Regional Trade Liberalisation in Developing Countries and Industrial Attractiveness: Evidence from the South-East Asia

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27 May 2010, WIOD Conference, Vienna
Issue discussed: Can RTA among developing countries promote regional industrialisation by increasing production share of manufactures inside the block?

The concept of the home-market effect (HME): tendency for large markets to attract disproportionate share of industry as a consequence of trade openness. (Krugman, 1980 AER; Helpman & Krugman, 1985 chap. 10)

How? constructing HME indicator in the multi-region setting.
The AFTA

Source: www.apecthai.org
Introduction

Multi-country HME concept

The model

Data and variables

Results

Conclusion
Why the multi-country setting?

- **Critics of the 2-country model**: no consideration of the ‘third-country effect’.

- **Multi-country HME model**: Behrens, Lamorgese, Ottaviano, Tabuchi (2005, CORE)

Appeal of a country as production site depends on:

- attractive factor (related to market size)
- accessibility factor (or accessibility to markets, related to trade openness).
Attractive factor (or HME in the 2-country model)
Accessibility factor and industry attractiveness

\[ \phi_{AC} > \phi_{AB} > \phi_{BC} \]
Accessibility factor and industry attractiveness

\[ \phi_{AC} > \phi_{AB} > \phi_{BC} \]

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Accessibility factor and industry attractiveness

\[ \phi_{AC} > \phi_{AB} > \phi_{BC} \]

\[ \phi_{BC} > \phi_{AB} > \phi_{AC} \]

B and C form RTA
Introduction Multi-country HME concept The model Data and variables Results Conclusion

- **Economy**: $M$ countries and $S + 1$ industries (indexed by $i = 1, 2, ..., M$ and $s = 1, 2, ..., S + 1$)
- **Monopolistic competition in international trade**
- **Firms are mobile internationally and choose location that maximises their profit.**
- **Consumer max. utility, provides labour (the only factor of production).**
- **Endogenous variable**: number of firms $n_i^s$
  $\rightarrow$ production share $\lambda_i^s = n_i^s / \sum_s n_i^s$
- **Exogenous variables**: trade openness $\phi_{ij}^s$ and relative market size $\theta_i^s$. 

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Spatial equilibrium is defined as a situation in which no firms have incentive to relocate. This yields:

$$\lambda^{s*} = \left[ \text{diag}((\Phi^s)^{-1}1)\Phi^s \right]^{-1} \theta, \quad (1)$$

with theoretical decomposition:

$$\lambda^{s*} = \alpha (\lambda^s)^{size} + \beta (\lambda^s)^{hub}. \quad (2)$$

Attractive factor: production share when countries are assumed to differ only in market size:

$$\left(\lambda^s\right)^{size} = [\alpha]^{-1} \left[ \lambda^{s*} \underbrace{\text{observed}}_{\text{computed}} - [\beta] \left(\lambda^s\right)^{hub} \right]. \quad (3)$$

How to evaluate the HME in a multi-country setting?
An industry displays the HME if:

- HME indicators are positive:

\[
Z_{ij}^s \equiv \left( \frac{\left( \lambda_i^s \right)_{\text{size}}}{\theta_i^s} - \frac{\left( \lambda_j^s \right)_{\text{size}}}{\theta_j^s} \right) (\theta_i^s - \theta_j^s) \geq 0;
\]

- there is no ‘industrial leap-frogging’ (ranking of industry density and market sizes match):

\[
\theta_i^s > \theta_j^s \rightarrow \frac{\lambda_i^s}{\theta_i^s} > \frac{\lambda_j^s}{\theta_j^s}.
\]  

\( \quad (4) \)
Necessary variables: production share $\lambda^s_i$; expenditure share $\theta^s_i$; trade openness matrix $\Phi^s$.

Construction of variables:
- Country-$i$ production share in good-$s$:
  \[
  \lambda^s_i = \frac{\text{PROD}^s_i}{\sum_j \text{PROD}^s_j}
  \]
  PROD: country-$i$’s output of good-$s$;

- Expenditure share of country-$i$ in good-$s$:
  \[
  \theta^s_i = \frac{Y_i + \sum_s (M^s_i - X^s_i)}{\sum_j [Y_j + \sum_s (M^s_j - X^s_j)]}
  \]

- Trade openness
  \[
  \phi^s_{ij} = \sqrt{\frac{X^s_{ij} X^s_{ji}}{X^s_{ii} X^s_{jj}}} \quad \text{and } X^s_{ii} \text{ and } X^s_{jj} \text{ are export to oneself.}
  \]
**Required data:** industry-level production and bilateral trade flows, GDP (for the year 2004)

**Sources:**

- Trade and Production database by the CEPII (the CEPII’s BACI + the OECD’s STAN to expand the World Bank’s database);
- Trade, Production and Protection database by the World Bank (COMTRADE + UNIDO);
- World Economic Outlook database by the IMF.

**Country sample:**

- AFTA: IDN, MYS, PHL, SGP, THA (merged together as the ASEAN-5);
- Selected EU countries: AUT, DEU, ESP, FIN, FRA, GBP, ITA, POR, SWE;
- Asia and the Pacific countries: AUS, CHI, IND, JPN, KOR, USA.
Table: Classification of manufacturing industries at the 3-digit ISIC Rev. 2 level

<table>
<thead>
<tr>
<th>Tech. int.</th>
<th>ISIC</th>
<th>Name</th>
<th>Tech. int.</th>
<th>ISIC</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>311</td>
<td>Food products</td>
<td>ML</td>
<td>362</td>
<td>Glass and products</td>
</tr>
<tr>
<td></td>
<td>321</td>
<td>Textiles</td>
<td>ML</td>
<td>369</td>
<td>Other non-metal min. prod.</td>
</tr>
<tr>
<td></td>
<td>322</td>
<td>Wearing apparel</td>
<td>MH</td>
<td>371</td>
<td>Iron and steel</td>
</tr>
<tr>
<td></td>
<td>323</td>
<td>Leather products</td>
<td>MH</td>
<td>372</td>
<td>Non-ferrous metals</td>
</tr>
<tr>
<td></td>
<td>324</td>
<td>Footwear</td>
<td>MH</td>
<td>381</td>
<td>Fabricated metal products</td>
</tr>
<tr>
<td></td>
<td>331</td>
<td>Wood prod. expt. furniture</td>
<td>MH</td>
<td>390</td>
<td>Other manufactured prod.</td>
</tr>
<tr>
<td></td>
<td>332</td>
<td>Furniture expt. metal</td>
<td>MHH</td>
<td>351</td>
<td>Industrial chemicals</td>
</tr>
<tr>
<td></td>
<td>341</td>
<td>Paper and products</td>
<td>MHH</td>
<td>382</td>
<td>Machinery expt. electrical</td>
</tr>
<tr>
<td></td>
<td>342</td>
<td>Printing and publishing</td>
<td>MHH</td>
<td>385</td>
<td>Prof. and sci. equipment</td>
</tr>
<tr>
<td>ML</td>
<td>355</td>
<td>Rubber products</td>
<td></td>
<td>352</td>
<td>Other chemicals</td>
</tr>
<tr>
<td></td>
<td>356</td>
<td>Plastic products</td>
<td></td>
<td>383</td>
<td>Machinery electric</td>
</tr>
<tr>
<td></td>
<td>361</td>
<td>Pottery china earthenware</td>
<td></td>
<td>384</td>
<td>Transport equipment</td>
</tr>
</tbody>
</table>
### Table: The $Z^s$ indicators at the 3-digit ISIC level in 2004

<table>
<thead>
<tr>
<th>ISIC</th>
<th>Name</th>
<th>$M$</th>
<th>Dropped countries</th>
<th>$Z^s$</th>
<th>No. of $Z^s_{ij}$ computed</th>
<th>$Z^s_{ij} &gt; 0$</th>
<th>$\phi^s$ ($\times 10^{-3}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>311</td>
<td>Food</td>
<td>16</td>
<td></td>
<td>−40.19</td>
<td>120</td>
<td>22</td>
<td>0.269</td>
</tr>
<tr>
<td>321</td>
<td>Textiles</td>
<td>16</td>
<td></td>
<td>−35.04</td>
<td>120</td>
<td>18</td>
<td>0.220</td>
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<tr>
<td>322</td>
<td>Apparel</td>
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<td></td>
<td>−21.76</td>
<td>120</td>
<td>22</td>
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<tr>
<td>323</td>
<td>Leather</td>
<td>15</td>
<td>FIN</td>
<td>−22.50</td>
<td>105</td>
<td>20</td>
<td>0.040</td>
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<tr>
<td>324</td>
<td>Footwear</td>
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<td>AUT, FIN, PRT</td>
<td>−47.96</td>
<td>78</td>
<td>18</td>
<td>0.028</td>
</tr>
<tr>
<td>331</td>
<td>Wood</td>
<td>15</td>
<td>PRT</td>
<td>−33.80</td>
<td>105</td>
<td>19</td>
<td>0.068</td>
</tr>
<tr>
<td>332</td>
<td>Furniture</td>
<td>14</td>
<td>FIN, PRT</td>
<td>−30.33</td>
<td>91</td>
<td>18</td>
<td>0.099</td>
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<td>341</td>
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<td>15</td>
<td>PRT</td>
<td>−39.49</td>
<td>105</td>
<td>17</td>
<td>0.191</td>
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<tr>
<td>342</td>
<td>Printing</td>
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<td>PRT</td>
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<td>11</td>
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<tr>
<td>351</td>
<td>Ind. Chem.</td>
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<td></td>
<td>−55.15</td>
<td>120</td>
<td>19</td>
<td>0.306</td>
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<tr>
<td>352</td>
<td>Oth chem.</td>
<td>16</td>
<td></td>
<td>−50.74</td>
<td>120</td>
<td>18</td>
<td>0.177</td>
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<tr>
<td>355</td>
<td>Rubber</td>
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<td></td>
<td>−49.89</td>
<td>120</td>
<td>13</td>
<td>0.108</td>
</tr>
<tr>
<td>356</td>
<td>Plastic</td>
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<td></td>
<td>−37.05</td>
<td>120</td>
<td>18</td>
<td>0.120</td>
</tr>
<tr>
<td>361</td>
<td>Pottery</td>
<td>13</td>
<td>FIN, PRT, SWE</td>
<td>−31.17</td>
<td>78</td>
<td>15</td>
<td>0.014</td>
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<tr>
<td>362</td>
<td>Glass</td>
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<td>−46.36</td>
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<td>11</td>
<td>0.076</td>
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<tr>
<td>369</td>
<td>Non-metal</td>
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<td></td>
<td>−39.34</td>
<td>120</td>
<td>13</td>
<td>0.068</td>
</tr>
<tr>
<td>371</td>
<td>Iron/steel</td>
<td>14</td>
<td>FIN, PRT</td>
<td>−30.84</td>
<td>91</td>
<td>18</td>
<td>0.413</td>
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<tr>
<td>372</td>
<td>Nf. metals</td>
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<td>AUT, PRT</td>
<td>−44.82</td>
<td>91</td>
<td>5</td>
<td>0.341</td>
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<tr>
<td>381</td>
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<td></td>
<td>−47.05</td>
<td>120</td>
<td>18</td>
<td>0.196</td>
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<tr>
<td>382</td>
<td>Machines</td>
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<td>−70.32</td>
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<td>0.289</td>
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<tr>
<td>383</td>
<td>Mach. elec.</td>
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<td>−56.02</td>
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<td>0.268</td>
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<tr>
<td>384</td>
<td>Transport</td>
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<td>−107.82</td>
<td>120</td>
<td>21</td>
<td>0.355</td>
</tr>
<tr>
<td>385</td>
<td>Prof./sci.</td>
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<td>−56.68</td>
<td>120</td>
<td>23</td>
<td>0.177</td>
</tr>
<tr>
<td>390</td>
<td>Misc.</td>
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<td></td>
<td>−26.84</td>
<td>120</td>
<td>23</td>
<td>0.125</td>
</tr>
</tbody>
</table>

→ On average, all industries display reverse HME.
Ranking of adjusted densities $\lambda_i^\text{size}/\theta_i$ and market sizes $\theta_i$ shows ‘industrial leap frogging’, thus no HME.

- However, the ASEAN5 is still a relative attractive production site.

(a) 383: Machinery electrics  (b) 384: Transport equipment

**Figure:** Market size ranking and industry agglomeration in 2004
Attractive factor cannot explain spatial distribution of industries in our country sample (no HME) but accessibility factor can:

Decomposition of the unadjusted HME indicators $Z(\lambda^{s*})$ into accessibility factor $Z((\lambda^{s})^{hub})$ and attractive factor $Z((\lambda^{s})^{size})$
Conclusion

- RTA can make the ASEAN-5 a fairly attractive region to manufacturing firms though industry attractiveness (or observed industrial density) is not associated with market enlargement mechanism (no HME).

- Accessibility factor can explain industrial attractiveness in the ASEAN-5.
  - Trade openness induces dispersion force of agglomeration from relatively large markets to the benefice of the smaller ones.
Instead of increasing market size, the ASEAN-5 can promote accessibility factor. How?

- Increase trade freeness by reducing intra- and inter-regional trade costs (transport and non-transport frictions)

- Behrens *et al.* (2007)
  - Transport frictions (transportation network & tech.)
    → benef. locally and globally, yields high attractive capacity;
  - Non-transport frictions (tariffs & standard regulations)
    → benef. locally, yields less attractive capacity.
Further issues:

- Including comparative advantage in the model (Behrens et al., 2009) esp. when considering trade among asymmetric economies.
  → Here, C.A. is included in the accessibility factor.

- Econometric application (gravity specification of monopolistic competition model in int’l trade).

- Consider firm heterogeneity for the HME in order to understand firm strategy on location (potential problem: firm-level data in ASEAN countries).
Thank you for your attention