
Empirical Methods in International Trade Using for Evaluation in Export of Services in CEE Countries Based on Balassa Index

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Abstract

Balassa Index is widely used in the research literature to measure country-sector called Revealed Comparative Advantage (RCA) to determine a country's weak and strong sectors. In this paper we determine a country's strong sector by analyzing the actual export flows in services of CEE countries. Our study includes 10 countries based on raw data from the International Trade Center for the period from 2012 till 2016. We provide a systematic analysis of the empirical distribution of the Balassa index. Using analysis, we consider which country in which sector of the service is Rival for chosen 10 countries. It is evident that foreign trade is important for all of them, albeit it to varying degrees. It might seem a logical way to restore economic strength.

This paper presents a new approach to the export structure of services using the Balassa Index.

Keywords: Balassa index, services, export, comparative advantage, CEE countries

Introduction

The term trade of services is generally understood to mean apply to international transactions in a diverse array of fields, including financial services, transportation, communication, construction and distribution. When considering barriers to trade in services, domestic regulations governing their supply and consumption are more important than border measures such tariffs. This is a contrast to trade in goods, where border measures play a significant role.

OECD [1] refers that services differ from goods in a number of ways, most commonly in the immediacy of the relationship between supplier and consumer. Many services are non-transportable. The definition of services trade under the GATS is four-pronged, depending on the territorial presence of the supplier and the consumer at the time of the transaction. The GATS covers services supplied: a) from the territory of one Member into the territory of any other Member (Cross border trade); b) in the territory of one Member to the service consumer of any other Member (Consumption abroad); c) by a service supplier of one Member, through commercial presence, in the territory of any other Member (Commercial presence) and d) by a service supplier of one Member, through the presence of natural persons of a Member in the territory of any other Member (Presence of natural persons) [2]. The General Agreement on Trade in Services (GATS) was concluded within the Uruguay run. Its outcomes had to be, as instructed by WTO, entirely realized by 2005. As for the content, GATS determined privatization of all services (let's mention several of the most important services-education, research, telecommunication, transport and tourism). WTO expects acquisition of new markets in the field of services due to privatization [3].

However, trade in services has been steadily increasing. According to WTO data exports commercial services by WTO members totalled US \$ 4.68 trillion in 2015 [4]. According to the data from The World Bank [5], goods and services accounted 29.367% of GDP in 2015 worldwide, trade in services (% of GDP) reported 12.345% in 2016 [6] and exported services recorded 4.933 Trillion US \$ [7].

Comparative advantage is a widely used concept in international trade. In this report we describe new approach to the competitiveness of ten CEE countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Ukraine) in the twelve sector services (Travel, Transportation, Other business services, Telecommunications, computer, and information services; Manufacturing services on physical inputs owned by others, Insurance and pension services, Financial services, Maintenance and repair services n.i.e., Personal, cultural, and recreational services, Charges for the use of intellectual property n.i.e., Construction and Government goods and services n.i.e.) using Balassa index to measure the specialisation of export. In this context we used the statistical data from International Trade Center in thousand €. We believe that we have presented important data referring the specialization of CEE country.

Methodology

Many investigations aimed at identifying international competitiveness and trade performance can be found in the scientific literature. In this study we have chosen Balassa index. Balassa [8] comparative-advantage indices measure revealed comparative advantage from international comparisons of exports data, and are blind to possible sources of advantage. The idea to determine a country's "strong" sectors by analysing the actual export flows was pioneered by Liesner [9]. Since the procedure was refined and popularized by Bela Balassa [8, 10] it is popularly known as the Balassa Index.

Alternatively, as the actual export flows 'reveal' the country's strong sectors it is also known as Revealed Comparative Advantage. The Balassa index measures the degree of specialization of CEE country export services. Many countries are, for example, producing and exporting cars. To establish whether a country, e.g. Japan, holds a particularly strong position in the car industry, Balassa argued that one should compare the share of car exports in Japan's total exports with the share of car exports in a group of reference country's total exports. The Balassa index is therefore essentially a normalized export share. More specifically, in this case the index is calculated as follows:

$$BI = \frac{\text{export of service by country/export of country}}{\text{export of service by CEE excluding the country/export by CEE excluding the country}}$$

If $BI > 1$, country A is said to have a revealed comparative advantage in service. It means that the service involves specialisation. If this is less than 1 it means no specialisation involved in the service. Hinloopen and Marrewijk [11] have gone further to divide the theoretical range of the RCA Index into four additional classes as follows: 0-1 Value of BI means industries with comparative disadvantage, 1-2 Value of BI means Industries with weak comparative advantage, 2-4 Value of BI means Industries with medium comparative advantage, Greater than 4 means Industries with strong comparative advantage. This indicator is one of the most commonly used [12]. According to Laursen [13], this measure has been applied in numerous reports e.g. UNIDO, World Bank, OECD, and academic publications to measure international trade specialization.

Results

Bulgaria

According to the calculations it can be seen that Bulgaria had a medium comparative advantage in category travel for the whole analysed period. Second category with partly strong comparative advantage was insurance and pension services in period from 2014 to 2015, rest of the years Bulgaria registered medium comparative advantage. This country recorded medium (in 2012 and 2013) and weak (in 2014 and 2015) comparative advantage in sector Personal, cultural and recreational services. In the last product label Telecommunications, computer, and information services we observed weak comparative advantage in years 2012-2013 and 2015-2016 as illustrated on the Fig. 1

Fig. 1. Balassa Index Bulgaria

Product label	2012	2013	2014	2015	2016
Travel	1,929	2,125	2,051	1,917	2,088
Transportation	0,658	0,701	0,784	0,728	0,741
Other business services	0,553	0,481	0,565	0,808	0,658
Telecommunications, computer, and information services	1,205	1,094	0,995	1,012	1,051
Manufacturing services on physical inputs owned by others	0,586	0,523	0,484	0,488	0,438
Insurance and pension services	3,021	3,724	5,747	4,485	2,934
Financial services	0,405	0,524	0,818	0,617	0,751
Maintenance and repair services n.i.e.	0,529	0,492	0,497	0,495	0,464
Personal, cultural, and recreational services	2,086	2,201	1,645	1,551	0,812
Charges for the use of intellectual property n.i.e.	0,141	0,174	0,183	0,352	0,319
Construction	0,900	0,169	0,170	0,137	0,118
Government goods and services n.i.e.	0,099	0,111	0,143	0,120	0,119

Source: author's own calculation based on [14, 15]

Czech Republic

Based on the Balassa Index results for Czech Republic we noticed comparative advantage in seven product labels. Fig. 2 summarizes the data. It is evident that Insurance and pension services had medium advantage in period 2012, 2013, 2014 and 2016 and weak one in 2015. The next labels with the weak comparative advantage for the whole period were Travel, Other business services and Telecommunications, computer, and information services as demonstrated in Fig. 2. Maintenance and repair services n.i.e. and Charges for the use of intellectual property n.i.e. we discovered the weak comparative advantage in period from 2014-2016. The last examined sector Construction had an advantage in year 2012, 2014 and 2015.

Fig. 2. Balassa Index Czech Republic

Product label	2012	2013	2014	2015	2016
Travel	1,255	1,251	1,256	1,264	1,258
Transportation	0,786	0,731	0,724	0,740	0,762
Other business services	1,096	1,162	1,063	1,042	1,044
Telecommunications, computer, and information services	1,305	1,275	1,181	1,055	1,093
Manufacturing services on physical inputs owned by others	0,599	0,804	0,845	0,849	1,002
Insurance and pension services	2,176	2,074	2,362	1,729	2,084
Financial services	0,943	1,077	1,126	1,087	0,997
Maintenance and repair services n.i.e.	0,670	0,579	1,356	1,688	1,349
Personal, cultural, and recreational services	0,811	0,941	0,845	0,646	0,675
Charges for the use of intellectual property n.i.e.	0,668	0,836	1,042	1,216	1,075
Construction	1,173	0,925	1,146	1,217	0,621
Government goods and services n.i.e.	0,166	0,172	0,186	0,193	0,198

Source: author's own calculation based on [14, 16]

Estonia

This country recorded the weak and medium advantage in two product labels Construction and Government goods and services n.i.e. for the whole studied period as shown in Fig. 3. Further analysis showed that six categories recorded weak advantage as follows: Travel and Maintenance and repair services n.i.e. from 2013 till 2016, Transportation from 2012 till 2015, Financial services in 2012, 2014 and 2016, Other business services only in year 2016 and Personal, cultural, and recreational services in year 2015.

Fig. 3. Balassa Index Estonia

Product label	2012	2013	2014	2015	2016
Travel	0,832	1,036	1,149	1,136	1,156
Transportation	1,286	1,163	1,123	1,129	0,984
Other business services	0,915	0,895	0,889	0,903	1,019
Telecommunications, computer, and information services	0,991	0,918	0,848	0,785	0,766
Manufacturing services on physical inputs owned by others	0,703	0,503	0,391	0,463	0,431
Insurance and pension services	0,218	0,098	0,097	0,078	0,102
Financial services	1,108	0,850	1,025	0,990	1,373
Maintenance and repair services n.i.e.	0,676	1,200	1,353	1,152	1,384
Personal, cultural, and recreational services	0,595	0,823	0,901	1,168	0,869
Charges for the use of intellectual property n.i.e.	0,159	0,070	0,085	0,108	0,113
Construction	1,879	2,296	2,284	2,246	2,973
Government goods and services n.i.e.	1,181	1,054	1,852	2,023	1,776

Source: author's own calculation based on [14, 17]

Hungary

Fig. 4 product label Charges for the use of intellectual property n.i.e. shows a significant very strong comparative advantage for Hungary. A visual inspection of this table shows us that Personal, cultural, and recreational services had weak (2012) and medium (2013-2016) comparative advantage for the whole period.

Other business services recorded weak comparative advantage. Two product labels Travel and Government goods and services n.i.e. we noticed the dominance only in the period from 2014 to 2016. Maintenance and repair services n.i.e. dominated only in the year 2012 and 2013 and Manufacturing services on physical inputs owned by others 2012, 2014 and 2015.

Fig. 4. Balassa Index Hungary

Product label	2012	2013	2014	2015	2016
Travel	0,957	0,975	1,066	1,122	1,150
Transportation	0,743	0,790	0,800	0,813	0,845
Other business services	1,303	1,267	1,233	1,251	1,271
Telecommunications, computer, and information services	0,936	0,899	0,776	0,725	0,655
Manufacturing services on physical inputs owned by others	1,122	0,977	1,053	1,172	0,863
Insurance and pension services	0,192	0,248	0,194	0,155	0,162
Financial services	0,490	0,691	0,592	0,587	0,635
Maintenance and repair services n.i.e.	1,315	1,282	0,968	0,867	0,876
Personal, cultural, and recreational services	1,609	2,352	3,269	2,626	2,752
Charges for the use of intellectual property n.i.e.	11,709	12,201	10,214	7,615	8,924
Construction	0,529	0,626	0,455	0,464	0,414
Government goods and services n.i.e.	0,809	0,754	1,327	1,464	1,271

Source: author's own calculation based on [14, 18]

Latvia

We note from Fig. 5 by Latvia very strong comparative advantage in the whole period. The second analysed sectors which report domination is Government goods and services n.i.e. with weak (2012 and 2013) and medium (2014-2016) comparative advantage and Transportation for the total examined period. Construction registered the dominance in 2013, 2014 and 2016. Only in 2016 Latvia had advantage in Telecommunications, computer, and information services.

Fig. 5. Balassa Index Latvia

Product label	2012	2013	2014	2015	2016
Travel	0,531	0,570	0,633	0,684	0,640
Transportation	1,635	1,472	1,407	1,344	1,245
Other business services	0,696	0,779	0,776	0,786	0,791
Telecommunications, computer, and information services	0,750	0,791	0,739	0,813	1,072
Manufacturing services on physical inputs owned by others	0,336	0,321	0,100	0,075	0,098
Insurance and pension services	0,562	0,901	0,090	0,070	0,303
Financial services	6,445	6,125	6,981	7,700	7,423
Maintenance and repair services n.i.e.	0,800	0,643	0,360	0,338	0,274
Personal, cultural, and recreational services	0,328	0,621	0,361	0,408	0,329
Charges for the use of intellectual property n.i.e.	0,100	0,119	0,053	0,069	0,054
Construction	0,860	1,157	1,346	0,823	1,663
Government goods and services n.i.e.	1,051	1,040	2,294	2,223	2,213

Source: author's own calculation based on [14, 19]

Lithuania

In this country can be seen that transportation had medium comparative advantage in observed period. Government goods and services n.i.e. allocated weak (2012-2014) and medium (2015, 2016) comparative advantage. In Construction Lithuania had dominated position only in 2012, 2015 and 2016, in Maintenance and repair services n.i.e. only on year 2016 as demonstrated on Fig. 6.

Fig. 6. Balassa Index Lithuania

Product label	2012	2013	2014	2015	2016
Travel	0,836	0,783	0,785	0,784	0,720
Transportation	2,038	2,160	2,163	2,080	2,077
Other business services	0,338	0,421	0,378	0,423	0,467
Telecommunications, computer, and information services	0,357	0,313	0,351	0,356	0,360
Manufacturing services on physical inputs owned by others	0,766	0,393	0,364	0,415	0,574
Insurance and pension services	0,000	0,000	0,000	0,000	0,000
Financial services	0,581	0,000	0,000	0,000	0,000
Maintenance and repair services n.i.e.	0,000	0,000	0,673	0,777	1,381
Personal, cultural, and recreational services	0,507	0,576	0,457	0,480	0,427
Charges for the use of intellectual property n.i.e.	0,029	0,236	0,170	0,190	0,210
Construction	1,072	0,966	0,000	1,301	1,554
Government goods and services n.i.e.	1,250	1,148	1,907	2,620	2,254

Source: author's own calculation based on [14, 20]

Poland

As highlighted in Fig. 7, the values of three product labels had weak comparative advantage for the whole period: Travel, Other business services and Construction. It is also apparent from this table that Maintenance and repair services n.i.e. dominated from 2013 till 2016, Personal, cultural, and recreational services for the whole period except 2014. Insurance and pension services, we noticed the comparative advantage in year 2013, 2015 and 2016 and Manufacturing services on physical inputs owned by others in year 2014 and 2016.

Fig. 7. Balassa Index Poland

Product label	2012	2013	2014	2015	2016
Travel	1,072	1,066	1,114	1,087	1,034
Transportation	0,892	0,894	0,884	0,867	0,870
Other business services	1,376	1,240	1,217	1,231	1,250
Telecommunications, computer, and information services	0,791	0,801	0,813	0,853	0,838
Manufacturing services on physical inputs owned by others	0,829	0,979	1,034	0,993	1,001
Insurance and pension services	0,961	1,294	0,923	1,583	1,743
Financial services	0,979	0,913	0,848	0,809	0,976
Maintenance and repair services n.i.e.	0,934	1,358	1,172	1,174	1,162
Personal, cultural, and recreational services	1,118	1,071	0,937	1,197	1,513
Charges for the use of intellectual property n.i.e.	0,214	0,298	0,296	0,444	0,433
Construction	1,428	1,631	1,701	1,450	1,705
Government goods and services n.i.e.	0,003	0,002	0,011	0,003	0,005

Source: author's own calculation based on [14, 21]

Romania

We have found that Romania dominated in three sectors over the whole period as following: medium advantage Manufacturing services on physical inputs owned by others with medium (2012) and weak advantage (2013-2016) and weak advantage by Other business services. Other product labels had weak advantages in different periods namely: Transportation in 2015 and 2016, Insurance and pension services and Financial services in 2012 and 2013, Maintenance and repair services n.i.e. only in year 2013, Charges for the use of intellectual property n.i.e. in year 2012, Construction over the period 2013 and 2014 and Government goods and services n.i.e. in 2014 and 2015 as illustrated in Fig. 8.

Fig. 8. Balassa Index Romania

Product label	2012	2013	2014	2015	2016
Travel	0,431	0,341	0,376	0,393	0,366
Transportation	0,847	0,969	0,971	1,068	1,066
Other business services	1,146	1,186	1,175	1,078	1,078
Telecommunications, computer, and information services	2,025	1,675	1,583	1,583	1,639
Manufacturing services on physical inputs owned by others	2,522	2,619	2,528	2,322	2,315
Insurance and pension services	1,964	1,171	0,676	0,635	0,529
Financial services	1,468	1,055	0,882	0,769	0,865
Maintenance and repair services n.i.e.	0,000	1,019	0,718	0,688	0,713
Personal, cultural, and recreational services	0,883	0,272	0,290	0,445	0,333
Charges for the use of intellectual property n.i.e.	1,365	0,331	0,334	0,253	0,179
Construction	0,944	1,165	1,094	0,826	0,938
Government goods and services n.i.e.	0,893	0,904	1,244	1,105	0,869

Source: author's own calculation based on [14, 22]

Slovakia

Figure below shows that Slovakia had in two product labels medium and weak comparative advantage in the whole analysed period: Maintenance and repair services n.i.e. and Travel. Other business services and Telecommunications, computer, and information services recorded weak comparative advantage from 2012 till 2014.

Financial services rose from 2014 till 2016. Insurance and pension services, we noticed the dominance only in 2012, 2014 and 2015. Transportation (2014), Personal, cultural, and recreational services (2012) and Construction (2012) seem to be not the strong product label of Slovakia.

Fig. 9. Balassa Index Slovakia

Product label	2012	2013	2014	2015	2016
Travel	1,168	1,154	1,249	1,370	1,507
Transportation	0,889	0,943	1,009	0,983	0,942
Other business services	1,012	1,117	1,052	0,988	0,970
Telecommunications, computer, and information services	1,116	1,240	1,050	0,969	0,908
Manufacturing services on physical inputs owned by others	0,557	0,408	0,412	0,348	0,435
Insurance and pension services	1,099	0,713	1,123	1,032	0,767
Financial services	0,802	0,896	1,108	1,534	1,115
Maintenance and repair services n.i.e.	2,506	1,897	1,164	1,263	1,140
Personal, cultural, and recreational services	1,193	0,483	0,301	0,389	0,395
Charges for the use of intellectual property n.i.e.	0,025	0,145	0,159	0,180	0,195
Construction	1,403	0,964	0,903	0,710	0,555
Government goods and services n.i.e.	0,178	0,104	0,090	0,240	0,355

Source: author's own calculation based on [14, 23]

Ukraine

Ukraine is the only country which does not belong to European Union of the CEE Group. We were surprised to find that Government goods and services n.i.e. had very strong comparative advantage as demonstrated on the Fig. 10. We discovered also that Transportation and Manufacturing services on physical inputs owned by others had the weak advantage for the whole examined period. Telecommunications, computer, and information services are on the rise from 2014 till 2016. Maintenance and repair services n.i.e. we notice the dominance only in the year 2012.

Fig. 20. Balassa Index Ukraine

Product label	2012	2013	2014	2015	2016
Travel	0,839	0,914	0,459	0,377	0,379
Transportation	1,411	1,315	1,459	1,509	1,535
Other business services	0,665	0,732	0,858	0,731	0,658
Telecommunications, computer, and information services	0,682	0,854	1,401	1,625	1,632
Manufacturing services on physical inputs owned by others	1,500	1,163	1,112	1,138	1,256
Insurance and pension services	0,315	0,255	0,145	0,151	0,297
Financial services	0,616	0,860	0,801	0,852	0,381
Maintenance and repair services n.i.e.	2,137	0,854	0,941	0,652	0,782
Personal, cultural, and recreational services	0,581	0,583	0,447	0,332	0,261
Charges for the use of intellectual property n.i.e.	0,242	0,356	0,392	0,372	0,315
Construction	0,419	0,412	0,536	0,859	0,606
Government goods and services n.i.e.	10,489	11,184	7,164	6,843	9,399

Source: author's own calculation based on [14, 24]

Discussion

Observation by Balassa Index shows that each CEE country has great advantage and disadvantage over those country exports. But is this Index a superficial measure of export trade? This method does not measure the circumstances of the market, or show economic and political implications. One Alternative is Constant Market Share Analysis which is an arithmetic breakdown of the growth of a country's market share over a period of time into a structural component, reflecting the impact of specialisation by product and geographical area, and other factors reflecting changes in individual markets shares. The starting point is difference between a country's export growth and world export growth [25].

Leromain and Oreficice introduced another method of analysis, a modern economic-based measure for Ricardian RCA. In their opinion, the modern, modified measure showed better statistical properties than the Balassa Index [26].

Further research at disaggregated (NUTS2) level may be suggested, as they are rare. We have found only one dataset compiled by the Netherlands Environmental Assessment Agency [27] so far. Furthermore, there should be a focus on the rest of European Union states. We think that this improves understanding of the regional aspect of competitiveness, including a future point of view of the economic development of the region.

The recently proposed additive measures of revealed comparative advantage (RCA) have been argued as better alternatives to the Balassa Index therefore this measure may be examined deeper and applied in calculation of RCA.

Conclusion

We described the empirical distribution of the Balassa Index by analysing the export performance of CEE countries, we investigated individual countries and the CEE as a whole. The distribution of the Balassa index differs considerably across countries, making the comparisons of the index between countries problematic. In this study officially-available data was used to calculate the Balassa Index with reliable results.

The results show that this Index can be used to show the value of exports of services between chosen states.

The upward trend in competitiveness in recent years is an important signal for the whole economy. Exports create growth and jobs opportunities. Internationalization is therefore an important component of our business strategy to protect jobs and prosperity in each region. The results of this study indicate that there are many interesting product labels in the countries.

This paper sheds light on the export structures of the services of CEE countries. These countries were all influenced by the economic downturn in the course of the crisis and have been struggling with national debt crises and recession. The economic situation, however, is different for each country.

Based on the calculations of the Balassa Index and the subsequent analysis performed on the Balassa scores for the time periods 2012-2016 the paper found that each country has comparative advantage and disadvantage in different product labels depends on their export variety and preference. On this basis the paper concludes that there has been a shift in the pattern of specialization from the examined period. According to the transition probability matrix there is a high probability of persistence in industries with an initial very strong comparative advantage ($RCA > 4$) e.g. Bulgaria in Insurance and pension services, Hungary in Charges for the use of intellectual property n.i.e., Latvia in Financial services and Ukraine in Government goods and services n.i.e., medium (2-4) and weak (1-2) comparative advantage and those with no comparative advantage ($RCA < 1$).

The evidence from this analysis suggests that industries with weak comparative advantage have a high probability of moving towards being a position of a comparative disadvantage. This shows that there is mobility in pattern of trade.

To sum up, the economic structure of service product label of Ukraine is the most problematic. Regarding the structure and the competitiveness of most sectors, the country's international standing and openness is far from solid.

This study focuses on a limited time period and a particular region country. In further work, it would be useful to examine longer time periods and expand the analysis to other Objective Areas in the European Union.

The research objectives were achieved, but the results show only provide of a measure of the importance of CEE exports diversity. An additional study investigating the role of goods exports would be valuable to give an overview of CEE's export economy.

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