Multinational firms and Export Dynamics

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Motivation

What are the main features of MNE dynamics as opposed to exporter dynamics?

Numerous recent papers on export dynamics, but little evidence on dynamics of FDI
Reason: strong data requirements

This paper

- novel facts on multinational firm dynamics contrasted with export dynamics
- using detailed firm-level data on exports and FDI from Norway, France and Germany
- simple extension of Helpman, Melitz, Yeaple (2004) suffices to explain many features of the data
Literature

- **Nascent literature on FDI dynamics**
  
  Conconi, Sapir, Zanardi (forthcoming); Cravino & Levchenko (2015); Egger, Fahn, Merlo & Wamser (2014); Fillat & Garetto (2014); Fillat, Garetto & Oldenski (2015); Kotseva & Vettas (2005); Ramondo, Rappaport & Ruhl (2013); Rob & Vettas (2003)

- **Comparatively large literature on export dynamics**

  *Fact finding*: e.g. Albornoz, Pardo, Corcos & Ornelas (2012), Schmeiser (2012);
1. **Norway, 1996-2006. Main data source.**  
   Sample: 8,044-8,838 firms per year.  
   - Balance sheet, customs, foreign affiliate data for manufacturing sector  
   - Every year: destination of exports; location of foreign affiliates; domestic, export and foreign affiliate sales

2. **France, 1999-2011.**  
   - Balance sheet, customs, foreign affiliate data for manufacturing sector  
   - Every year: destination of exports; location of foreign affiliates; domestic and (monthly) export sales; foreign affiliates: no sales, some employment

3. **Germany, 1999-2011.**  
   - Foreign affiliate data for manufacturing sector  
   - Every year: location of foreign affiliates; domestic and foreign affiliate sales and employment; no exporters or domestic firms
Fact I: Exit rates (I)

Exit rates are lower for new MNEs than for new exporters.
Firm-destination level. Norway.
Exit rates are lower for new MNEs than for new exporters.
Firm-destination level. France.
Fact I: Exit rates (III)

Exit rates are lower for new MNEs than for new exporters. Multinational firms. All countries.
### Fact 1: Exit rate regressions

\[
\text{Exit}_{inmt} = \beta_0 \ mne_{int} + \beta_1 \ age_{inmt} + \beta_2 \ mne_{int} \times age_{inmt} \\
+ \beta_3 \ exp_{inmt} + \beta_4 \ mne_{int} \times exp_{inmt} + \alpha_n + \alpha_s + \alpha_t + \epsilon_{inmt}
\]

with \( i \): firm, \( n \): destination, \( m \): mode, \( t \): time, \( s \): sector; \( \alpha \): fixed effect

<table>
<thead>
<tr>
<th></th>
<th>— Norway —</th>
<th>— France —</th>
</tr>
</thead>
<tbody>
<tr>
<td>( mne_{in} )</td>
<td>-0.22*** (0.027)</td>
<td>-0.28*** (0.022)</td>
</tr>
<tr>
<td>( age_{inmt} )</td>
<td>-0.044*** (0.002)</td>
<td>-0.072*** (0.004)</td>
</tr>
<tr>
<td>( mne_{in} \times age_{inmt} )</td>
<td>0.026*** (0.006)</td>
<td>0.048*** (0.005)</td>
</tr>
<tr>
<td>( exp_{inm} )</td>
<td>-0.063 (0.054)</td>
<td>-0.135*** (0.011)</td>
</tr>
<tr>
<td>( exp_{inm} \times mne_{in} )</td>
<td>0.073 (0.064)</td>
<td>0.109*** (0.014)</td>
</tr>
<tr>
<td>( \log \ sales_{it, dom} )</td>
<td>-0.03*** (0.004)</td>
<td>-0.04*** (0.001)</td>
</tr>
</tbody>
</table>

Observations: 114,426 114,426 109,092 2,158,576 2,158,576 925,990
R-squared: 0.066 0.066 0.077 0.135 0.120 0.126
Fact II: Sales growth rates (I)

Growth profiles are flatter for new MNEs than for new exporters.
Fact II: Sales growth rates (II)

Growth profiles are flatter for new MNEs than for new exporters.
Foreign affiliate sales vs. employment growth. Germany.
Fact II: Sales growth rates (III)

Growth profiles are flatter for new MNEs than for new exporters. Foreign sales and employment growth. France.
Fact II: Sales growth rates

Growth profiles are flatter for new MNEs than for new exporters.

![Graph showing sales growth rates for Exporters, MNEs, and MNEs with export experience over age]
Fact III: Transition patterns

**Experienced MNEs are larger than incumbent MNEs.**

Firm level. Mean log sales.

<table>
<thead>
<tr>
<th>$t - 1 \backslash t$</th>
<th>Domestic</th>
<th>Exporter</th>
<th>MNE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>-1.47</td>
<td>-0.92</td>
<td>-0.42</td>
<td>-1.43</td>
</tr>
<tr>
<td>Exporter</td>
<td>-1.17</td>
<td>-0.35</td>
<td>0.96</td>
<td>-0.39</td>
</tr>
<tr>
<td>MNE</td>
<td>-2.29</td>
<td>0.38</td>
<td>0.67</td>
<td>0.63</td>
</tr>
<tr>
<td>Total</td>
<td>-1.45</td>
<td>-0.38</td>
<td>0.68</td>
<td>-0.86</td>
</tr>
</tbody>
</table>
Theory: Assumptions

- One factor of production: labor
- Two countries
- Three options: domestic activity $D$, exporting $X$, FDI $M$
- Fixed costs of exporting $f^X$ and FDI $f^M$ with $f^M > \tau^{\sigma - 1} f^X$
- Iceberg-type transport costs $\tau \geq 1$
- Continuum of firms, monopolistic competition, CES preferences

Plus
- Several time periods $t = 0, 1, 2, \ldots$, infinite time horizon
- **Sunk costs of FDI** $f_e^M > 0$
- **Markov productivity process**: productivity $\phi_t = \exp(z_t)$ with

$$z_t = \rho z_{t-1} + \sigma \epsilon_t \quad 0 < \rho < 1, \ \epsilon_t \sim N(0, 1)$$
Results

1. MNEs more productive than exporters, MNE entrants more productive than MNE exiters.

\[ \bar{\phi}^X < \bar{\phi}^M < \bar{\phi}^M_e \]

\( \rightarrow \) Band of inaction \( \phi \in [\bar{\phi}^M, \bar{\phi}^M_e] \)

2. Exit rate of experienced MNEs lower than of inexperienced MNEs.

Intuition:

- Exporters more productive than domestic firms
- MNE entry upon positive productivity shock
- MNE exit cut-off independent of experience

\( \Rightarrow \) As experienced MNEs larger at time of entry, less likely to exit.
### Calibration: Moments (Norway)

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Value Moment</th>
<th>Data Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\sigma$ Elasticity of substitution</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>$\beta$ Discount factor</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td><strong>Calibrated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\tau$ trade iceberg cost</td>
<td>1.6</td>
<td>$\frac{\text{export sales}}{\text{domestic sales}}$</td>
</tr>
<tr>
<td>$\rho$ persistence of productivity shock</td>
<td>0.966</td>
<td>0.966</td>
</tr>
<tr>
<td>$\sigma_\varepsilon$ SD of productivity shock</td>
<td>0.095</td>
<td>0.095</td>
</tr>
<tr>
<td>$f^x$ export fixed cost</td>
<td>0.040</td>
<td>fraction of exporters, 39.6 40.8</td>
</tr>
<tr>
<td>$f^m$ FDI fixed cost</td>
<td>3.930</td>
<td>fraction of MNEs, 1.5 1.41</td>
</tr>
<tr>
<td>$f^{me}$ FDI entry cost</td>
<td>2.472</td>
<td>prob. 1st y. MNE exit 21 13</td>
</tr>
</tbody>
</table>
## Calibration: Non-targeted moments

<table>
<thead>
<tr>
<th>Non-targeted moments</th>
<th>data</th>
<th>model</th>
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<tbody>
<tr>
<td>probability of export exit in the 1st yr after entry</td>
<td>58%</td>
<td>31%</td>
</tr>
<tr>
<td>fraction of experienced MNEs (in all MNEs)</td>
<td>39%</td>
<td>15%</td>
</tr>
<tr>
<td>prob. of becoming experienced MNE</td>
<td>0.17%</td>
<td>0.52%</td>
</tr>
<tr>
<td>prob. of becoming non-experienced MNE</td>
<td>0.09%</td>
<td>0%</td>
</tr>
<tr>
<td>prob. of experienced MNE exit in the 1st yr after entry</td>
<td>16%</td>
<td>13%</td>
</tr>
<tr>
<td>prob. of non-experienced MNE exit in the 1st yr after entry</td>
<td>27%</td>
<td>22%</td>
</tr>
</tbody>
</table>
Calibration: Exit rates

(a) MNEs

(b) Exports

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Multinational firms and Export Dynamics
(c) Affiliate sales — growth rel. to entry year

(d) Exports — growth rel. to entry year
Take away

- New facts on MNE vs. exporter dynamics
- In particular: lower exit rates of new MNEs than of new exporters, even after controlling for size and age
- Findings pro sunk costs of FDI, but not sunk costs of exporting
- Simple model captures salient facts, but not all

Next steps

- Further explore life cycle of firms
- Include hiring and lay-off patterns