



# Managing Global Changes

Proceedings of the Joint International Conference Organised by

- University of Primorska, Faculty of Management, Slovenia
- Juraj Dobrila University of Pula, Faculty of Economics and Tourism 'Dr. Mijo Mirković,' Croatia
- Moscow School of Economics, Moscow State University, Russian Federation
- Association for the Study of East European Economies and Cultures, USA
- Society for the Study of Emerging Markets, USA

Pula, Croatia • 1–4 June 2016

## **MIC 2016: Managing Global Changes**

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University of Primorska, Faculty of Management, Slovenia,  
Juraj Dobrila University of Pula, Faculty of Economics and Tourism, Croatia,  
Moscow State University, Moscow School of Economics, Russian Federation,  
Association for the Study of East European Economies and Cultures, USA, and  
Society for the Study of Emerging Markets, USA

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## Foreword

The traditional Management International Conference (MIC) was organized in Pula, Croatia, in co-operation of University of Primorska, Faculty of Management, (Slovenia), Juraj Dobrila University of Pula, Faculty of Economics and Tourism 'Dr. Mijo Mirković' (Croatia), Moscow School of Economics, Moscow State University (Russian Federation), Association for the Study of East European Economies and Cultures (USA) and Society for the Study of Emerging Markets (USA).

The focus of the conference was Managing Global Changes. In this view the conference aimed to address various aspects of managing global changes, with special focus on economic, financial, tourism and energy issues, and to offer researchers and professionals the opportunity to discuss other issues of global developments. The conference was carried out in five tracks:

- MIC Track (traditional Management International Conference, organized by University of Primorska, Faculty of Management),
- Economics Track (organized by Association for the Study of East European Economies and Cultures),
- Finance Track (organized by Society for the Study of Emerging Markets),
- Tourism Track (organized by Juraj Dobrila University of Pula, Faculty of Economics and Tourism 'Dr. Mijo Mirković'),
- Energy Track (organized by Moscow School of Economics, Moscow State University).

We would like to extend a sincere appreciation to all the participants and presenters for their contributions and participation. This year we received 232 submissions and selected the best 158 papers from authors from 32 countries, and the total number of participants has reached 200 (together with panel discussions and workshops). All abstracts of papers were included in the Book of Abstracts, ready for the conference.

After the conference authors were invited to submit their full papers to the MIC 2016 Conference Proceedings. In the Conference Proceedings authors submitted 35 papers. We use this opportunity to thank all the reviewers for doing a great job in reviewing all full papers and for their precious time

Authors had also the opportunity to submit papers to the MIC Special Issues, organized by the MIC supporting journals:

- *Economic Research/Ekonomska Istraživanja* (Editor in Chief Dr. Marinko Škare, Juraj Dobrila University of Pula, Faculty of Economics and Tourism 'Dr. Mijo Mirković,' Croatia),
- *Management and Production Review*, special issue on Sustainable Strategies in Global Business Turbulence (Guest Editor Dr. Josu Takala, University of Vaasa, Finland),
- *Managing Global Transitions*, special issue on Institutional Environment and Development of Business Networks in South East Europe (Guest Editor Dr. Darko Tipurić, Faculty of Economics and Business, University of Zagreb, Croatia),
- *Management*, special issue on (Re)inventing Business Networks and Organisations in SEE (Guest Editor Dr. Miroslav Ante Omazić, Faculty of Economics and Business, University of Zagreb, Croatia),

- *Review of Innovation and Competitiveness* (Editors Dr. Marinko Škare and Dr. Danijela Križman Pavlović, University of Pula, Faculty of Economics and Tourism 'Dr. Mijo Mirković,' Croatia).

Authors also had the opportunity to submit their full papers to other supporting journals of the MIC Conference: *Borsa Istanbul Review*, *Comparative Economic Studies*, *Eastern European Economics*, *Economic Systems*, *Emerging Markets Finance and Trade*, *International Journal of Computational Economics and Econometrics*

Special thanks go to keynote speakers:

- Dr. Milford Bateman, Freelance Consultant on Local Economic Development, Visiting Professor of Economics at Juraj Dobrila University of Pula (Croatia) and Adjunct Professor of Development Studies, St Marys University (Canada) and
- Dr. Zdeněk Drábek, Professor at the Faculty of Social Sciences at Charles University in Prague (Czech Republic).

We would also like to thank to the editors of the supporting journals, participating at the Editors Panel, and to students who participated at the Doctoral Students' Workshop.

Last but not least, we extend our sincere thanks to everybody who participated in the programme boards and organization of the MIC 2016.

Dr. Suzana Laporšek  
Conference Chair

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## Comparative Advantages in CEEC-5

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*Abstract.* The structure, geography, and organization of world trade have dramatically changed in the last decades with the emergence of new global competitors and the decline of old ones. Global Value Chains are probably the most prominent feature of this new landscape and the growth of these chains is posing new challenges to studies of international trade and countries' competitiveness. Some traditional measures may be of little use since they hinge on the assumption that all activities in the production of a good take place in the local economy, using domestic inputs only. Furthermore, export indexes based on gross flows become less meaningful as part of its value is made of imported inputs. Previous applied research uses a wide array of statistical tools to assess international specialization and trade performance but focuses is on Gross Exports. These analyses can be very misleading due to double counting of trade in intermediate inputs. This paper would like to shed light on the export structure and competitiveness in five Central and Eastern European Countries during 1995-2011. I assess which sectors enjoy a comparative advantage in 1995-2011 using Gross Exports and Value Added in Trade data. The sets of competitive industries are compared and discussed. There are some noticeable differences in these indicators in Hungary and Slovakia, while just a few in Romania and Bulgaria.

*Keywords:* international trade, comparative advantages, CEEC-5.

### 1 Introduction

This paper examines the export performance of some Central and Eastern European countries. It tries to shed light on their export competitiveness during the period 1995-2011 using the data provided by WIOD. Under free trade these countries should specialize in those goods and services they have a comparative advantage. From a theoretical point of view, this issue can be easily solved if we can observe the difference between autarkic and free trade relative prices (Deardorff 1980). Unfortunately, the former are usually unobservable and we must resort to ex post information. Indicators of competitiveness should respect several criteria. First, they should address all the sectors exposed to international competition, i.e. the ones that produce the so-called "tradeables". Then, they should be based on data that are fully comparable at the international level. Due to lack of homogeneity, studies based on export prices are often confined to aggregate measures of manufacturing (Durand and Giorno 1987). Furthermore, for a quite large number of goods, such as commodities, prices tend to be determined at the world level rather than by local producers. To overcome these problems we adopt the customary Revealed Comparative Advantage approach initiated by Liesner (1958) and Balassa (1965), who adapted the location coefficient introduced by Hoover (1936) to international trade. We embrace several indicators for 35 sectors and deviate from standard analyses in two respects. First, we focus on sectors rather than goods reducing the dimensionality of the product space by far. Second, we take into account the profound changes in the geography of world trade with the emergence of the Global Value Chains. Hence, we move beyond standard measures based on Gross Exports to address indicators based on domestic value added generated by foreign final demand. This distinction is crucial, as within GVCs it is customary to offshore parts of production. Final goods may contain a large share of imported intermediate and competitiveness indicators based on Gross Exports may be completely misleading as they include output due to other producers. To bring these issues to the fore we embrace the Value Added in Trade approach. Only net flows can reveal actual international trade

as value added, not gross output, discloses domestic production. Another advantage of this approach is the straightforward extension to services. The latter are usually neglected, as these international flows are often unrecorded, even if it has been widely recognized the increasing importance of tertiary that has the largest share in GDP of all the most advanced countries. Excluding services from the analysis would fail to capture a fundamental contribution to export performance in these nations as domestically produced services are embodied even in foreign goods. Hence, it is interesting to check export competitiveness through the lens of domestic value added (Ceglowski 2015). The paper is organized as follows. Next section presents the dataset and the methodology. Then Section 3 shows which sectors are competitive in five Central and Eastern European countries: Bulgaria, the Czech Republic, Hungary, Romania, and Slovakia. Section 4 concludes.

## 2 Methodology and database

We adopt the world input–output model with  $N$  sectors and  $R$  countries. International IO tables follow the standard approach in multiregional analysis and can be represented by partitioned matrices and vectors (Miller and Blair 2006):

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{y} = \mathbf{B} \sum_{i=1}^R \mathbf{f}^i \quad (1)$$

with:

$$\mathbf{c} \mathbf{x} = \begin{bmatrix} \mathbf{x}^1 \\ \vdots \\ \mathbf{x}^c \\ \vdots \\ \mathbf{x}^R \end{bmatrix}, \quad \mathbf{A} = \begin{bmatrix} \mathbf{A}^{11} & \dots & \mathbf{A}^{1c} & \dots & \mathbf{A}^{1R} \\ \vdots & & \vdots & & \vdots \\ \mathbf{A}^{c1} & \dots & \mathbf{A}^{cc} & \dots & \mathbf{A}^{cR} \\ \vdots & & \vdots & & \vdots \\ \mathbf{A}^{R1} & \dots & \mathbf{A}^{Rc} & \dots & \mathbf{A}^{RR} \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} \mathbf{B}^{11} & \dots & \mathbf{B}^{1c} & \dots & \mathbf{B}^{1R} \\ \vdots & & \vdots & & \vdots \\ \mathbf{B}^{c1} & \dots & \mathbf{B}^{cc} & \dots & \mathbf{B}^{cR} \\ \vdots & & \vdots & & \vdots \\ \mathbf{B}^{R1} & \dots & \mathbf{B}^{Rc} & \dots & \mathbf{B}^{RR} \end{bmatrix},$$

$$\mathbf{y} = \begin{bmatrix} \mathbf{y}^{11} \\ \vdots \\ \mathbf{y}^{c1} \\ \vdots \\ \mathbf{y}^{R1} \end{bmatrix} + \dots + \begin{bmatrix} \mathbf{y}^{1c} \\ \vdots \\ \mathbf{y}^{cc} \\ \vdots \\ \mathbf{y}^{Rc} \end{bmatrix} + \dots + \begin{bmatrix} \mathbf{y}^{1R} \\ \vdots \\ \mathbf{y}^{cR} \\ \vdots \\ \mathbf{y}^{RR} \end{bmatrix} = \mathbf{f}^1 + \dots + \mathbf{f}^c + \dots + \mathbf{f}^R$$

where  $\mathbf{f}^c$  is final demand in country  $c$ . Country  $c$  Gross Exports to country  $s$  are:

$$\mathbf{e}_G^{cs} = \mathbf{A}^{cs} \mathbf{x}^{cs} + \mathbf{y}^{cs} \quad (2)$$

and bilateral gross trade balance is:

$$\mathbf{t}_G^{cs} = \mathbf{u}(\mathbf{A}^{cs} \mathbf{x}^s + \mathbf{y}^{cs}) - \mathbf{u}(\mathbf{A}^{sc} \mathbf{x}^c + \mathbf{y}^{sc}) \quad (3)$$

where  $\mathbf{u}$  is a unit vector. Worldwide exports and imports are easily derived by aggregation. Following Koopman *et al.* (2014), we can arrange the Leontief model in a different way:

$$\begin{bmatrix} q^{11} & q^{12} & \dots & q^{1R} \\ q^{21} & q^{22} & \dots & q^{2R} \\ \vdots & \vdots & \dots & \vdots \\ q^{R1} & q^{R2} & \dots & q^{RR} \end{bmatrix} = \begin{bmatrix} \mathbf{B}^{11} & \mathbf{B}^{12} & \dots & \mathbf{B}^{1R} \\ \mathbf{B}^{21} & \mathbf{B}^{22} & \dots & \mathbf{B}^{2R} \\ \vdots & \vdots & \dots & \vdots \\ \mathbf{B}^{R1} & \mathbf{B}^{R2} & \dots & \mathbf{B}^{RR} \end{bmatrix} \begin{bmatrix} \mathbf{y}^{11} & \mathbf{y}^{12} & \dots & \mathbf{y}^{1R} \\ \mathbf{y}^{21} & \mathbf{y}^{22} & \dots & \mathbf{y}^{2R} \\ \vdots & \vdots & \dots & \vdots \\ \mathbf{y}^{R1} & \mathbf{y}^{R2} & \dots & \mathbf{y}^{RR} \end{bmatrix} \quad (4)$$

or

$$\left[ q^1 \dots q^c \dots q^R \right] = (\mathbf{I} - \mathbf{A})^{-1} \left[ f^1 \dots f^c \dots f^R \right] \quad (5)$$

$$\mathbf{Q} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{F} \quad (5bis)$$

where both the gross output and final demand matrices are  $(NR \times R)$ . If we premultiply (5) with a diagonal matrix of direct value-added coefficients along the main diagonal we obtain the value-added production matrix:

$$\hat{\mathbf{v}}\mathbf{B}\mathbf{F} = \begin{bmatrix} \hat{v}^1 & 0 & \dots & 0 \\ 0 & \hat{v}^2 & \dots & 0 \\ \vdots & \vdots & \dots & \vdots \\ 0 & 0 & \dots & \hat{v}^R \end{bmatrix} \begin{bmatrix} q^{11} & q^{12} & \dots & q^{1R} \\ q^{21} & q^{22} & \dots & q^{2R} \\ \vdots & \vdots & \dots & \vdots \\ q^{R1} & q^{R2} & \dots & q^{RR} \end{bmatrix} = \begin{bmatrix} \hat{v}^1 \sum_{g=1}^R \mathbf{B}^{1g} \mathbf{y}^{g1} & \dots & \hat{v}^1 \sum_{g=1}^R \mathbf{B}^{1g} \mathbf{y}^{gR} \\ \hat{v}^2 \sum_{g=1}^R \mathbf{B}^{2g} \mathbf{y}^{g1} & \dots & \hat{v}^2 \sum_{g=1}^R \mathbf{B}^{2g} \mathbf{y}^{gR} \\ \vdots & & \vdots \\ \hat{v}^R \sum_{g=1}^R \mathbf{B}^{Rg} \mathbf{y}^{g1} & \dots & \hat{v}^R \sum_{g=1}^R \mathbf{B}^{Rg} \mathbf{y}^{gR} \end{bmatrix} \quad (6)$$

whose block elements in the diagonal give each country's production of value added absorbed at home, while off diagonal block elements show value added produced in country and absorbed abroad. Value added exports from country  $c$  to  $s$  and worldwide are:

$$e_{VA}^{cs} = \hat{v}^c \sum_{g=1}^R \mathbf{B}^{cg} \mathbf{y}^{gs} \quad (7)$$

$$e_{VA}^c = \hat{v}^c \sum_{s \neq c} \sum_{g=1}^R \mathbf{B}^{cg} \mathbf{y}^{gs} . \quad (8)$$

Similarly, country  $c$  imports value added produced in country  $s$  and worldwide:

$$e_{VA}^{sc} = \hat{v}^s \sum_{g=1}^R \mathbf{B}^{sg} \mathbf{y}^{gc} \quad (9)$$

$$m_{VA}^c = \hat{v}^s \sum_{s \neq c} \sum_{g=1}^R \mathbf{B}^{sg} \mathbf{y}^{gs} . \quad (10)$$

This approach is applied to the well-known WIOD dataset that contains annual time-series of world input-output tables covering the period from 1995 to 2011 for 40 nations (Timmer *et al.* 2015). All together they cover about 85% of world GDP in 2008. In addition, the remaining non-covered part is estimated too, so that these 40 countries and the "Rest of the World" region form a complete world IO model. They have an industry-by-industry format and provide details for 35 industries mostly at the two-digit level. Data are based on officially published supply and make matrices merged with national accounts and international trade statistics, even if it is claimed it relies more on IO tables than international trade (Weidman *et al.* 2011, Rojas-Romagosa 2015). Moreover, the calibration procedure

employed in WIOD implies the usual data discrepancies cannot be fully calibrated, and the Rest of the World is implicitly absorbing these differences.

The literature aimed at investigating international competitiveness and trade performance is huge. We follow the standard Revealed Comparative Advantage approach and address ex post trade data. Balassa (1965) introduced the first and the most popular measure of comparative advantage. It may track either exports or imports, even if only the former is usually figured out. Balassa defines comparative advantage in terms of markets shares:

$$BRCA_i^c = \frac{e_i^c / e^c}{e_i^w / e^w} \quad (11)$$

Where  $e_i^c$  and  $e_i^w$  are exports of the  $i$ -th product in country  $c$  and the reference area, say the world.  $e^c = \sum_i e_i^c$  is total exports in country  $c$  and, similarly,  $e^w$  is the grand total. The critical value is one. A country  $c$  has a comparative advantage in the production of the  $i$ -th good if its export share is larger than the reference area and  $BRCA > 1$ . This index suffers several shortcomings. First, it is a single flow index and results about exports and imports may differ. Then, the BRCA index has neither an ordinal nor a cardinal property that facilitate comparisons between countries and sectors: *“the traditional RCA approach does not produce a strict ordinal index and, in cases, may not even provide a statistically significant ranking of industries according to revealed comparative advantage. Concerning this problem, it is evident that the potential for bias is greatest when comparisons are made between industries which have the widest differences in their underlying (country) RCA distributions”* (Yeats 1985, 67). Moreover, it is not additive and it tends to give a stronger advantage to small countries with high specialization (Hoen and Oosterhaven 2006). Finally, it is asymmetric in that is bounded by zero on one end and does not have an upper bound on the other end (De Benedictis and Tambari, 2004). The asymmetry causes problems when the Balassa index is included in standard econometric models. In order to fix this issue an easy alternative has been suggested by Laursen (1998) and Dalum *et al.* (1998):

$$SRCA_i^c = \frac{BRCA_i^c - 1}{BRCA_i^c + 1} \quad (12)$$

This index is symmetric and ranges from -1 to +1 with a critical value equal to zero. Moreover, it is an approximation of the log transformation of BRCA suggested by Vollrath (1991) and should provide the same rankings, since it is an almost positive monotonic transformation. It shares other shortcomings yet. It does not have a stable mean over space and time, which gives suspicious on its comparability between and within countries.

Some researchers argue the multiplicative form of BRCA and SRCA causes their problematic features. Hoen and Oosterhaven (2006) suggest to adopt an additive form:

$$ARCA_i^c = \frac{e_i^c}{e^c} - \frac{e_i^w}{e^w} \quad (13)$$

where all the variables have been defined previously. The cut-off is zero again. Positive values indicate a comparative advantage and negative ones the opposite. The index is symmetric and it is not affected by the level of sectoral aggregation, but comparability in cross country analysis is questionable, as the sum of the ARCA with respect to a given sector is not stable (Sanidas and Shin

2010). A final recent alternative is mixing both additive and multiplicative features with the Normalized Revealed Comparative Advantage index introduced by Yu *et al.* (2009):

$$NRCA_i^c = \frac{e_i^c}{e^w} - \frac{e_i^w e^c}{e^w e^w} \quad (14)$$

The reference value is still zero, while values ranges from -0.25 to 0.25. Since world trade is used to normalize, figures tend to be very small. One unquestionable advantage is comparability over time and across space, since the sum of NRCAs is equal to zero across both dimensions. *“This explains well the notion of zero sum imbedded in comparative advantage: if a country gains comparative advantage in one sector, then the country loses comparative advantage in other sectors; and if one country gains comparative advantage in a sector, then other countries lose comparative advantage in the sector”* (Sanidas and Shin 2010, 18).

### 3 Competitiveness in CEECS

In this section I present results for the five CEEC countries under investigation, i.e. Bulgaria, the Czech Republic, Hungary, Romania, and Slovakia. This preliminary study addresses the dichotomous choice about competitiveness without matching values between and within countries, as comparability over time and sectors is questionable but NRCA. Is not difficult to prove that if an industry has a competitive advantage according to the Balassa index then the other indicators confirm it. Hence, we can restrict the analysis to the differences between Gross Export and Value Added in Trade. For reason of clarity, results are not given for each year, but for selected ones. We divided the sample into three periods and pick: 1995 and 2001 as the initial observation and the year before the creation of the Monetary Union, 2006 as the last year of tranquility before the subprime crisis and the Lehman bankruptcy, and 2011, i.e. the last year available before the complete eruption of the Euro-crisis. Sector classification is provided in the Appendix.

In table 1-5 I provide the lists of the industries with comparative advantages in each country. I do not assess changes over time and diversities between nations, but focus on differences in the dichotomous classification using gross and net data. These dissimilarities are highlighted in bold. For instance, in Bulgaria (table 1) according to Value Added in Trade the 4-th sector (Textile) has a competitive advantage in 1995 that is not signaled by the Gross Export index. However, the former is rather questionable as BRCA is 1.03 only and NRCA is slightly positive ( $6.8 \times 10^{-7}$ ). Anyway, figures are much larger in the following years suggesting an increasing competitiveness. The picture is somehow different if we deem VAI<sub>T</sub> in financial intermediation (sector 28). This industry is in the second position in the ARCA/NRCA ranking, while it holds a lower place in the BRCA/SRCA list (only 15<sup>th</sup>), but still on the competitive side of the economy. In contrast, its performance is rather modest according to Gross Export. This is reasonable as financial services may be embodied in other goods and direct sales abroad are often small. Quite interestingly, it is no longer competitive between 1997 and 2003, when all the indicators shift below the critical cutoff. On the opposite side, sectors 9 (Chemical Products), 11 (Other Non-Metallic Mineral), and 12 (Basic Metals and Fabricated Metal) are competitive in gross terms only. The very same situation refers to 21 (Retail Trade) and 27 (Post and telecommunication).

The picture is slightly different in 2001 with 5 (Leather) that is competitive according to VAI<sub>T</sub> only and vice versa 6 (Wood) for Gross Exports. The identical situation applies to 13 (Machinery, nec) and 12 (Basic Metals and Fabricated Metal). The retail sector (21) is interesting too. Its performance is concordant in the first years only. Thereafter, there is a decline in value added figures. For instance, BRCA is about 1.28 in 1996 and merely 0.52 two years later. In the following period, it is close to

unity (0.98) in 2006 alone. In the last part of the sample there are just a few differences between VAI<sub>T</sub> and Gross Exports, as the right hand columns show.

Table 1: Competitive sectors in Bulgaria

| 1995      |           | 2001      |           | 2006      |           | 2011      |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| VA        | GE        | VA        | GE        | VA        | GE        | VA        | GE        |
| 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| 3         | 3         | 4         | 4         | 4         | 4         | 3         | 3         |
| <b>4</b>  | 5         | <b>5</b>  | <b>6</b>  | 6         | 6         | 4         | 4         |
| 5         | 6         | 8         | 8         | 8         | 8         | 6         | 6         |
| 6         | 8         | 11        | 11        | 11        | 11        | 8         | 8         |
| 8         | <b>9</b>  | <b>13</b> | <b>12</b> | 12        | 12        | 11        | 11        |
| 17        | <b>11</b> | 17        | 17        | 16        | 16        | 12        | 12        |
| 18        | <b>12</b> | 18        | 18        | 17        | 17        | 17        | 17        |
| 19        | 17        | 19        | 19        | 18        | 18        | 18        | 18        |
| 20        | 18        | 23        | <b>20</b> | 19        | 19        | 19        | 19        |
| 23        | 19        | 24        | <b>21</b> | 21        | <b>20</b> | 21        | <b>20</b> |
| 24        | 20        | 25        | 23        | 23        | 21        | 23        | 21        |
| 25        | <b>21</b> | 26        | 24        | 24        | 23        | 24        | 23        |
| 26        | 23        | 27        | 25        | 25        | 24        | 25        | 24        |
| <b>28</b> | 24        | 29        | 26        | 26        | 25        | 26        | 25        |
| 29        | 25        | 31        | 27        | 27        | 26        | 27        | 26        |
|           | 26        |           | 29        | <b>28</b> | 27        | <b>28</b> | 27        |
|           | <b>27</b> |           | 31        | 29        | 29        | 29        | 29        |
|           | 29        |           |           | 31        | 31        | 31        | 31        |

Table 2: Competitive sectors in the Czech Republic

| 1995     |           | 2001      |           | 2006      |           | 2011      |           |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| VA       | GE        | VA        | GE        | VA        | GE        | VA        | GE        |
| <b>1</b> | 4         | <b>3</b>  | 6         | 6         | 6         | 6         | 6         |
| <b>3</b> | 5         | <b>4</b>  | 7         | 7         | 7         | 7         | 7         |
| 4        | 6         | 6         | 10        | 10        | 10        | 10        | 10        |
| 5        | 8         | 10        | 11        | 11        | 11        | 11        | 11        |
| 6        | <b>10</b> | 11        | 12        | 12        | 12        | 12        | 12        |
| 8        | 11        | 12        | 13        | 13        | 13        | 13        | 13        |
| 11       | 12        | 13        | 15        | 14        | 14        | 14        | 14        |
| 12       | 16        | 15        | 16        | 15        | 15        | 15        | 15        |
| 16       | 17        | 16        | 17        | 16        | 16        | 16        | 16        |
| 17       | 18        | 17        | 18        | 17        | 17        | 17        | 17        |
| 18       | 19        | 18        | 19        | 18        | 18        | 18        | 18        |
| 19       | 21        | 19        | 22        | 19        | 19        | 19        | 19        |
| 22       | 22        | <b>21</b> | 23        | <b>20</b> | 22        | <b>21</b> | 22        |
| 23       | 23        | 22        | 26        | <b>21</b> | 23        | 22        | 23        |
| 26       | 26        | 23        | 32        | 22        | 33        | 23        | 33        |
| 27       | 27        | 26        | 33        | <b>23</b> | <b>34</b> | <b>26</b> | <b>34</b> |
| 29       | 29        | <b>27</b> | <b>34</b> | <b>27</b> |           | <b>32</b> |           |
| 31       | <b>30</b> | 32        |           | 33        |           | 33        |           |
| 32       | 31        | 33        |           |           |           |           |           |
| 33       | 32        |           |           |           |           |           |           |
|          | <b>33</b> |           |           |           |           |           |           |
|          | <b>34</b> |           |           |           |           |           |           |

Let's now turn to the Czech Republic. We can notice the number of competitive sectors is more or less the same as in Bulgaria. At the beginning, there are some diversities between Gross Exports and VAI<sub>T</sub> indexes in primary and secondary such as 1 (Agriculture), 3 (Food), 4 (Textile), and 10 (Rubber and plastic). On the opposite, differences mostly pertain to the tertiary in the last decade. Service sectors that deliver exports mainly via other products are 20 (Wholesale trade), 21(Retail trade), 23 (Inland transport), 26 (Other Supporting and Auxiliary Transport Activities), 27 (Post and



telecommunication), and 32 (Education). However, their occurrence is scattered through time, but the 27-th sector, that has always a competitive advantage as stated by the VAiT indicators and only in 1995 for Gross Exports.

Table 3: Competitive sectors in Hungary

| 1995      |           | 2001      |           | 2006      |           | 2011      |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| VA        | GE        | VA        | GE        | VA        | GE        | VA        | GE        |
| 1         | 1         | 1         | 1         | <b>8</b>  | <b>1</b>  | 1         | 1         |
| 3         | 3         | <b>4</b>  | 10        | <b>9</b>  | 10        | <b>8</b>  | 10        |
| <b>5</b>  | 8         | <b>5</b>  | 14        | 10        | 14        | 10        | 11        |
| <b>6</b>  | 11        | <b>8</b>  | 15        | <b>11</b> | 15        | 11        | 13        |
| 8         | <b>12</b> | 10        | 17        | 14        | <b>17</b> | 13        | 14        |
| 11        | 17        | <b>11</b> | 18        | 15        | 18        | 14        | 15        |
| 17        | 18        | 14        | 19        | 18        | <b>19</b> | 15        | 17        |
| 18        | 19        | 15        | <b>20</b> | 19        | 20        | 17        | 18        |
| 19        | <b>20</b> | 17        | 21        | 21        | 21        | 18        | 19        |
| 21        | 21        | 18        | 23        | 23        | 23        | 19        | <b>20</b> |
| 23        | 23        | 19        | 26        | 26        | 26        | 21        | 21        |
| 27        | <b>25</b> | 21        | 30        | <b>27</b> | 34        | 23        | 23        |
| 30        | <b>26</b> | 23        | 31        | <b>29</b> |           | 26        | 26        |
| 31        | 27        | 26        | 34        | <b>30</b> |           | <b>27</b> | 34        |
| <b>32</b> | <b>28</b> | <b>27</b> |           | <b>31</b> |           | <b>29</b> |           |
| <b>33</b> | <b>29</b> | <b>29</b> |           | <b>32</b> |           | <b>30</b> |           |
| <b>34</b> | 30        | 30        |           | 34        |           | <b>31</b> |           |
|           | 31        | 31        |           |           |           | <b>32</b> |           |
|           |           | <b>32</b> |           |           |           | 34        |           |
|           |           | <b>33</b> |           |           |           |           |           |
|           |           | 34        |           |           |           |           |           |

Table 4: Competitive sectors in Romania

| 1995      |           | 2001     |    | 2006      |           | 2011      |           |
|-----------|-----------|----------|----|-----------|-----------|-----------|-----------|
| VA        | GE        | VA       | GE | VA        | GE        | VA        | GE        |
| 1         | 1         | <b>1</b> | 4  | <b>1</b>  | 4         | 1         | 1         |
| 4         | 4         | <b>3</b> | 5  | 4         | 5         | <b>3</b>  | 4         |
| 5         | 5         | 4        | 6  | 5         | 6         | 4         | 5         |
| 6         | 6         | 5        | 8  | 6         | 8         | 5         | 6         |
| 8         | 8         | 6        | 11 | 8         | 12        | 6         | 10        |
| 9         | 9         | 8        | 12 | <b>10</b> | 16        | 10        | <b>12</b> |
| 11        | 11        | 11       | 16 | 12        | 18        | <b>11</b> | 16        |
| 12        | 12        | 12       | 17 | 16        | <b>19</b> | <b>15</b> | 17        |
| 16        | 16        | 16       | 18 | <b>17</b> | 20        | 16        | 18        |
| 17        | 17        | 17       | 20 | 18        | 21        | 17        | <b>19</b> |
| 18        | 18        | 18       | 21 | 20        | 22        | 18        | 20        |
| 21        | 20        | 20       | 23 | 21        | 23        | 20        | 21        |
| 22        | 21        | 21       | 27 | 22        | 26        | 21        | 22        |
| 23        | 22        | 23       |    | 23        | 27        | 22        | 23        |
| 27        | 23        | 27       |    | 26        | <b>30</b> | 23        | 26        |
| <b>28</b> | <b>24</b> |          |    | 27        |           | 26        | 27        |
|           | 27        |          |    |           |           | 27        | <b>30</b> |

Hungary and Romania look very different. Sometimes they do not seem very competitive in international markets, at least when we use Gross Export. The former country exhibits only 12 figures larger than critical cut offs in 2006, while the latter just 13 in 2001. There are a few more before and thereafter, but cardinality of the sets is often smaller than in the previous economies. Concordance between the VAiT and Gross Exports is almost perfect in the first part of the sample in Romania, because only a couple of values diverge. In the last years, there are several differences mostly in

manufacturing. On the contrary, several service sectors in Hungary enjoy a competitive advantage that is revealed only when we adopt the value added content. These range from 26 (Other Supporting and Auxiliary Transport Activities) to 32 (Education), while 33 (Health and Social Work) drops out after 2001. Finally, let's deem Slovakia in table 5. This country summarizes several features discussed above. There are a few differences concerning mainly 16 (Manufacturing, nec), 17 (Electricity, Gas and Water Supply), 19 (Sale), 20 (Wholesale Trade), and 29 (Real Estate Activities). Nevertheless, we must acknowledge there is an overall concordance between gross and net measures.

Table 5: Competitive sectors in Slovakia

| 1995      |           | 2001      |           | 2006      |    | 2011      |    |
|-----------|-----------|-----------|-----------|-----------|----|-----------|----|
| VA        | GE        | VA        | GE        | VA        | GE | VA        | GE |
| 5         | 5         | <b>3</b>  | 5         | 5         | 5  | 5         | 5  |
| 6         | 6         | <b>4</b>  | 6         | 6         | 6  | 6         | 6  |
| 7         | 7         | 5         | 7         | 7         | 7  | 7         | 7  |
| 8         | 8         | 6         | 8         | 8         | 8  | 10        | 10 |
| 9         | 9         | 7         | 10        | 10        | 10 | 11        | 11 |
| 10        | 10        | 8         | 11        | 11        | 11 | 12        | 12 |
| 11        | 11        | 10        | 12        | 12        | 12 | 14        | 14 |
| 12        | 12        | 11        | 15        | 14        | 14 | 15        | 15 |
| <b>16</b> | 18        | 12        | 16        | 15        | 15 | 16        | 16 |
| <b>17</b> | <b>19</b> | <b>13</b> | 17        | <b>16</b> | 17 | <b>17</b> | 18 |
| 18        | 21        | 15        | 18        | 17        | 18 | 18        | 21 |
| 21        | 22        | 16        | 21        | 18        | 19 | <b>19</b> | 22 |
| 22        | 23        | 17        | <b>22</b> | 19        | 21 | <b>20</b> | 23 |
| 23        | 26        | 18        | 23        | <b>20</b> | 22 | 21        | 33 |
| 26        | 27        | <b>19</b> | 31        | 21        | 23 | 22        | 34 |
| 27        | 28        | 21        | 33        | 22        | 29 | 23        |    |
| 28        | 29        | 23        | 34        | 23        | 33 | <b>29</b> |    |
| 29        | <b>34</b> | <b>29</b> |           | 29        | 34 | <b>32</b> |    |
|           |           | 31        |           | 33        |    | 33        |    |
|           |           | 33        |           | 34        |    | 34        |    |
|           |           | 34        |           |           |    |           |    |

#### 4 Conclusions

This paper examines competitiveness in five CEEC countries, i.e. Bulgaria, the Czech Republic, Hungary, Romania, and Slovakia. We embrace four indicators of competitive advantages ranging from the most popular due to Balassa (1965) to the recent one introduced by Yu *et al.* (2009). However, it is easy to prove that all these indicators are equivalent in terms of the dichotomous choice about competitive advantages, i.e. if a sector is competitive according to the Balassa criterion then it does so according to the other ones because if  $BRCA > 1$  then  $SRCA > 0$ ,  $ARCA > 0$ , and  $NRCA > 0$ . Hence, we restrict our analysis and take into account sectoral RCA indicators using Gross Exports and Value Added in Trade. The country net trade surplus/deficit is the same in both cases while, at the disaggregated industry level, values can differ as the VAI<sub>T</sub> includes both value added in its direct exports and the value added it supplies as inputs to other domestic industries' exports. A large literature shows global supply chains can change the picture a lot. It is interesting to check differences in competitiveness of the countries under scrutiny. For such a task, we embrace the WIOD dataset that provides a series of annual world input output tables from which we can derive gross and net exports by industry. This approach is extremely useful as it allows us to consider the tertiary as well as manufacturing. The complete inclusion of services is important for several reasons. First, most advanced economies shifted their production towards the tertiary, which is now the main bulk of GDP. Second, even if services are not directly exported they are often embodied in goods. Hence, a Balassa index smaller than one in Gross Export but larger than unity in VAI<sub>T</sub> can reveal a sector whose output

is included in other goods that are sold abroad. The opposite shows an international shipment mainly made by foreign value added. Hence, the information conveyed by gross and net flows may be very different (Johnson and Noguera 2012). Koopman *et al.* (2014) give examples how, for some sectors, a comparative advantage according to the former can turn in a disadvantage for the latter. Recently, Brackman and Marrewijk (2016), using a previous and modified version of WIOD, conclude countries specialize dissimilarly. “Consistent with the theory of comparative advantage, distributions of RCA between different countries are different. This holds for gross export RCA as well as for value added RCA... The distributions of cross export RCA and value added RCA are almost always significantly different for a country. These measures thus do not convey the same information” (Brackman and Marrewijk 2016, 9-10). Their analysis drops three sectors, does not consider the last two years, and converts current dollars to constant ones using the US GDP deflator. This global deflation is questionable and I prefer to stick to current values using all the observations available. Nonetheless, differences for our CEEC-5 are minimal and stylized facts are mostly confirmed. For instance, Bulgaria appears to be a very competitive country in terms of number of sectors when data about Gross Exports are used. Nineteen industries out of 35 (32 for Brackman and Marrewijk) display an export share larger than worldwide, but this number is reduced when we deem net flows. However, this finding applies predominantly in the first part of the sample, when European GVCs were still building up. This phenomenon could have been at work at the turn of the century in Slovakia and Hungary too, as the number of competitive industries is increasing in both secondary and tertiary. On the opposite, it is not so apparent in Romania and the Czech Republic. This calls for a better understating of the strength and the deepness of the links within and between supply chains and, first of all, for a quantitative assessment about the magnitude of comparative advantages. Future research should address both issues.

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## Appendix

### Sectoral Classification and NACE rev. 1

|    |          |   |
|----|----------|---|
| 1  | AtB      | Agriculture, Hunting, Forestry and Fishing                      |
| 2  | C        | Mining and Quarrying  |
| 3  | 15t16    | Food, Beverages and Tobacco                                     |
| 4  | 17t18    | Textiles and Textile Products                                   |
| 5  | 19       | Leather, Leather and Footwear                                   |
| 6  | 390      | Wood and Products of Wood and Cork                              |
| 7  | 391t3939 | Pulp, Paper, Paper , Printing and Publishing                    |
| 8  | 393      | Coke, Refined Petroleum and Nuclear Fuel                        |
| 9  | 394      | Chemicals and Chemical Products                                 |
| 10 | 395      | Rubber and Plastics   |
| 11 | 396      | Other Non-Metallic Mineral                                      |
| 12 | 397t398  | Basic Metals and Fabricated Metal                               |
| 13 | 399      | Machinery, Nec  |
| 14 | 30t33    | Electrical and Optical Equipment                                |
| 15 | 34t35    | Transport Equipment   |
| 16 | 73t37    | Manufacturing, Nec; Recycling                                   |
| 17 | E        | Electricity, Gas and Water Supply                               |
| 18 | F        | Construction  |
| 19 | 50       | Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; |
| 20 | 51       | Wholesale Trade and Commission Trade, Except of Motor Vehicles  |
| 21 | 539      | Retail Trade, Except of Motor Vehicles and Motorcycles;         |
| 22 | H        | Hotels and Restaurants  |
| 23 | 60       | Inland Transport  |
| 24 | 61       | Water Transport   |
| 25 | 639      | Air Transport   |
| 26 | 63       | Other Supporting and Auxiliary Transport Activities;            |
| 27 | 64       | Post and Telecommunications                                     |
| 28 | J        | Financial Intermediation  |
| 29 | 70       | Real Estate Activities  |
| 30 | 71t74    | Renting of M&Eq and Other Business Activities                   |
| 31 | L        | Public Admin and Defence; Compulsory Social Security            |
| 32 | M        | Education   |
| 33 | N        | Health and Social Work  |
| 34 | O        | Other Community, Social and Personal Services                   |
| 35 | P        | Private Households with Employed Persons                        |