ICT as Facilitator of Internationalisation in SMEs

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Outline

Intuition and contribution
Econometric approach
Data
Stylised facts
Estimation results
Robustness and Limitations
Concluding remarks

A glimpse:
Firm-level analysis of ICT and exports in 12 countries on remote with Distributed Microdata Approach (DMD)

SME defined as firm with 10-249 employees (99 per cent of EU firms and 60 per cent of output, ECR 2014)

ICT capacities = usages or skills

80 per cent of firms investigated have a website

Having a website is associated with the decision to export in 7 out of 12 countries
Intuition and Contribution

ICT facilitates trade (especially of SMEs), both national and international by lowering barriers, legal or practical (distance) and by reducing costs (efficient sales, ICT skilled staff, physical presence)

Relationship between ICT and exports neglected in the literature. Few available studies: aggregate level or non-representative samples indicating positive link ICT - exports

Aggregate
Websites and ICT infrastructure important for exports growth (Freund and Weinhold 2004; Portugal-Perez and Wilson 2013)

Disaggregate
Online activities affect exports sales positively and firms with fast growing exports dependent on ICT (Bennett 1997; Morgan Thomas and Bridgewater 2004; Morgan-Thomas and Jones, 2009)

Websites and e-sales significantly related to exports growth and internet indirectly so (Matthews and Bianchi 2010; Bianchi and Matthews 2012)

Contribution
A set of ICT variables explored in connection with exports activity of SMEs, including one novel, based on harmonised and representative data in dimensions not earlier available (approximately 100,000 observations) for 12 European countries.
Econometric Approach

Investigate the relationship between exports behaviour of SMEs and ICT:

ED  Decision to export (Probit)
XI  Export intensity (Pooled OLS)

By including ICT capacities

HKITpct  Proportion of formally ICT schooled employees (post-upper secondary education)
WEB  Firm has a website (=1)
BROADpct  Proportion of Broadband internet-enabled employees
AESELL  Firm has online transactions (=1)

And...
Econometric Approach

...typical determinants such as sunk cost (EX), productive resources: labour productivity, capital ratio and firm size (R), exports spillovers (Exspill), other characteristics: age and foreign ownership (C) and time and industry fixed effects (S). Independent variables lagged one year. (Melitz 2003; Hollenstein 2005)

Probit:

$$XD_{it}^* = \beta_0 + \beta_1 EX_{it-1} + \beta_2 R_{it-1} + \beta_3 C_{it} + \beta_4 ICT_{it-1} + \beta_5 HK_{it-1} + \beta_6 EX_{Spill_{it-1}} + \beta_7 S + \epsilon_{it}$$

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

Pooled OLS:

$$XI_{it} = \beta_0 + \beta_1 R_{it-1} + \beta_2 C_{it} + \beta_3 ICT_{it-1} + \beta_4 HK_{it-1} + \beta_5 S + \epsilon_{it}$$
Data

**ESSLait** national linked firm-level data and **Micro Moments Database**, covering 14 European countries (12 included in this analysis). These firm and industry-level datasets provide new indicators and information in dimensions not earlier available.

**Business register**
*Industry code, age, employment*

**Production statistics**
*Gross output, intermediates, value added, number of employees, capital, pay, foreign affiliates (or FATS)*

**Trade statistics (and VAT)**
*Exports*

**Education register**
*Educational achievement*

**EU-harmonised surveys on ICT usage and innovation activities (CIS) in enterprises**
*ICT usage and innovation indicators*
Data Retrieval: Distributed Microdata Research (MMD)

Metadata review and Data selection → Data assembly → Code development → Analysis & Reporting

Secure Environment

Country-specific Source Surveys

Code execution
(Data linking)

Merged Datasets

Disclosure controls

Output dataset → Output dataset → Output dataset → Merge with all countries’ output datasets → ESSLait Micro Moments Database
Services firms more ICT intensive. WEB and BROADpct pattern consistent across size class. AESELL and HKIT more common among larger firms.

Source: ESSLait Micro Moments Database
Stylised Facts: Proportion of Total Exports in SMEs

Source: ESSLait Micro Moments Database
SMEs responsible for on average 36 per cent of total exports in firms larger than 10 employees in 2010.
Stylised Facts: Average Size of SMEs

SME in sample has on average 35 employees. Larger country-larger average size, except IE and IT.
Stylised Facts:
Average Labour Productivity by Size Class

Source: ESSLait Micro Moments Database
E means number of employees. IE value for large firms truncated. Small firms lower productivity. Difference between medium-sized and large firms less clear. Ranking across countries not stable over size class. Large country, larger average size more often higher productivity.
# Estimation Results

## Pooled and unbalanced samples of SMEs 2001-2010

<table>
<thead>
<tr>
<th>Variable</th>
<th>ATG</th>
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<th>ITG</th>
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<tbody>
<tr>
<td>Firm has website WEB XD coef</td>
<td>0.11</td>
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<td>0.09</td>
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<td>0.19</td>
<td>**</td>
<td>0.24</td>
<td>***</td>
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<td>Employee broadband access BROADpct XD coef</td>
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<td>0.13</td>
<td>*</td>
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<td>0.02</td>
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<td>n.a</td>
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**Observations**
- 800
- 5897
- 6486
- 5385
- 34802
- 4479
- 4923
- 6476
- 18690
- 9068
- 912
- 333

*Source: ESSLait Micro moments database*

***, ** and * indicates significance at 1, 5 and 10 per cent level. In 9 out of 12 countries ICT is significantly and positively related to the decision to export. WEB most common, AESELL not significant. Countries with more intensive ICT usage in firms stronger link to advanced usages. Control variables behave as expected, sunk costs, large and foreign-owned firms more likely to export. Spillovers important in some countries.
# Estimation Results

## Pooled and unbalanced samples of SMEs 2001-2010

<table>
<thead>
<tr>
<th></th>
<th>AT(^G)</th>
<th>DK</th>
<th>FR</th>
<th>IE</th>
<th>IT(^G)</th>
<th>LU</th>
<th>NL(^G)</th>
<th>NO(^G)</th>
<th>PL</th>
<th>SE</th>
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<tr>
<td>Firm has website</td>
<td>XI</td>
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<tr>
<td>WEB</td>
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<td>0.02***</td>
<td>0.05**</td>
<td>n.a.</td>
<td>-0.02</td>
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<td>0.01*</td>
<td>0.20***</td>
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<tr>
<td>ICT-intensive human capital</td>
<td>XI</td>
<td>coef</td>
<td>n.a</td>
<td>0.41***</td>
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<td>n.a</td>
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<td>n.a</td>
<td>0.16*</td>
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<td>9068</td>
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</tbody>
</table>

Source: ESSLait Micro moments database

***, ** and * indicates significance at 1, 5 and 10 per cent level. Simpler ICTs as WEB less important for increase of exports sales. AESELL now significant in some countries. Negative estimates in PL and NO.
**Estimation Results: Patterns**

Pooled and unbalanced samples of SMEs 2001-2010

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</tbody>
</table>

Source: ESSLait Micro Moments Database

Box with frame means significant and negative association.
Robustness and Limitations

Pattern consistence across industries, except for decision to export and online presence (WEB), where link is more common among services firms.

Eurostat (2012) shows different pattern for large firms: Advanced ICTs more often related to decision to export than in SMEs.

Heckman sample selection model with lagged exports, export spillovers and the capital/labour ratio as identifying variables. Two out of three identifying variables significant in most cases, IMR sometimes small but significant. Estimates of key variables not largely affected. However, method can be discussed since zeroes are known.

DMD cannot be made more advanced than each dataset, local operator and IT system holds for. Opportunity to re-run regressions on remote limited.

Measures to reduce response burden of firms lead to selection bias (small overlaps) in and over time when multiple surveys are linked. Rotating panels over time imply that panel data methods are difficult to use.

Marginal analyses less affected by bias than descriptive statistics (Fazio et al 2006, lancu et al 2013).
Concluding Remarks

Analytical results
A) ICT capacities relate to exports behaviour in firms, but kind of ICT differs across countries and between decision to and magnitude of exports (more advanced ICTs).

B) Low ICT intensity coincides with significance of simpler ICTs.

Policy implications
Results do not contradict general support for broadband infrastructure. Measures for improved security (EU digital Agenda) and cheaper systems for online transactions might benefit SMEs.

Definition of SME. Indications that firms 50-249 employees more similar to large firms.

Future
Fine-tune DMD approach to allow more advanced analyses, study switchers.

Changes in sample survey designs, increased coordination for instance, needed to allow more advanced econometrics.