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National Borders and Knowledge Bases
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Cross-border Innovation Cooperation: National Borders and Knowledge Bases
Ranveig Edda Hjaltadóttir, Teemu Makkonen and Nils Karl Sørensen

Introduction

Increase in innovation cooperation of firms is related to: faster product life cycles, complexity of technology and sharing of risk. Choice between different partners is based on significance of the knowledge they offer and cost savings (Balderboes et al. 2004). Choosing a foreign partner can give access to knowledge not available in the region but comes with a cost (Boschma, 2005). Choice of partner is influenced by firm characteristics, industry and location of the firm.

Research Questions

The aim is to investigate heterogeneity in choice of innovation partner based on the location of partners (Denmark, EU, USA or Asia).

- What kind of patterns can be identified in the choice of partner in cross-border innovation cooperation activities of Danish firms according to their characteristics and geographical location?
- Do these patterns vary across distinct industrial branches relying on different knowledge bases?

Results of the Multivariate Probit Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Denmark (DK)</th>
<th>EU (EU)</th>
<th>USA (USA)</th>
<th>Canada (CA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>0.15 (0.05)**</td>
<td>0.16 (0.04)**</td>
<td>0.10 (0.04)**</td>
<td>0.16 (0.04)**</td>
</tr>
<tr>
<td>RDev</td>
<td>1.38 (0.66)**</td>
<td>1.16 (0.68)*</td>
<td>1.84 (0.72)**</td>
<td>2.27 (0.83)**</td>
</tr>
<tr>
<td>RDintsq</td>
<td>-0.50 (0.40)</td>
<td>-0.94 (0.62)</td>
<td>-1.29 (0.69)*</td>
<td>-1.59 (0.80)**</td>
</tr>
<tr>
<td>Rdde</td>
<td>0.06 (0.17)</td>
<td>0.14 (0.13)</td>
<td>0.06 (0.15)</td>
<td>-0.10 (0.17)</td>
</tr>
<tr>
<td>RDSub</td>
<td>-0.47 (0.20)**</td>
<td>0.35 (0.18)**</td>
<td>0.29 (0.16)**</td>
<td>0.56 (0.16)**</td>
</tr>
<tr>
<td>Newrrd</td>
<td>0.05 (0.19)</td>
<td>0.44 (0.14)**</td>
<td>0.49 (0.13)**</td>
<td>0.04 (0.15)</td>
</tr>
<tr>
<td>Newfr</td>
<td>0.37 (0.15)</td>
<td>0.14 (0.12)</td>
<td>-0.04 (0.12)</td>
<td>0.10 (0.14)</td>
</tr>
<tr>
<td>Newfrm</td>
<td>0.21 (0.15)</td>
<td>0.01 (0.12)</td>
<td>0.09 (0.13)</td>
<td>0.10 (0.14)</td>
</tr>
<tr>
<td>Patent</td>
<td>0.19 (0.21)</td>
<td>0.32 (0.16)**</td>
<td>0.52 (0.15)**</td>
<td>0.54 (0.16)**</td>
</tr>
<tr>
<td>RInt</td>
<td>Not included</td>
<td>-0.13 (0.10)**</td>
<td>-0.11 (0.11)</td>
<td>-0.13 (0.13)</td>
</tr>
<tr>
<td>Intai</td>
<td>Not included</td>
<td>-0.23 (0.17)</td>
<td>0.05 (0.18)</td>
<td>-0.35 (0.20)*</td>
</tr>
<tr>
<td>Analytic</td>
<td>-0.09 (0.23)</td>
<td>-0.04 (0.19)</td>
<td>0.51 (0.20)**</td>
<td>0.15 (0.22)</td>
</tr>
<tr>
<td>Synthetic</td>
<td>-0.11 (0.19)</td>
<td>-0.10 (0.15)</td>
<td>0.12 (0.17)</td>
<td>-0.11 (0.18)</td>
</tr>
<tr>
<td>Symbolic</td>
<td>0.14 (0.37)</td>
<td>0.07 (0.28)</td>
<td>0.62 (0.30)**</td>
<td>0.19 (0.35)</td>
</tr>
<tr>
<td>constant</td>
<td>0.42 (0.25)**</td>
<td>-0.22 (0.35)</td>
<td>-1.62 (0.36)**</td>
<td>-1.74 (0.41)**</td>
</tr>
</tbody>
</table>

P>|z|: *<0.1 **<0.05 ***<0.01

<table>
<thead>
<tr>
<th></th>
<th>Rho1 (DK)</th>
<th>Rho2 (EU)</th>
<th>Rho3 (USA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK vs. EU</td>
<td>0.04 (0.88)</td>
<td>0.18 (0.098)*</td>
<td>0.48 (0.07)**</td>
</tr>
<tr>
<td>Denmark vs. USA</td>
<td>0.12 (0.120)</td>
<td>0.28 (0.09)**</td>
<td>0.31 (0.08)**</td>
</tr>
</tbody>
</table>

Results, firm characteristics and location

Choosing an innovation partner in Denmark is independent from choosing a partner abroad. The choice between partners in different foreign location is dependent. Firm size, R&D intensity and having R&D in foreign subsidiaries is significant for partners in all 4 locations. Newness of the innovation (Newrwd) is significant for EU and USA and having applied for patent for all foreign location. This further supports the difference in choosing a domestic or foreign partners. Distance from land-border is as expected only significant for partners in EU. Closeness to international border is not an important factor for the choice of partner based on location.

Results, knowledge bases

The hypothesis that the knowledge bases that firm rely on for their innovations is not confirmed (only significant for 2 out of 3 in USA). This is somewhat surprising given underlying theory and empirical evidence which is mainly based on case studies. Possible explanations might be choice of variables, operationalization of knowledge bases or sample size. Further research is needed before decisive conclusions are drawn.

Literature Cited


Data and Methods

- Firm specific data from 2010 Community innovation survey in Denmark
- 602 firms have cooperated on innovation
- 86% have a partner in Denmark
- 61% have a partner abroad
- 49% have both DK and foreign partners

- Multivariate Probit Model
  - Four binary choice equations
  \[
  y_{i,k} = \begin{cases} 1 & x_{i,k}^\beta_k + \omega_{i,k} > 0 \\ 0 & \text{otherwise} \end{cases}
  \]
  \[
  k=1,2,3,4 \quad i=1,\ldots,N
  \]
  \[
  y_{i,k} \quad \text{of partner}
  \]
  \[
  X \quad \text{the independent variables}
  \]

Acknowledgements

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