Export behaviour of SMEs in the Swedish computer service industry

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Summary report chapter 3:

Project team
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Internal reviewer: Heinz Hollenstein
Motivation

• Few SMEs export
• Tradability of services increased rapidly in recent years
• Export participation of SMEs in Swedish computer services increased rapidly between 2001-2010
  – Micro enterprises: from 6 to 11 percent
  – SMEs 10-249: from 62 to 73 percent.

Aim of the paper

• New empirical evidence on the determinants of the export decision

Contribution:

• Unique data of the total population of firms
• full coverage of micro enterprises
• no reporting threshold for intra and extra EU exports
Motivation

• Why studying the determinants of the export decision of SMEs in computer services?
  – Tradability of software increased due to internet
  – Provision of a service can be geographically separated from its consumption
  – Export participation increased unlike in remaining service industries
  – Computer services one of fastest growing industry
  – Previous studies on ICT/software companies are often based on small surveys (see Bell 1995, 1997; Coviello and Munro 1997; Garvey and Brennan 2006; Ojala and Tyrväinen 2007; Terjesen et al. 2008)
  – Still few studies for service firms
Motivation

Export participation of SMEs among computer service firms

- SMEs 10-249 (left axis)
- SMEs 0-249 (right axis)
- SMEs 0-9  (right axis)
Motivation

Evolution of export participation of SMEs in services over time

- Wholesale trade 51
- Air transport 62
- R&D 73
- Motion picture & video 92-12
- Financial services 6
- Computers 72
- Land transport 60
- Water transport 61
- Other business act 74
- Renting 71
- Retail trade 52
- Sewage 90
- Activities of membership org. 92
- Post and telecomm. 64
- Hotels & restaurants 55
- Other service activities 93

Comparison between 2001 and 2010.
Theoretical background and previous literature

- Size, labour productivity, innovation activities, skills are as key determinants of export participation (Greenaway and Kneller 2007 or Wagner 2007)
- Self-selection of high productivity firms in exporting
- Schott (2004) importance of highly skilled employees in determining the export activities of a firm

Studies for SMEs

- Hollenstein (2005): availability of human and physical capital, other firm-specific assets in fields like marketing, organisation and access to finance
- Gashi, Hashi and Pugh (2014): human capital and technology-related factors, industry linkages, firm size, foreign capital share, sector of activity, availability of external finance, and membership in business associations
- Hauser et al 2013. export scope and innovation activities
Theoretical background and previous literature

• Limitations of previous studies
  – micro enterprises are often partly covered
  – Exports of goods and services are collected by separate institutions
  – reporting thresholds for intra and extra EU exports in the trade statistics
  – Reporting thresholds for intra EU exports very high
    • 150,000 for FR, 250,000 for D, more than 500,000 for IE
  – Subjective self reported information on exports in some surveys

• Previous studies based on Swedish firm level data
Theoretical background and previous literature

Export participation based on trade and VAT statistics in the Swedish business enterprise sector, 2010 (in percent)

<table>
<thead>
<tr>
<th>Firm size (employees)</th>
<th>number of firms</th>
<th>number of exporters (goods &amp; services)</th>
<th>export participation in percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SBS/ER trade statistics</td>
<td>VAT data trade statistics</td>
<td>VAT data</td>
</tr>
<tr>
<td>0</td>
<td>740,840</td>
<td>7,404</td>
<td>20,489</td>
</tr>
<tr>
<td>1-9</td>
<td>226,967</td>
<td>19,086</td>
<td>34,433</td>
</tr>
<tr>
<td>0-9</td>
<td>967,807</td>
<td>26,490</td>
<td>54,922</td>
</tr>
<tr>
<td>0-249</td>
<td>1,001,049</td>
<td>37,231</td>
<td>69,228</td>
</tr>
<tr>
<td>1-249</td>
<td>260,209</td>
<td>29,827</td>
<td>48,739</td>
</tr>
<tr>
<td>10-249</td>
<td>34,240</td>
<td>11,444</td>
<td>15,087</td>
</tr>
<tr>
<td>250+</td>
<td>998</td>
<td>703</td>
<td>781</td>
</tr>
<tr>
<td>total</td>
<td>1,002,047</td>
<td>37,934</td>
<td>70,009</td>
</tr>
</tbody>
</table>

source: statistics Sweden
Empirical model

Specification of the export decision

\[ XD_{it}^* = \beta_0 + \beta_1 \ln \left( \frac{Y}{L} \right)_{it-1} + \beta_2 HK_{it-1} + \beta_3 FOROWN_{it.1} + \beta_4 Size_{it} + \beta_5 Age_{it} + \epsilon_{it} \]

Dependent variable

\[ XD_{it} = \begin{cases} 1 & \text{if } XD_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases} \]

XD: dummy exports of goods or services based on VAT

Independent variables

(Y/L)_{t-1}: gross output per worker (requires L>1)

HK: proportion of highly skilled workers

FOROWN: foreign ownership (50 per cent + foreign equity)

SIZE: Firm size class or number of workers

AGE: dummy variable for young firms (<=5yrs)
Empirical model

- fixed or random effect logit model can be used
  \[ XD_{it}^* = Y_{it}\beta + e_{it} \]
  \[ e_{it} = \delta_i + d_t + \varepsilon_{it} \]

- Use of the conditional (fixed effects) logit model
- Two estimation samples: SMEs with 0-249 and 10-249 employees
- Alternative estimators:
  - Dynamic probit model (Wooldridge, 2005)
  - Dynamic RE probit model (MSL estimator) (Stewart, 2007)
Data source

- Linked firm level data
  - Total population of firms in computer services (Nace rev. 1.1 72)
  - Business register/structural business statistics: output, employment
  - VAT database: exports of goods and services
  - employment register: education

- Swedish firm-level data are and are not publicly available and protected by secrecy legislation, data access possible for research projects via MONA system
- Number of observations used in the conditional logit: 45000 on 7000 firms
- Inclusion of labour productivity reduce the sample
Data source

- Micro data online access for external users
  - Application needed (research project)
  - Administration fee
  - Original firm ID replaced by a running number
  - Linking is done by SCB
  - Confidential agreement
  - Results are not checked by SCB
  - Remote access (results can be lifted output)
  - Software: STATA, SAS, R, Geodata, server version

- Source
  http://www.scb.se/Grupp/Produkter_Tjanster/Forskare/_Dokument/MONA/Produktblad-Eng.pdf

- Access is provided to researchers affiliated to higher education or research institutions in Sweden.
- Access is restricted to certain datafiles for EU researchers
Descriptive statistics:

skill intensity: share of workers with tertiary degree

Source: Statistics Sweden
Descriptive statistics:

Output per employee

(in 1000 SEK)

1-249
SMEs 10-249
SMEs 1-9

Source: Statistics Sweden
Empirical results

• firm size, skill intensity and labour productivity are all significantly positively related with the probability of exporting of goods and/or services

• Impact of skill intensity decreases in magnitude and significance when labour productivity is included
  => labour productivity more important than skill intensity

• Magnitude of the impact of labour productivity is rather small
  • increase in labour productivity by 10 percent => increase in the probability of exporting by 0.23 percent

• Foreign ownership and firm age are not relevant

• Time effects are significant=> increase in export participation during the economic and financial crisis

• During 2002-2010 60 % of the increase in export participation is due to time effects
Empirical results

Conditional logit model of the determinants of exporting of Swedish SMEs (1-249) in computer services

<table>
<thead>
<tr>
<th></th>
<th>coef</th>
<th>z</th>
<th>m.e.</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>size 10-49</td>
<td>1.45</td>
<td>20.35</td>
<td>0.276</td>
<td>25.41</td>
</tr>
<tr>
<td>size 50-249</td>
<td>2.55</td>
<td>14.14</td>
<td>0.347</td>
<td>26.24</td>
</tr>
<tr>
<td>young SMEs</td>
<td>-0.17</td>
<td>-4.17</td>
<td>-0.040</td>
<td>-4.04</td>
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<tr>
<td>foreign-owned t-1</td>
<td>-0.10</td>
<td>-0.96</td>
<td>-0.023</td>
<td>-0.95</td>
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<tr>
<td>share of tertiary graduates t-1</td>
<td>0.18</td>
<td>3.06</td>
<td>0.044</td>
<td>3.08</td>
</tr>
<tr>
<td>year dummies</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>number of obs</td>
<td>45180</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>number of firms</td>
<td>6731</td>
<td></td>
<td></td>
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Empirical results

Conditional logit model of the determinants of exporting of Swedish SMEs (1-249) in computer services

Inclusion of labour productivity

<table>
<thead>
<tr>
<th></th>
<th>coef</th>
<th>z</th>
<th>m.e.</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>size 10-49</td>
<td>1.17</td>
<td>15.66</td>
<td>0.094</td>
<td>7.02</td>
</tr>
<tr>
<td>size 50-249</td>
<td>2.12</td>
<td>11.17</td>
<td>0.109</td>
<td>6.73</td>
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<tr>
<td>young SMEs</td>
<td>-0.21</td>
<td>-3.81</td>
<td>-0.022</td>
<td>-3.08</td>
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<tr>
<td>foreign-owned t-1</td>
<td>-0.09</td>
<td>-0.79</td>
<td>-0.010</td>
<td>-0.77</td>
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<tr>
<td>share of tertiary graduates t-1</td>
<td>0.15</td>
<td>1.80</td>
<td>0.016</td>
<td>1.80</td>
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<tr>
<td>log output per employees t-1</td>
<td>0.24</td>
<td>10.35</td>
<td>0.026</td>
<td>17.40</td>
</tr>
<tr>
<td>year dummies</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>number of obs</td>
<td>24338</td>
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Empirical results

Conditional logit model of the determinants of exporting of Swedish SMEs (1-249) in computer services

<table>
<thead>
<tr>
<th>time effects (ref 2002)</th>
<th>coeff</th>
<th>z</th>
<th>marg eff</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>0.045</td>
<td>0.70</td>
<td>0.005</td>
<td>0.72</td>
</tr>
<tr>
<td>2004</td>
<td>0.241 ***</td>
<td>3.70</td>
<td>0.024 ***</td>
<td>4.02</td>
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<tr>
<td>2005</td>
<td>0.008</td>
<td>0.11</td>
<td>0.001</td>
<td>0.11</td>
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<tr>
<td>2006</td>
<td>0.141 **</td>
<td>2.06</td>
<td>0.014</td>
<td>2.25</td>
</tr>
<tr>
<td>2007</td>
<td>0.256 ***</td>
<td>3.67</td>
<td>0.025 ***</td>
<td>4.03</td>
</tr>
<tr>
<td>2008</td>
<td>0.169 **</td>
<td>2.37</td>
<td>0.017 **</td>
<td>2.59</td>
</tr>
<tr>
<td>2009</td>
<td>0.207 ***</td>
<td>2.80</td>
<td>0.021 ***</td>
<td>3.06</td>
</tr>
<tr>
<td>2010</td>
<td>0.254 ***</td>
<td>3.33</td>
<td>0.025 ***</td>
<td>3.68</td>
</tr>
</tbody>
</table>
Conclusions

• Detailed study for export decision of SMEs in computer/software services
• Lagged level of labour productivity, share of workers with a tertiary degree, firm size, time effects are main determinants of exporting of SMEs in computer services
• size of the labour productivity effect is small
• increase in exporting cannot be explained by productivity and skill intensity alone => time effects , macro factors

Future work:
• estimation of both export decision and export intensity given exporting=> two part models (Mundlak/Wooldridge approach)
• determinants of SME exporting beyond Europe
• inclusion of other determinants: innovation activities etc
• Exporting and firm growth =>moderating factors