian company abroad affect the breadth of its collaboration network in the respective world region?
- Does the effect depend on:
  - knowledge base (analytical / synthetic / symbolic)
  - mode of presence in the region (subsidiary / HQ)?
DATA & MEASURES.
Data.

- **Norwegian Innovation Survey 2010**
  - national wave of the CIS 2010
  - pretested, collected and cleaned by Statistics Norway
    - 3,419 firms in manufacturing and KIBS
    - 1,501 innovation active

- **Firm level data about**
  - innovation input
  - innovation output
  - innovation activities / behavior
    - collaboration
    - information search
    - ...
  - based on OECD‘s Oslo Manual
Measures.

- **International collaboration** (continuous variable)
  - Differentiating four world regions
    - Norway / Nordic countries / Europe (w/o Nordic countries) / US
  - For each region and for each partner type (customers / suppliers / consultants / competitors / universities / research inst. / R&D labs) binary variable indicates innovation collaboration in the data

- **Involvement index** (Bozeman & Gaughan, 2011; Gaugan & Corley, 2010; Ebersberger & Herstad, 2013)
  - Additive index of collaboration
  - Weights for each collaboration = inverse of relative frequency of collaboration in the NACE 2-digit industry

- **Involvement index**
  - weights up rare collaboration
  - weights down common collaboration in the industry
Measures.

- **Knowledge bases (binary variables)**
  - **Analytical knowledge base**
    - Information from science sector more valuable than from any other source
  - **Synthetic knowledge base**
    - Not analytical
    - Engineering competence available in the firm
  - **Symbolic knowledge base**
    - Not analytical & no engineering competence available in the firm
    - Competences in design, web and multimedia available in the firm

- **Presence in the world region (binary variables)**
  - HQ (Norwegian firm is part of an MNE headquartered e.g. in US)
  - Subsidiary (Norwegian firm is part of an MNE with coll. subs. e.g. in US)

- **Interaction of knowledge base and presence**
Measures.

- **Controls**
  - Size
  - Innovation intensity
  - External innovation exp. domestic / international
  - Part of a Norwegian MNE
  - Public funding domestic / international
  - Market presence local / domestic / EU / international
  - Protection strategies formal / strategic
  - Factors hampering innovation market / financial
  - Sector controls (~NACE 2 digit)

- **Method**
  - Probit to identify innovators
  - SUR for the international collaboration (NO, ND, EU, US)
FINDINGS.
**Table 4:** Effect of weak presence (headquarter location) in the world region on the breadth of the firm's network linkages in the region

<table>
<thead>
<tr>
<th>Knowledge base</th>
<th>Norway</th>
<th>Nordic</th>
<th>EU</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>I – Symbolic</td>
<td>0.072</td>
<td>-0.01</td>
<td>-0.04</td>
<td>-0.859</td>
</tr>
<tr>
<td>II - Synthetic</td>
<td>-0.395***</td>
<td>-0.021</td>
<td>0.005</td>
<td>-0.222*</td>
</tr>
<tr>
<td>III - Analytical</td>
<td>-0.251</td>
<td>0.41</td>
<td>-0.645**</td>
<td>0.402</td>
</tr>
</tbody>
</table>

Significance of difference in impact between knowledge bases

<table>
<thead>
<tr>
<th></th>
<th>I vs II</th>
<th>I vs III</th>
<th>II vs III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.51***</td>
<td>1.26</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>0.01</td>
<td>1.74</td>
<td>1.92</td>
</tr>
<tr>
<td></td>
<td>0.07</td>
<td>5.34**</td>
<td>7.61***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.77</td>
</tr>
</tbody>
</table>

Note: ***, **, * indicate significance on the 1%, 5%, 10% level.
Table 5: The effect of strong presence (direct coll. with another subsidiary) in the world region on the breadth of the firm’s network linkages within it

<table>
<thead>
<tr>
<th>Knowledge base</th>
<th>Norway</th>
<th>Nordic</th>
<th>EU</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - Symbolic</td>
<td>1.835***</td>
<td>0.616***</td>
<td>0.319</td>
<td>0.565</td>
</tr>
<tr>
<td>II - Synthetic</td>
<td>1.240***</td>
<td>1.043***</td>
<td>0.591***</td>
<td>0.936***</td>
</tr>
<tr>
<td>III - Analytical</td>
<td>1.110***</td>
<td>0.540*</td>
<td>0.197</td>
<td>-</td>
</tr>
</tbody>
</table>

Significance of differences between knowledge bases

<table>
<thead>
<tr>
<th></th>
<th>I vs II</th>
<th>I vs III</th>
<th>II vs III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.15***</td>
<td>4.90**</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>5.00**</td>
<td>0.06</td>
<td>2.92*</td>
</tr>
<tr>
<td></td>
<td>1.57</td>
<td>0.18</td>
<td>2.78*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

Note: ***, **, * indicate significance on the 1%, 5%, 10% level.
Findings.

- Impact of presence is contingent of the mode of presence
  - HQ do by and large not affect the breadth of the collaboration network

- Impact of strong presence is contingent on the knowledge base.

- Symbolic knowledge base
  - symbolic knowledge base is context specific / impact is more sensitive of cultural and social proximity
  - MNE does not really overcome this in EU and US
Findings.

- **Synthetic knowledge base**
  - synthetic knowledge is contextual to a certain degree but not as culture specific (as symbolic)
  - it has some tacitness to it
  - it is multi-disciplinary
  - it is sensitive to proximity (search constraints and face-to-face interaction)
  - subsidiary presence seems to be conducive to maintain a broader network and transfer this knowledge.
  - subsidiary presence works as a platform for search and collaboration
Findings.

- **Analytical knowledge base**
  - Codified, not contextual in itself
  - Yet breadth of collaboration requires proximity (cf impact on subs in Norway)
    - this is because breadth of collaboration extends beyond the science system
  - No impact of presence on breadth.
    - either no need for subsidiary presence or
    - subsidiary can channel knowledge from its broad network without loss and no need for a broad network
THANK YOU.