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Multidimensional Analysis
of International Competitiveness,
with focus on Visegrad countries

COMPETITIVENESS SESSION
HUNGARIAN ECONOMIC ASSOCIATION (HEA) ANNUAL MEETING

September 8, 2017 Eger, Hungary
Agenda

1. The concept of international competitiveness – theoretical developments: types and dimensions of competitiveness, relations between competitive ability, competitive position, and productivity.

2. Competitive position of Visegrad countries.
   • Development gap between Visegrad and other CEE countries, and Western Europe, and convergence processes.
   • The pentagon of macroeconomic performance.
   • Investment competitiveness of Visegrad countries, and benefits from FDI for the economy, with focus on technology transfer.

3. Focus on competitive ability: innovation as driver of international competitiveness of Visegrad countries.

What is competitiveness?

• Competitiveness – ability of a country (region, location) to deliver the beyond GDP goals for its citizens” (Aiginger K., Vogel J., (2015), "Competitiveness: from a misleading concept to a strategy supporting Beyond GDP goals", Competitiveness Review, 25(5), pp. 497-523.)

• WERI approach – competitiveness defined in 3 categories:

- **Income competitiveness**
  A sustainable increase in the standard of living

- **Trade competitiveness**
  An improvement in country’s position in the global marketplace

- **Investment competitiveness**
  Enhanced economy’s attractiveness, mostly for foreign capital

Emerging dimensions of competitiveness:

- **Technological competitiveness**
- **Digital competitiveness**
- **Sustainable competitiveness**
  - **Social competitiveness**
  - **Environmental competitiveness**
Dimensions of competitiveness

I. **competitiveness at the microeconomic level** – enterprise perspective – the ability to provide products and services as well as or more effective than their main competitors (Porter, 2003)

II. **competitiveness at the mezoeconomic level** – regional (local, urban, cluster, etc.) or sectoral perspective

III. **competitiveness at the macroeconomic level** – country (in international comparative) perspective

IV. **competitiveness at the mega-economic level** – the group of countries perspective (e.g. the EU, CEE or V4)

V. **competitiveness at the meta-economic level** – competition between different models of capitalism
Different spatial perspectives on competitiveness

Competitiveness, competitive ability and competitive position

**Competitive ability**

*Inputs* (internal and external advantages) – factors determining a long-term ability to compete:

- Possessed and created *assets* – their structure and quality
- *Institutions and policies* (intangibles) and their quality

**Competitiveness** (Productivity)

Usage of tangibles and intangibles and its efficiency

**Competitive position**

Results (output)

*static approach*
Focus on competitive position:
Development gap in V4 + 4 countries and Baltic States vis-à-vis the EU15 average, 1989–2016 (GDP per capita in PPP, EU15 = 100)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Visegrad (V4) countries</td>
<td></td>
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<tr>
<td>Czech Rep.</td>
<td>75</td>
<td>69</td>
<td>76</td>
<td>80</td>
<td>83</td>
<td>8</td>
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<tr>
<td>Hungary</td>
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<td>55</td>
<td>61</td>
<td>63</td>
<td>64</td>
<td>8</td>
</tr>
<tr>
<td>Poland</td>
<td>38</td>
<td>43</td>
<td>57</td>
<td>63</td>
<td>65</td>
<td>27</td>
</tr>
<tr>
<td>Slovakia</td>
<td>59</td>
<td>50</td>
<td>69</td>
<td>72</td>
<td>74</td>
<td>15</td>
</tr>
<tr>
<td>+4 countries</td>
<td></td>
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<tr>
<td>Bulgaria</td>
<td>47</td>
<td>30</td>
<td>42</td>
<td>43</td>
<td>45</td>
<td>-2</td>
</tr>
<tr>
<td>Croatia</td>
<td>51</td>
<td>50</td>
<td>54</td>
<td>55</td>
<td>55</td>
<td>4</td>
</tr>
<tr>
<td>Romania</td>
<td>34</td>
<td>30</td>
<td>49</td>
<td>51</td>
<td>54</td>
<td>20</td>
</tr>
<tr>
<td>Slovenia</td>
<td>74</td>
<td>75</td>
<td>74</td>
<td>78</td>
<td>79</td>
<td>5</td>
</tr>
<tr>
<td>Baltic states</td>
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<tr>
<td>Estonia</td>
<td>54</td>
<td>48</td>
<td>69</td>
<td>71</td>
<td>71</td>
<td>17</td>
</tr>
<tr>
<td>Lithuania</td>
<td>55</td>
<td>44</td>
<td>67</td>
<td>70</td>
<td>71</td>
<td>16</td>
</tr>
<tr>
<td>Latvia</td>
<td>52</td>
<td>41</td>
<td>57</td>
<td>60</td>
<td>60</td>
<td>8</td>
</tr>
</tbody>
</table>

The reduction in individual EU11 countries’ income gap towards the EU15 in the three consecutive subperiods

Economic convergence

Economic convergence (general framework)

Beta (β) convergence
less developed economies (with lower GDP per capita) grow faster than more developed economies (with higher GDP per capita)

Sigma (σ) convergence
income differentiation between economies decreases over time

How to measure sigma (σ) convergence?

Dispersion statistics
➢ usually standard deviation:

\[ s = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2} \]

absolute
economies approach the same point

conditional
multiple steady-states => club-convergence
\( g_y = -0.0185y_0 + 0.2054 \)

\( R^2 = 0.5833 \)

σ-convergence in the EU: Standard deviation of GDP per capita, 1993–2016

## The pentagon of macroeconomic performance for Visegrad (V4) and selected other EU countries in 2016

<table>
<thead>
<tr>
<th>Macro-economic goal Indicator</th>
<th>Economic growth</th>
<th>Internal equilibrium (no inflation)</th>
<th>Full employment</th>
<th>Public finance equilibrium</th>
<th>External equilibrium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP growth (%)</td>
<td>Inflation (%)</td>
<td>Unemployment (%)</td>
<td>Government budget balance (% of GDP)</td>
<td>Current account balance (% of GDP)</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>2.5</td>
<td>0.6</td>
<td>4.1</td>
<td>−0.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Hungary</td>
<td>2.0</td>
<td>0.4</td>
<td>6.0</td>
<td>−2.0</td>
<td>4.9</td>
</tr>
<tr>
<td>Poland</td>
<td>3.1</td>
<td>−0.6</td>
<td>6.3</td>
<td>−2.8</td>
<td>−0.1</td>
</tr>
<tr>
<td>Slovakia</td>
<td>3.4</td>
<td>−0.2</td>
<td>9.9</td>
<td>−2.3</td>
<td>−1.0</td>
</tr>
<tr>
<td>France</td>
<td>1.3</td>
<td>0.3</td>
<td>9.8</td>
<td>−3.3</td>
<td>−0.5</td>
</tr>
<tr>
<td>Germany</td>
<td>1.7</td>
<td>0.4</td>
<td>4.3</td>
<td>0.1</td>
<td>8.6</td>
</tr>
<tr>
<td>Italy</td>
<td>0.8</td>
<td>−0.1</td>
<td>11.5</td>
<td>−2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Spain</td>
<td>3.1</td>
<td>−0.3</td>
<td>19.4</td>
<td>−4.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Sweden</td>
<td>3.6</td>
<td>1.1</td>
<td>6.9</td>
<td>−0.4</td>
<td>5.0</td>
</tr>
</tbody>
</table>

The pentagon of macroeconomic performance for Visegrad (V4) and selected other EU countries in 2016

The pentagon of macroeconomic performance for Hungary in 2016

The pentagon of macroeconomic performance for Poland in 2016

The pentagon of macroeconomic performance for Spain in 2016

Focus on Investment Competitiveness:
Foreign Direct Investment (FDI) % of GDP, Inward stock, 1995–2016

Source of data: UNCTAD statistics.
**Why are FDI important for V4 competitiveness?**

*Capital inflow, creating job places, etc. … but also:*

International technology transfer through FDI

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**Direct effect in FDI**

**IA**

Implementation of technology (transfer of capital goods, knowledge, know-how, management methods, organizational solutions, and skills (trainings))

**IB**

Absorption of new technology and its integration into existing practices

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**Spillover effects**

- **Demonstration-imitation effect**
- **Competition effect**
- **Foreign linkage effect**
- **Training effect**
- **Cooperation effect**
### R&D incentives for FDI – the case of Visegrad countries

<table>
<thead>
<tr>
<th>Types of incentives</th>
<th>Czech Republic</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovakia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax credits</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Cash grants</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Reduced tax rates/preferable tax rates</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Reduced social security contributions</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Infrastructure/land preferential price</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Tax deductions (including super deductions)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>Tax exemptions</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>Patent-related incentives</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Tax holiday</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Qualifies for Horizon 2020 funding</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Key challenges for international competitiveness of V4 countries

• Expiring factors of economic growth for Visegrad group countries:
  ✓ the relatively low costs of work
  ✓ the access to cheap materials
  ✓ a favourable geographical situation
  ✓ the accession to the European Union and related funds

• The need to search for new drivers of competitiveness

• The development trends of highly-developed countries show that building the competitive advantage based on knowledge and innovation is the only way to guarantee both short-term and long-term development =>

  innovation = one of the key drivers of competitiveness
EU Member States’ innovation performance, with focus on Visegrad countries

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Czech Republic</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovak Republic</th>
<th>EU28</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERD (R&amp;D exp.) as % of GDP</td>
<td>1.95</td>
<td>1.38</td>
<td>1.00</td>
<td>1.18</td>
<td>1.96</td>
</tr>
<tr>
<td>BERD (private R&amp;D expenditures) as % of GDP</td>
<td>1.12</td>
<td>0.98</td>
<td>0.44</td>
<td>0.33</td>
<td>1.23</td>
</tr>
<tr>
<td>HERD (higher education R&amp;D expenditures) as % of GDP</td>
<td>0.51</td>
<td>0.19</td>
<td>0.27</td>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>GOVERD (government R&amp;D expenditures) as % of GDP</td>
<td>0.36</td>
<td>0.19</td>
<td>0.23</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Industry-financed GERD as % of GDP</td>
<td>0.72</td>
<td>0.66</td>
<td>0.37</td>
<td>0.29</td>
<td>1.05</td>
</tr>
<tr>
<td>Foreign-financed GERD as % of GDP (2012)</td>
<td>0.46</td>
<td>0.20</td>
<td>0.12</td>
<td>0.15</td>
<td>n.a.</td>
</tr>
<tr>
<td>Applied research expenditures as % of all exp.</td>
<td>36</td>
<td>34</td>
<td>17</td>
<td>25</td>
<td>n.a.</td>
</tr>
<tr>
<td>Total R&amp;D personnel per thousand total employment</td>
<td>12.61</td>
<td>8.82</td>
<td>6.63</td>
<td>7.91</td>
<td>12.19</td>
</tr>
</tbody>
</table>

Based on data extracted on 23 August 2017 from OECD.Stat.
Selected indicators describing the innovative position of the V4 countries
(relative, standardised values)

Based on data from OECD.Stat.
Innovative position of the V4 countries: The share of exports of high technology products in total exports (%)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>14.1</td>
<td>14.1</td>
<td>15.2</td>
<td>16.1</td>
<td>16.4</td>
<td>16.1</td>
<td>15.1</td>
<td>15.3</td>
<td>15.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Hungary</td>
<td>21.3</td>
<td>20.2</td>
<td>22.2</td>
<td>21.8</td>
<td>20.9</td>
<td>17.3</td>
<td>16.3</td>
<td>14.5</td>
<td>15.2</td>
<td>-6.1</td>
</tr>
<tr>
<td>Poland</td>
<td>3.0</td>
<td>4.3</td>
<td>5.7</td>
<td>6.0</td>
<td>5.1</td>
<td>6.0</td>
<td>6.7</td>
<td>7.9</td>
<td>8.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Slovakia</td>
<td>5.0</td>
<td>5.2</td>
<td>5.9</td>
<td>6.6</td>
<td>6.6</td>
<td>8.2</td>
<td>9.6</td>
<td>9.9</td>
<td>9.8</td>
<td>4.8</td>
</tr>
<tr>
<td>EU 28</td>
<td>16.1</td>
<td>15.4</td>
<td>17.1</td>
<td>16.1</td>
<td>15.4</td>
<td>15.7</td>
<td>15.3</td>
<td>15.7</td>
<td>17.0</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Source of data: Polish Business and Innovation Centers Association Report.
Development of high technology sectors in Visegrad countries

## Innovation capacity in high-technology sectors

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Czech Republic</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovak Republic</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of BERD performed in the <strong>pharmaceutical</strong> industry</td>
<td>2.29</td>
<td><strong>20.65</strong></td>
<td>3.54</td>
<td>1.71</td>
</tr>
<tr>
<td>% of BERD performed in the computer, electronic and optical industry</td>
<td>3.99</td>
<td>2.09</td>
<td>2.22</td>
<td>1.42</td>
</tr>
<tr>
<td>% of BERD performed in the <strong>aerospace</strong> industry</td>
<td>1.88</td>
<td>no data</td>
<td><strong>2.17</strong></td>
<td>no data</td>
</tr>
</tbody>
</table>

## Innovation position in high-technology sectors

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Czech Republic</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovak Republic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export market share: <strong>Pharmaceuticals</strong></td>
<td>0.50</td>
<td><strong>0.89</strong></td>
<td>0.66</td>
<td>0.11</td>
</tr>
<tr>
<td>Export market share: Computer, electronic and optical industry</td>
<td>1.06</td>
<td>0.67</td>
<td>0.73</td>
<td>0.63</td>
</tr>
<tr>
<td>Export market share: <strong>Aerospace</strong></td>
<td>0.22</td>
<td>0.03</td>
<td><strong>0.61</strong></td>
<td>0.01</td>
</tr>
</tbody>
</table>

Based on data extracted from OECD.Stat.
What Determines Competitiveness?

• Endowments create a *foundation* for prosperity, but true prosperity is created by *productivity in the use of endowments*.

Source: Professor M.E. Porter lecture on Microeconomics of Competitiveness, MOC website.
What Determines Competitiveness?

- Macroeconomic competitiveness sets the potential for high productivity, but is not sufficient.
- Endowments create a foundation for prosperity, but true prosperity is created by productivity in the use of endowments.

Source: Professor M.E. Porter lecture on Microeconomics of Competitiveness, MOC website.
What Determines Competitiveness?

Microeconomic Competitiveness

- Quality of the National Business Environment
- State of Cluster Development
- Sophistication of Company Operations and Strategy

Macroeconomic Competitiveness

- Macroeconomic Policies
- Social Development and Political Institutions

Endowments

- Productivity ultimately depends on improving the microeconomic capability of the economy and the sophistication of local competition

Clusters – geographic concentrations of interconnected companies and associated institutions in particular fields that compete but also cooperate (def. M.E. Porter).

Source: Professor M.E. Porter lecture on Microeconomics of Competitiveness, MOC website.
Different aspects of clusters, competitiveness, and innovations

Geographic concentration

- Proximity
- Linkages
- Interactions

- Innovative push and pull
- From linear to interactive model of innovation process

- Synergy and spillovers
- Polarisation

- Sectoral concentration
  (horizontal dimension)

- Innovation system
  (vertical dimension)
Accredited clusters in Hungary

Clustering in Poland

Conclusions

• There is persistent development gap between Visegrad group economies and Western European countries, but it has been diminishing since 1989, proving the convergence process.

• In the long run, Visegrad group economies are improving their investment attractiveness, which is reflected in growing inward FDI stock in relation to their GDP.

• Visegrad group countries are below the EU average in terms of innovation performance, taking the position of moderate innovators. Within the group, Czech Republic and Hungary exhibit higher innovative position.

• Specialization patterns of different CEE economies are corresponding with high export market shares in specific industries, and are connected with strong regional clusters.
Thank you

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