Margins of Trade: CEE Firms Before, During and After the Turmoil

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Introduction

Exports of goods and services (% of GDP)

- Increasing openness of CEE economies

Source: World Bank
Slovakia and Czech Republic are strongly engaged in value chains.
Introduction – Previous literature

• Importance of firms’ extensive margins in explaining the dynamics of trade

• Emerging economies diversify their product portfolio as they catch up with advanced economies
  • Imbs and Wacziarg (2003) study the evolution of sectoral concentration along the per-capita income development path

• Understanding the adjustment of current account imbalances
  • Corsetti et al. (2013) revisit the relationship between current account imbalances and exchange rate adjustment (Obstfeld and Rogoff, 2005)
  • The expansion of varietes (extensive margin) need not be associated with terms of trade deterioration as consumers love new varietes (Krugman, 1989)
Introduction – Previous literature

• Growing importance of value chains, manifesting itself i.a. in a high proportion of imported intermediate goods in the export value of goods
  • Beltramello et al. (2012) find that most of the 2007-2009 trade collapse occurred at the intensive margin, being much larger in intermediates
  • Altomonte et al. (2012): intra-group French trade in intermediates exhibited a faster drop followed by a faster recovery that the arm’s length trade in 2007-2009 (bullwhip effect) as multinational firms better optimise inventories and do not suffer from large information asymmetries
• The previous literature yields mixed results on the significance of margins
  • Amador and Opromolla (2013): both margins are important in explaining the year-on-year variation in Portuguese export
  • Beltramello et al. (2012): extensive margin accounts for about 60% of total export growth in 1995-2007 (39 countries since 1995); higher extensive margin for CEE economies
  • Silgoner et al. (2013): extensive margin of CESEE-10 countries accounts for less than 10% of export growth in 2003-2005
• Wagner (2016) surveys empirical studies using transaction level data
Introduction - What we do

- Investigate margins of trade in CZ, SK and PL before, during and after the 2008-2009 crisis, using comparable firm transaction-level datasets and the same methodology
  - We expect extensive margins making a significant contribution to export growth
- We examine determinants of elementary mid-point export growth rates
  - Mid-point growth rates account for both intensive and extensive margins
  - Destinations, product groups (capital, intermediate, consumption, cars, other), firm size, import intensity (proxy for international production linkages)
  - Focus on periods during the crisis and immediate post-crisis recovery until the end of 2011
- We extend Galuscac and Sutoris (CNB WP 12/2016) to a panel setup and cross-country comparison
Methodology

• Following Bricongne et al. (2012), we use quarterly data on exports by firm, destination and product in 2005-2015 to compute mid-point growth rates

\[ g_{ict} = \frac{x_{ict} - x_{ick}(t-4)}{\frac{1}{2}(x_{ict} + x_{ick}(t-4))} \]

• We define weights as

\[ w_{ict} = \frac{x_{ict} + x_{ick}(t-4)}{\sum_c \sum_i \sum_k x_{ict} + \sum_c \sum_i \sum_k x_{ick}(t-4)} \]

• Total value of exports is

\[ G_t = \sum_c \sum_l \sum_k g_{ict} w_{ict} \cdot \]
Methodology

• We define extensive margins:
  • Firm extensive
  • Country extensive
  • Product extensive

• Intensive margin is the contribution of the continuing firm-destination-product export relationships

• Biases are discussed in Bricongne et al. (2012) and in Berthou and Vicard (2013)
Methodology

- We compute gross and net margins
- Next, we apply shift-share decomposition to investigate the impact of specific factors on elementary mid-point growth rates
  - We estimate a weighted regression in a panel setup with firm and time fixed effects
  - We regress growth rates on dummies for destinations, product groups, firm size and import intensity. Each dummy is interacted with a period dummy (during the crisis, after the crisis)
• We use quarterly datasets of individual firms exporting goods in 2005-2015 by products and destinations (Intrastat, Extrastat)
• We define extensive margin as exports not exceeding the reporting threshold in the preceding or next year
• We aggregate HS6 products into the System of National Accounts categories: capital goods, intermediate goods, consumption goods, passenger motor cars, other goods
• Destinations are DE, SK/PL/CZ, rest of euro area (RoEA), rest of EU (RoEU), rest of the world (ROW)
• We define firm size by HS2 product class in each period
• We investigate the role of production linkages using the intermediate goods import intensity of exports as a proxy for participation in global value chains
Data

- We address several measurement issues
  - Increasing thresholds for intra-EU export
    - Exclude firms in those years in which their yearly exports are below the highest threshold
  - In CZ, firms are allowed to fill in joint reports on their exports since 2009
  - Cross-border flows vs. national accounts data
    - Exclude exports by non-resident firms as a robustness check
• Top destinations after the crisis (export shares):

<table>
<thead>
<tr>
<th></th>
<th>DE</th>
<th>RoEA</th>
<th>RoEU</th>
<th>ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZ</td>
<td>30</td>
<td>22</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>SK</td>
<td>21</td>
<td>24</td>
<td>36</td>
<td>19</td>
</tr>
<tr>
<td>PL</td>
<td>25</td>
<td>26</td>
<td>20</td>
<td>29</td>
</tr>
</tbody>
</table>

• About three quarters of exports are by the top 5% of exporters
• Share of exports to ROW increased after the crisis
• Exports of intermediate goods dominate (60% of exports in CZ, 53% in SK, 50% in PL)
• Share of exports by firms with high import intensity is higher after the crisis than before in CZ and SK
- Sample export value and the number of firms exporting.
The 2008-2009 crisis affected exports to all destinations.
• Exports of intermediate and capital goods declined in 2008-2009, recovered quickly in 2010
• Exports of consumption goods declined only mildly in 2008-2009 (increased in PL)
• Export of cars affected by launching new products/factories
- Export growth is driven by large firms
Results

 Contributions of net margins to mid-point growth rates

- **Intensive margin** explains most of the export growth, similar to the previous evidence for other countries.
- The role of the **extensive margin** is smaller, but not negligible.

**CZ**

**SK**

**PL**

- Intensive margin explains most of the export growth, similar to the previous evidence for other countries.
- The role of the extensive margin is smaller, but not negligible.
### Contributions to mid-point growth rates and the share of net extensive margin, Czech exports

<table>
<thead>
<tr>
<th></th>
<th>size: all</th>
<th></th>
<th>size: 0-95%</th>
<th></th>
<th>size: 95-100%</th>
<th></th>
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<tbody>
<tr>
<td>overall growth</td>
<td>12.8</td>
<td>-8.9</td>
<td>9.8</td>
<td>2.0</td>
<td>-4.3</td>
<td>1.0</td>
</tr>
<tr>
<td>net intensive</td>
<td>7.8</td>
<td>-8.7</td>
<td>6.9</td>
<td>0.2</td>
<td>-3.9</td>
<td>-0.1</td>
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<td>net extensive</td>
<td>5.0</td>
<td>-0.2</td>
<td>2.9</td>
<td>1.7</td>
<td>-0.4</td>
<td>1.2</td>
</tr>
<tr>
<td>net firm</td>
<td>2.8</td>
<td>0.9</td>
<td>1.7</td>
<td>0.9</td>
<td>-0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>net product</td>
<td>0.9</td>
<td>-0.4</td>
<td>0.9</td>
<td>0.3</td>
<td>-0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>net country</td>
<td>1.4</td>
<td>-0.7</td>
<td>0.3</td>
<td>0.5</td>
<td>-0.1</td>
<td>0.3</td>
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<tr>
<td>net extensive to total (%)</td>
<td>39.3</td>
<td>2.1</td>
<td>29.7</td>
<td>88.3</td>
<td>10.0</td>
<td>112.5</td>
</tr>
</tbody>
</table>

- In CZ, net extensive margin accounts for 39% of export growth in 2006-07 and 30% in 2010-14 (25% in 2010, 30% in 2011 and 25% in 2014)
  - Share of net extensive margin declined after the crisis
  - Extensive margin has a greater role among small firms
  - Net firm margin remained slightly positive in 2008-09
  - Much lower net country margin after the crisis
Results

Contributions to mid-point growth rates and the share of net extensive margin, Slovak exports

<table>
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</thead>
<tbody>
<tr>
<td>overall growth</td>
<td>17.3</td>
<td>-13.8</td>
<td>9.9</td>
</tr>
<tr>
<td>net intensive</td>
<td>6.7</td>
<td>-13.8</td>
<td>6.1</td>
</tr>
<tr>
<td>net extensive</td>
<td>10.7</td>
<td>0.0</td>
<td>3.9</td>
</tr>
<tr>
<td>net firm</td>
<td>6.4</td>
<td>0.2</td>
<td>1.7</td>
</tr>
<tr>
<td>net product</td>
<td>1.3</td>
<td>-0.5</td>
<td>1.4</td>
</tr>
<tr>
<td>net country</td>
<td>3.0</td>
<td>0.3</td>
<td>0.8</td>
</tr>
<tr>
<td>net extensive to total (%)</td>
<td>61.6</td>
<td>-0.2</td>
<td>38.8</td>
</tr>
</tbody>
</table>

- In SK, net extensive margin accounts for 62% of export growth in 2006-07 and 39% after the crisis
  - Higher contribution of extensive margin than in CZ
  - Other patterns are similar to CZ:
    - Share of net extensive margin declined after the crisis
    - Extensive margin has a greater role among small firms
    - Net firm margin remained slightly positive in 2008-09
    - Much lower net country margin after the crisis
Results

In PL, net extensive margin accounts for 45% of export growth in 2006-07 and 37% after the crisis

- Higher contribution of extensive margin than in CZ
- Other patterns are similar to CZ:
  - Share of net extensive margin declined after the crisis
  - Extensive margin has a greater role among small firms
  - Net firm margin remained positive in 2008-09
  - But: a bit lower net country margin after the crisis
Results

- Next, we investigate elementary mid-point export growth rates
- Use firm and time fixed effects
- Crisis period is 3q2008 to 4q2009
- Focusing on immediate post-crisis recovery until 4q2011
- Results during vs before and after vs before the crisis
Controlling for firm fixed effects, contribution of exports of intermediate goods was higher than of other product groups after the crisis (until 2011)
- Exports to Europe dropped relatively more during the crisis
- Exports to ROW more significant in post-crisis period
Results

- Exports of small firms hit harder in the crisis
Results

- Except for PL, higher import intensity explains more in post-crisis export growth
• Marginal effects are lower after than before the crisis
  • Compositional effects? (see results without firm fixed effects in Appendix A)
• Appendix B contains predicted effects
• We restrict the CZ sample to a balanced panel of active firms, see the results in Appendix C
Conclusions

- Preliminary results from a large project, making use of huge comparable transaction-level datasets
- Intensive margin explains most of the export growth
  - Trade collapse mostly through the intensive margin
- The share of extensive margin is higher in SK and PL than in CZ
- The contribution of extensive margin declined after the crisis in all three countries
  - Lower rate of convergence?
  - Slower pace of GVC integration?
- Results from a shift-share analysis are consistent with the presence of value chains
Thank you for your attention

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Appendix A: No firm fixed effects

CZ, no firm fixed effects

Predictive Margins of sna with 95% CIs

Predictive Margins of c with 95% CIs

Predictive Margins of v_cat with 95% CIs

Predictive Margins of int4 with 95% CIs
Appendix A: No firm fixed effects

SK, no firm fixed effects

Predictive Margins of sna with 95% CIs

Predictive Margins of c with 95% CIs

Predictive Margins of v_cat with 95% CIs

Predictive Margins of int4 with 95% CIs
Appendix A: No firm fixed effects

PL, no firm fixed effects

Predictive Margins of sna with 95% CIs

Predictive Margins of c with 95% CIs

Predictive Margins of v_cat with 95% CIs

Predictive Margins of int4 with 95% CIs
## Appendix B: Predicted effects

### Predicted effects in 2006-2011; crisis period: 3q2008-4q2009

<table>
<thead>
<tr>
<th></th>
<th>CZ during vs before</th>
<th>CZ after vs before</th>
<th>SK during vs before</th>
<th>SK after vs before</th>
<th>PL during vs before</th>
<th>PL after vs before</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital vs mean</td>
<td>-8.95*** -6.78***</td>
<td>-6.40*** -10.37***</td>
<td>7.25*** 9.63***</td>
<td>-6.02*** -4.93***</td>
<td>2.45*** 3.83***</td>
<td>3.51*** 5.99***</td>
</tr>
<tr>
<td>Intermediate vs mean</td>
<td>-2.22*** -3.98***</td>
<td>1.78*** 0.37***</td>
<td>1.63*** 2.63***</td>
<td>4.63*** -1.02***</td>
<td>-8.23*** -7.05***</td>
<td>0.40*** 2.91***</td>
</tr>
<tr>
<td>Consumption vs mean</td>
<td>13.53*** 10.91***</td>
<td>-4.78*** -10.59***</td>
<td>21.53*** 23.77***</td>
<td>4.30*** 3.43***</td>
<td>11.05*** 7.07***</td>
<td>0.45*** -7.59***</td>
</tr>
<tr>
<td>Cars vs mean</td>
<td>10.66*** 21.98***</td>
<td>2.06*** 22.25***</td>
<td>-23.92*** -27.24***</td>
<td>-10.45*** -7.41***</td>
<td>15.25*** 17.65***</td>
<td>-12.89*** -4.26***</td>
</tr>
<tr>
<td>Other vs mean</td>
<td>-38.68*** -92.29***</td>
<td>41.11*** -3.41*</td>
<td>10.66*** 5.08***</td>
<td>-3.77*** 33.63***</td>
<td>-9.05*** 1.73***</td>
<td>2.60*** 11.07***</td>
</tr>
<tr>
<td>DE vs mean</td>
<td>8.30*** 9.67***</td>
<td>-0.26 2.33***</td>
<td>7.80*** 12.91***</td>
<td>9.27*** 20.92***</td>
<td>7.96*** 9.12***</td>
<td>3.90*** 5.71***</td>
</tr>
<tr>
<td>PL vs mean</td>
<td>-8.80*** -14.25***</td>
<td>0.43 -8.32***</td>
<td>3.32*** 2.65***</td>
<td>-4.64*** -10.74***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK vs mean</td>
<td>-1.64*** -5.77***</td>
<td>-1.51*** -10.84***</td>
<td></td>
<td></td>
<td>0.06 -4.03***</td>
<td>-4.05*** -7.79***</td>
</tr>
<tr>
<td>CZ vs mean</td>
<td></td>
<td></td>
<td>2.05*** 0.09</td>
<td>-2.70*** -9.98***</td>
<td>-2.89*** -3.81***</td>
<td>-6.11*** -6.56***</td>
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<tr>
<td>RoEA vs mean</td>
<td>-2.37*** -0.98***</td>
<td>-1.67*** 2.20***</td>
<td>-3.87*** -6.56***</td>
<td>-5.11*** -6.46***</td>
<td>-0.95*** -0.75***</td>
<td>-0.81*** 0.05</td>
</tr>
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<td>RoEU vs mean</td>
<td>-12.22*** -12.77***</td>
<td>-4.81*** -4.95***</td>
<td>-8.35*** -11.50***</td>
<td>-1.95*** -15.29***</td>
<td>-6.66*** -7.71***</td>
<td>0.35* -0.03</td>
</tr>
<tr>
<td>RoW vs mean</td>
<td>-1.48*** -1.54***</td>
<td>5.87*** 3.80***</td>
<td>-1.15* 0.65</td>
<td>1.53*** 6.92***</td>
<td>-3.29*** -3.58***</td>
<td>-1.48*** -3.61***</td>
</tr>
<tr>
<td>Size 0-80 vs mean</td>
<td>-6.36*** -6.85***</td>
<td>-1.27*** 0.27</td>
<td>-12.56*** -18.08***</td>
<td>-8.47*** -17.74***</td>
<td>-10.39*** -16.34***</td>
<td>0.48* -9.51***</td>
</tr>
<tr>
<td>Size 80-95 vs mean</td>
<td>-4.95*** -4.73***</td>
<td>-1.12*** -0.68**</td>
<td>-2.93*** -7.86***</td>
<td>-3.30*** -5.01***</td>
<td>-4.24*** -7.90***</td>
<td>0.12 -6.34***</td>
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<td>Size 95-99 vs mean</td>
<td>1.33*** 1.49***</td>
<td>-1.52*** -1.65***</td>
<td>0.22 -2.20***</td>
<td>-5.28*** -3.46***</td>
<td>1.97*** 1.64***</td>
<td>1.99*** 0.76***</td>
</tr>
<tr>
<td>Size 99-100 vs mean</td>
<td>1.78*** 1.66***</td>
<td>1.54*** 1.27***</td>
<td>2.43*** 5.95***</td>
<td>4.86*** 5.65***</td>
<td>2.20*** 4.95***</td>
<td>-1.45*** 3.75***</td>
</tr>
<tr>
<td>Intensity 0 vs mean</td>
<td>4.84*** -11.00***</td>
<td>-12.33*** -56.92***</td>
<td>-1.70*** -12.20***</td>
<td>2.31*** -27.73***</td>
<td>4.05*** -4.50***</td>
<td>-1.74*** -22.73***</td>
</tr>
<tr>
<td>Intensity 0-0.5 vs mean</td>
<td>0.19*** 0.65***</td>
<td>0.86*** 3.17***</td>
<td>0.05 2.20***</td>
<td>-5.73*** 4.24***</td>
<td>-0.75*** 0.89***</td>
<td>0.31*** 4.10***</td>
</tr>
<tr>
<td>Intensity&gt;=0.5 vs mean</td>
<td>-1.73*** 1.39***</td>
<td>1.24*** 7.61***</td>
<td>1.34* 0.02</td>
<td>28.09*** 4.03***</td>
<td>-0.36* 0.23</td>
<td>0.2 2.30***</td>
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<tr>
<td>Firm fixed effects</td>
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<td>no yes no yes</td>
<td>no yes no yes</td>
<td>no yes no yes</td>
<td></td>
</tr>
</tbody>
</table>

Note: * p<0.05; ** p<0.01; *** p<0.001. To identify the coefficients, we impose that their weighted sum within each group of characteristics is zero.
Appendix C: Panel of active firms

CZ, panel of active firms, firm fixed effects

Predictive Margins of sna with 95% CIs

Predictive Margins of c with 95% CIs

Predictive Margins of v_cat with 95% CIs

Predictive Margins of int4 with 95% CIs
Appendix C: Panel of active firms

CZ, panel of active firms, no firm fixed effects

Predictive Margins of sna with 95% CIs

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Predictive Margins of v_cat with 95% CIs

Predictive Margins of int4 with 95% CIs