DOI: https://doi.org/10.36708/Littera_Scripta2022/2/3

Exports of Central and Eastern European countries to China in terms of value-density

Ondrej Tomčík

University of Economics, Faculty of Commerce, Dolnozemská cesta 1, 852 35, Bratislava-Petržalka, Slovak Republic

Abstract

China's cooperation with the countries of Central and Eastern Europe (CEE) under the 16+1 forum has raised concerns in western capitals since it posed a new challenge in the region. On the other hand, the CEE countries viewed it as a potential new trade opportunity. Certain countries may have even viewed it as an opportunity to rebalance the influence of the West and East in the region. A decade into the 16+1 cooperation, it is more evident that the expectations of the CEE partners have not been met. An empirical study devoid of political agendas is required to provide an objective evaluation of this cooperation. The article utilizes UN Comtrade statistics to determine the value-density ratios of commodities exported to China, which are then compared to the value density of goods exported to other markets. While the results indicate that such exports contribute positively to the economies of the majority of CEE countries, the V4 countries performed exceptionally well. The fact that non-EU countries largely underperformed indicates that EU membership may be more critical for the successful exports to China than their participation in the 16+1 forum.

Keywords: 16+1 China-CEEC forum, belt and road initiative, value density ratio, export to China

Introduction

China's President Xi Jinping's goal of reconstructing the ancient Silk Road has been the cornerstone of his administration. The Belt and Road Initiative (BRI) spans over 60 nations and is comprised of an extensive network of railroads, pipelines, ports, and highways. Among these are the sixteen Central and Eastern European (CEE) countries with which China established the 16+1 forum in 2012. Greece joined later in 2019, and

Lithuania withdrew in 2021. Ever since 16+1 cooperation was conceived, it has become a subject of heated debates with opposing viewpoints depending on who conveyed them. Attitudes range from extremely favourable among Chinese intellectuals to more cautious among western academics and officials. The aim of this paper is to evaluate exports of the CEE countries to China by employing the value-density ratio of their exported products to China and the other parts of the world.

Literature research

The 16+1 strategy under the cooperative BRI framework can be viewed as China's long-term strategy for global economic growth (Musabelliu, 2017). According to Zuokui (2017), China's 16+1 Cooperation fosters a new type of international relations because it is founded on mutual respect and inclusive international cooperation, adheres to the principle of mutually beneficial and win-win cooperation, and closely observes the relevant parties' core interests and major concerns (Zuokui, 2017). Nevertheless, when viewed in a broader context, China-CEE collaboration has a relatively limited influence on public and policy levels, and is increasingly challenged by regional entities with greater strength (Vangeli, 2019). The 16+1 cooperation and the BRI initiative both emphasize increasing connectivity, collaboration, trade, and cultural exchange between China and the CEEC, according to Pepermans (2018). Since its inception, there has been considerable debate over the scope of these large-scale programs. Even though a significant gap persists between the 16+1 objectives and economic outputs, this method with Chinese elements is currently working to the initiator's (i.e. China’s) favour (Pepermans, 2018).

As stated by Bąk (2019), the cooperation under the 16+1 initiative revealed the potential of effective collaboration, but it also demonstrated the limitations of the adopted solutions. Due to the wide range of economic and political differences across CEE countries, the potential for collaboration as well as the implemented approaches vary greatly from country to country. In some countries, working with China is seen as a lucrative opportunity, while in others, it's seen as less attractive (Bąk, 2019). However, Song, Fürst (2022) noted, that while the two sides' cooperation has intensified over the last decade or so, the rising discrepancies between China and CEECs, as a result of relatively modest progress in comparison to initial CEECs' expectations, have aroused a negative response from CEE countries. There is an intra role conflict between China's vision of its leadership role and the role expectations of China held by CEE Countries. China strives to forge a leadership role for itself in relation to the CEECs. In the context of typically low expectations for China's leadership position, three distinct patterns of responses can be observed among CEECs: dissenters, pragmatists, and persistent partners (Song, Fürst, 2022). Stanojevic used his theoretically coherent gravity model and a panel dataset of 167 nations to demonstrate a slowdown in Sino-CEE trade following 2012, demonstrating that cooperation has not yet resulted in considerable trade growth. Additionally, the estimations revealed that collaboration could have a more favourable impact on China's trade with non-EU CEE countries (Stanojevic, Qiu & Chen, 2021).

China has its sights set on other countries in the area, such as Belarus, which might serve as a gateway for the Belt and Road Initiative into European countries. However, the extent to which Beijing's strengthened relations with Minsk would benefit China's interests in connecting with Europe will be determined in large part by Belarus's and the EU's ability to resolve substantial disagreements in their relationship (Rinna, 2021). But these promises remain illusory considering the recent events in Ukraine. Besides, China's framing of "traditional friendship" with CEE countries on the basis of a common socialist past does not sit well with the majority of the CEE region, which has a rather problematic view of Communism as a result of its own historical experience (Turcsanyi, Qiaoan, 2020).

In the eyes of many, the BRI is China's soft power in the global arena. When compared to Europe's general media portrayal of China, empirical evidence shows that the European media first reported on this project quite positively and, to a degree, mirrored Chinese narratives of economic potential while ignoring geopolitical and security concerns (Turcsanyi, Kachlikova, 2020). China's increased focus on CEE countries and the Mediterranean through BRI poses a serious challenge to major western actors. From the very beginning, there have been concerns that some of the projects could erode European political unity or the regulations of Chinese investments in the EU. The European Union, on the other hand, has a lot of opportunities for coordination in its political cooperation toward China (Vergeron, 2018). The CEE nations' excitement about the prospect of increased collaboration with China, which they initially viewed as a viable alternative, has mostly waned in recent years. After a few years, CEE governments became gradually dissatisfied with the lack of economic outcomes. Additionally, EU membership brings certain crucial characteristics that make the Chinese propositions less desirable (Turcsanyi, Kachlikova, 2020).

In the COVID-19 period, it appears as though China-CEE cooperation has ceased. But according to Kavalski (2021), the majority of CEE governments had already been considering a halt on their engagement for some time prior to the pandemics. In this regard, the epidemic has only accelerated the estrangement of CEE countries and China. The study concludes that China's "unrequited romance" with the CEE area has significant consequences for the Belt and Road Initiative's post-pandemic trajectory (Kavalski, 2021). Apart from that, the EU's strategic positioning toward China has shifted fundamentally from "partner" to "systemic rival," with the US factor and power symmetries serving as the strongest drivers. China-EU ties will only decline in the future due to increased rivalry and disagreements (Li, He, 2022). This will have significant ramifications for the 16 CEE countries' cooperation, whether they are EU members or not.

Therefore, an adequate evaluation of such a partnership between China and CEE countries that would be free of apolitical agendas requires raw data analysis. As illustrated in Table 2, the trade figures demonstrate an increase in the exports of participating CEE countries to China. However, China is no exception. At the same time, the CEE region has increased its exports to almost all other markets. This article examines whether and to what extent participation in the 16+1 format benefits individual CEE countries.

Navigating through the numerous competing points of view on the 16+1 forum can be difficult given the subject's complexity and the enormous number of competing political agendas involved.

Those advocating for stronger cooperation with China within the 16+1 framework emphasize the potential benefits of doing business with the world's largest market, while others point out the existing red tape that prevents free access to the Chinese market despite multiple declarations made by Chinese officials to reduce the barrier.

As demonstrated in Table 2, commerce between China and the nations that take part in the 16+1 forum has increased significantly in recent years. This fact implies that the cooperation had a positive impact on all of the participants. China, on the other hand, was able to significantly increase its exports to Central and Eastern Europe during the same period. CEE countries place a high priority on China's market, and they have promoted their presence in China in the same way that advanced nations do, despite the fact that they have a limited technological advantage. Nonetheless, to what degree is this a win-win situation? Which states benefit the most from this cooperation, and to what extent is it profitable for Central and Eastern European countries?

The value-per-weight metric

A quantitative measure based on the value-per-weight ratio can be used to evaluate the profitability of exports to a certain market.

The value-per-weight ratio has been extensively employed in logistics theory. Classification of products based on their value-per-weight and time sensitivity factors enables the selection of the most appropriate mode of transportation (Dettmer, Freytag & Draper, 2014). Changes in demand structure, as a result of the shift away from high-volume, low-value products toward greater value-per-weight luxury or smart goods, have had a significant impact on transportation time and, consequently, on the chosen method of transport (Riet, Jong & Walker, 2007). Sectors that generate items with a higher value-per-weight ratio and manufacturing processes that are easily separable in time and space (such as electronics) are the most likely to be subjected to transnational outsourcing.

The higher value-per-weight ratio of commodities makes the transportation expenses relatively insignificant in comparison to the total production costs, resulting in the frequent use of air freight (Farrell, 2005). Christen (2010) points out that goods with low value-per-weight ratios tend to be shipped by ground transportation such as rail cargo vessels or trucks, whereas high value-per-weight goods may be shipped by more costly transportation. The preferred method of transportation of high value-per-weight goods depends on perishability or time sensitivity of the product, as more perishable products require quicker transport (Christen, 2010). Air-freight is a significantly more expensive mode of carriage than ground-bound modes, and it is used in the case of high value-per-weight goods and where the speed of delivery, its security, regularity, and frequency are important factors (Reynolds-Feighan, 2001).

Product's value density, referred to as eighter the value-to-weight or value-to-volume ratio, has a significant effect on the company's logistic strategy. In the case of very high value-density products, namely microchips, their production has been relatively centralised, geographically allocated to a limited number of dedicated large-scale industrial clusters. These production sites provide the world with supplies of microchips by airfreight since the transport costs are insignificant in relation to the cost of building multiple production sites around the world. On the other hand, production of bulky low value-density products (e.g. cement) is usually allocated in close proximity to the point of sale (Delfmann, Albers, 2000).

Similarly, Lovell, Saw & Stimson (2005) demonstrated in the SONY example that value-density exhibits paramount importance in supply chain segmentation as a means of governing the costs of its supply chain management. High value density makes holding the product's inventories very expensive. This puts in place measures to keep overall stock optimised and to reduce the levels of stock in transport, i.e., centralised inventories and fast modes of transport. They allow for timely supplies even in cases of high demand-volatility parts or products (Lovell, Saw & Stimson, 2005).

The weight of the product is not only its physical property, but in the case of a less homogenous product or more differentiated product, it may add to it a special distinction. Wines sold in heavier bottles are often perceived as being of higher quality. The perception was stronger among naïve consumers and weaker among experts (Piqueras-Fiszman, Spence, 2012). Data from US imports also indicate that richer countries tend to export in more product categories, and they export lower quantities within those categories but at considerably higher prices, suggesting higher quality products (Hummels, Klenow, 2005). Value density is related to the incidence of logistical, including transport costs, on the final product price to the extent that the delivery cost of low-value density products becomes a key issue for profitability (Ghezzi, Mangiaracina & Perego, 2012).

An approach by Lashkaripour (2020) to analyse the role that value density plays in international trade uncovers relations between weight and quality perception. His model predicts that firms located in high-wage economies are more likely to supply heavier product varieties, whereas firms located in distant economies are more likely to supply lighter product varieties. Heavier varieties of the same product exhibit a significantly higher quality or appeal among customers. In his model, Lashkapour (2020) assumes that the unit weight explains up to 60% of the cross-supplier variation in quality. The unit weight of country-level exports increases significantly with the exporter's GDP per capita but decreases with the bilateral distance between the trading partners. The value-to-weight ratio of exports, meanwhile, increases significantly with both the exporter's GDP per capita and bilateral distance.

Furthermore, the producer can give his product an edge simply by adding a distinctive attribute that distinguishes it from the competition, thus creating a subvariant with altered market conditions and a higher value-to-weight ratio.

Stahel (2010) in his work, studied the relationship between the productivity of a given economy and the value density of its production. He established the value-per-weight

ratio as a simple metric that can be used by economic actors, innovators, politicians, and consumers to judge the economic resource productivity of goods and services. It provides consumers and producers with information about the sustainability of competing goods directly at the point of sale. The value-per-weight ratio, along with the value-per-labour ratio and the value-from-renewable resources ratio, constitute the three key dimensions of the competitiveness sustainability triangle – economic, environmental, and social welfare. As shown in Table 1, the metric of the value-per-weight ratio enables Stahel to classify the recent economy into three distinct types of: Stone age Economy, Industrial Economy and Performance economy. While the bulk goods are made by the Stone Age Economy, the smart goods are provided by the Performance Economy, with the production of the Industrial Economy falling somewhere in between. Transforming raw steel into autos, or in other words, shifting from a stone-age product to an industrial product, allows for a 25-fold increase in the value-per-weight ratio.

Industrial Economy bulk materials — coal, steel, and electricity – have a marginally higher value-per-weight ratio than Stone Age Economy products. However, by integrating these materials into high-value-added consumer goods such as autos and white goods, the Industrial Economy increases the value-per-weight ratio significantly. Razor blades, notebook computers, and other smart goods have a significantly higher value-per-weight ratio than bulk products. Utilizing smartness enables goods to have a higher value added. Extending the life of bulk durable products, such as automobiles and buildings, enables them to achieve a value-per-weight ratio comparable to that of smart goods.

Tab. 1: Product examples categorized into one of the three distinct economy types

	Value-per-weight ratio of goods		
	Stone age Economy	Industrial Economy	Performance Economy
Sand and gravel	1 ¢/kg		
Cement	6 ¢/kg		
Ready-mix concrete	4 ¢/kg		
Filet steak		20 €/kg	
Automobiles		20 €/kg	
Chateau Suduiraut		80 €/kg	
Razor blades		500 €/kg	
Natural fragrances		700 €/kg	
Notebook PC		700 €/kg	
Spinnaker Boutique cloth		800 €/kg	
Spectacle frames			5000 €/kg
Memory stick			8000 €/kg
amorphous carbon coating			40 000 €/kg
Fe_2O_3 tracer for drug delivery			100 000 – 500 000 €/g
"rebif" interferon			5 mil. €/g
Enzymes			up to 10 mil. €/g

Source: Stahel (2010).

However, for other goods in the Performance Economy, such as immaterial goods, intellectual property, and knowledge-based services (R&D, software, brands),

establishing a physical weight at the time of sale is challenging. Companies that successfully integrate the intelligent use of science into their company strategy will emerge as long-term winners.

Data and methods

Despite the fact of doubling the 16 CEE countries' exports to China (Tab. 2), a decade into the cooperation, it becomes evident that the early export and investment expectations of the participating CEE countries won't be materialized.

Tab. 2. The export to China by the CEE Countries participating in BRI and 16+1 forum (millions of USD)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Poland	1,627.5	1,860.9	1,748.9	2,119.7	2,251.0	2,017.3	1,911.1	2,305.0	2,501.4	2,701.6	3,059.8
Czechia	1,213.9	1,667.8	1,670.8	1,916.7	2,038.3	1,849.5	1,913.7	2,414.4	2,583.5	2,469.7	2,604.7
Slovakia	1,286.1	2,074.4	1,733.5	2,120.5	1,826.0	1,130.7	1,263.1	1,380.5	1,608.8	1,898.5	2,344.5
Hungary	1,529.0	1,683.0	1,810.6	1,997.3	2,156.2	1,796.8	2,244.6	2,663.9	2,371.5	1,666.4	2,062.8
Bulgaria	250.0	406.9	764.0	860.0	708.9	610.6	517.3	768.9	901.1	922.9	1,052.4
Greece	420.4	425.2	491.1	557.1	370.1	252.9	363.1	535.4	1 063.8	999.1	975.2
Romania	410.1	544.0	494.4	663.6	759.4	581.8	682.5	827.1	883.6	849.9	942.9
Serbia	7.3	15.3	19.8	9.1	14.2	20.2	25.3	62.2	91.7	329.2	377.0
Slovenia	119.8	126.8	174.0	168.7	186.5	164.5	300.7	359.1	360.2	297.4	318.9
Estonia	155.4	304.7	137.7	157.4	204.0	171.3	189.1	248.3	221.0	187.8	281.3
Latvia	33.1	55.8	59.9	111.1	139.9	120.3	133.1	161.5	187.6	179.4	177.4
North Macedonia	89.2	127.5	158.8	107.0	92.6	146.4	47.8	10.2	65.3	166.0	163.7
Croatia	37.7	54.7	45.9	76.4	68.1	77.3	83.8	126.0	158.4	120.5	96.7
Albania	85.2	48.6	53.1	108.4	83.0	52.1	60.0	70.8	52.7	56.5	46.3
Montenegro	0.2	1.0	4.9	5.2	3.4	8.8	20.9	7.3	16.6	19.7	25.4
Bosnia Herzegovina	5.0	5.8	5.6	7.1	9.2	16.0	14.7	22.1	22.4	17.1	15.2
TOTAL	**7,270**	**9,402**	**9,373**	**10,985**	**10,911**	**9,017**	**9,771**	**11,962**	**13,090**	**12,882**	**14,544**

Source: UN Comtrade, 2022.

The value-density metric is used to undertake an empirical examination of the export data. It can be determined in either unit or weight terms. Although UN Comtrade's trade statistics include some unit data, they are frequently incomplete, and reported units differ from one country to another. For practical reasons as well as the scope of applications, the value-density used in the further text is the value-to-weight ratio. As the name of the metric suggests, it is calculated as:

$$\frac{value}{weight} \quad (1)$$

The straightforward use of the value-density ratio, calculated as value-to-weight ratio, is its estimation for a single commodity. Since various commodities possess different

qualities, they also have various value-density ratios. Because the items within each commodity category are not totally the same, there is always some degree of heterogeneity. Even the quality attributes of crude oil, iron ore, or agricultural commodities can differ significantly according to their place of origin. This fact results in some ambiguity when employing, to some extent, aggregated statistics reported by the UN Comtrade. The value-per-weight ratio of a given commodity exported by two different exporters or exporting countries to a specific market is a reliable metric of the export effectivity. An established wine exporter with a good name can achieve a higher value-per-weight ratio than a novice to the market who has yet to earn his reputation. The higher the value-density a producer can sustain in a market, the more of his production costs, transport costs, or profit margin is covered. Higher production costs, depending on the product, could be the result of higher labour costs that can translate into higher salaries or employment. Higher production costs can also be the result of more expensive inputs that suggest higher quality, which often enables higher added value, hence profitability. The final product has usually a higher value-density than the value-density of the inputs it contains. Since the transport expenses associated with a higher value-density variant account for a smaller proportion of the total value, the trade can be conducted over a greater distance. This increases the sustainability of the trade by allowing for a greater area of supply operations.

Comparing value density ratios of a product category achieved by exporting countries reveals how solid footing they have in the specific product category and market. But comparing the country's overall exports, as opposed to exports within a product category, using a value density ratio is a more complex issue. Due to the high number and diverse nature of the goods exported by a country, calculating the value density ratios of each of the product categories would be highly impractical. Since every commodity possesses a unique value-density attribute, the commodity structure of the trade will play a crucial role in evaluating the value-density of a country's overall exports. The bigger the share of high value density products in the overall export, the higher the value-density ratio of the country's overall export.

The value-per-weight ratio of a country's total exports to another country is calculated as the average of the value-per-weight ratios of all product categories weighted by the proportion of product categories in the total exports:

$$VpWr = \sum_{i=1}^{n} \frac{v_i}{w_i} * \frac{v_i}{v_t} \tag{2}$$

where v_i is the export value of the commodity *i* to a specific country, $w_i$is the weight of the exported commodity *i* to the country, and v_t is the value of all commodities exported to the country by the exporter. From the construction of the index, it is obvious that while it provides a glimpse of the value density ratio of a given exporting country to a given market, in fact, it doesn't say much about the competitiveness nor sustainability of the exports because of the structural variability in trade among countries. While some

countries export advanced technology, others rely on exports of natural resources. The export structure is, to an extent, a result of the country's natural endowments. Therefore, the value density ratio is not a relevant measure for multinational comparison.

On the other hand, the application of the value density ratio allows for the assessment of one country's exports to another country in the context of economic benefits. The higher the reported value density for export to the destination market compared to the other markets, the higher the additional income the particular export generates. The exporting markets can then be ranked according to their premiums that reflect the economic benefits the exporters make from their exports. Given that there is a country A exporting to a country B, the overall value-per-weight ratio can be determined (i.e., the price for a kilogram of an exported commodity) for all commodities flowing from the country A to the country B:

$$p_i^{A,B} = \frac{v_i^{A,B}}{w_i^{A,B}} \tag{3}$$

$piA,B$is the value-per-weight ratio of A's export of the commodity i to the country B, $viA,B$is the value of the export, and $wiA,B$is its reported physical weight. The obtained figure $piA,B$is, at the same time, the average commodity price per weight unit. To be able to assess the price level in a particular destination market, it needs to be simply compared against the value-per-weight ratio of the same commodity exported to the rest of the world. This is calculated as follows:

$$p_i^{A,W-\{B\}} = \frac{v_i^{A,W-\{B\}}}{w_i^{A,W-\{B\}}} = \frac{v_i^{A,W} - v_i^{A,B}}{w_i^{A,W} - w_i^{A,B}} \tag{4}$$

$p_i^{A,W-\{B\}}$ is the value-per-weight ratio of the commodity *i* exported by the country A worldwide, except for the export of the commodity to the country B. By multiplying the weight of the commodity exported to country B ($w_i^{A,B}$) by the world market price $p_i^{A,W-\{B\}}$, the hypothetical revenue $r_i^{A,B,W}$ from the hypothetical sale of the product is calculated.

$$r_i^{A,B,W} = p_i^{A,W-\{B\}} * w_i^{A,B} \tag{5}$$

$r_i^{A,B,W}$is the revenue that could have potentially been generated from the sale of the commodity i in world markets if it hadn't been sold to country B due to the price difference between the market price of the country B and the average price in the rest of the world. It is a hypothetical number because those prices aren't by any means guaranteed.

The difference between the actual value of the export to country B and the hypothetical revenue $r_i^{A,B,W}$(6) uncovers the extent of the economic benefits harvested by exporting the commodity to the market of country B. A positive value of the difference indicates higher than average revenue from the sales to the market of country B. That can be considered an export premium, whereas a negative one shows lower than average

incomes from country B, pointing to the costs of lost opportunity from selling the commodity i to the market B.

$$g_i^{A,B,W} = v_i^{A,B} - r_i^{A,B,W} \tag{6}$$

This way, the value-per-weight ratio can be used to assess export markets for any commodity for which there is available data on weight. Export markets can be assessed as a whole by summing up the surpluses and gaps ($g_i^{A,B,W}$), i.e., premiums and costs of lost opportunity for all *n* commodities, to a single value. The sum then represents the whole of the gains and losses associated with exporting to the market. The sum can be a positive value, a negative value or 0. The higher the total value $g^{A,B,W}$, the more beneficial the export is for an exporter.

$$g^{A,B,W} = \sum_{i=1}^{n} g_i^{A,B,W} \tag{7}$$

The construction of the formula (8) indicates that the calculated economic costs and gains depend on the relative proportion of the value-per-weight ratio of the exports to China to the value-per-weight ratio of the same goods exported to the rest of the world. The exports of the countries whose exports to China are relatively limited demonstrate rather high volatility as a result of the strong influence of individual export contracts.

Additionally, the $g^{A,B,W}$ indicates a greater, lower, or identical price level in the destination market B in relation to the other export markets. The relative export price differential is computed simply by dividing $g^{A,B,W}$ by the country's total export value $v^{A,B}$ to the country B.:

$$PX^{A,B,W} = \left(\frac{g^{A,B,W}}{v^{A,B}}\right) * 100 \tag{8}$$

Results

Over 99 percent of all exports are reported in kilograms as well. Countries with smaller exports to China tend to show higher volatility of $g^{A,B,W}$ (in millions of USD) due to their sensitivity to individual purchases, whereas more established exporters (i.e., V4 countries) exhibit more consistent values of $g^{A,B,W}$. The results of the analysis are in Table 3.

Tab. 3: The premiums and costs of exports ($g^{A,B,W}$) to China are calculated using data from 16 Central and Eastern European countries (millions of USD)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Albania	15.1	-4.1	-0.1	37.6	0.1	13.5	-3.9	16.5	19.7	14.3	15.5
Bosnia Herzegovina	0.2	-1.6	-0.4	0.1	-0.3	0.9	-0.4	-0.4	-2.7	-6.6	-3.3
Bulgaria	-249.0	30.9	-44.9	-20.7	-76.1	-182.4	-147.1	-671.3	-295.7	-247.8	-333.0
Croatia	-55.7	-523.7	-75.7	-76.7	-84.0	7.0	-3.3	-2.2	37.1	32.2	25.0
Czechia	140.2	170.8	230.1	360.1	360.9	332.9	414.1	410.6	364.2	507.3	553.3
Estonia	-27.7	-29.2	-17.7	-18.0	2.6	18.5	48.9	51.7	44.1	27.7	48.9
Greece	-60.5	-25.3	3.5	32.4	22.6	22.5	3.0	55.2	61.8	80.5	23.0
Hungary	310.5	362.2	502.9	518.8	505.5	395.7	482.7	442.3	476.1	490.2	484.9
Latvia	-13.1	6.6	-7.5	-4.5	25.0	-40.6	25.6	31.2	24.6	-38.9	25.6
Montenegro	-0.3	0.5	4.2	-0.3	0.2	2.1	3.1	6.0	3.4	3.4	-2.0
North Macedonia	-8.4	-10.9	7.0	6.3	6.2	12.7	-1.3	-6.5	-4.8	32.9	18.7
Poland	118.8	55.4	-25.7	67.7	174.9	202.7	229.9	195.4	400.2	475.7	578.8
Romania	29.0	47.4	37.8	-102.7	142.3	95.5	-852.3	150.5	128.8	157.3	91.4
Serbia	1.3	3.3	1.7	-1.6	1.2	6.0	2.3	4.3	-4.3	-9.2	-8.0
Slovakia	-56.7	308.6	247.5	195.2	68.1	126.2	44.2	76.0	202.1	346.8	316.6
Slovenia	-25.0	-2.6	-33.4	15.6	29.2	33.7	36.3	74.5	64.1	55.2	70.4

Source: Author's own calculation based on UN Comtrade data, 2022.

The price differential between exports to China and the rest of the world is then estimated in relative terms using the formula (8) and the results for respective CEE countries are presented in Table 4.

Tab. 4: The export price differential ($PX^{A,B,W}$) between the prices at which 16 Central and Eastern European countries exported their goods to China and to other global markets in 2020.

Albania	33.5%	Czechia	21.2%	Latvia	14.4%	Romania	9.7%
Bosnia Herzegovina	-21.8%	Estonia	17.4%	Montenegro	-7.8%	Serbia	-2.1%
Bulgaria	-31.6%	Greece	2.4%	North Macedonia	11.4%	Slovakia	13.5%
Croatia	25.9%	Hungary	23.5%	Poland	18.9%	Slovenia	22.1%

Source: Author's own calculation based on UN Comtrade data, 2022.

Discussion

The Belt and Road Initiative as a symbol of the new China's emerging strength has sparked debates between the West and East. China's 16+1 forum has raised significant expectations both in China and among participating CEE nations.

Gao (2019) observes that the Chinese government and state-run media portray the Belt and Road Initiative in multiple positive ways, such as: "Development," "Mutual respect and mutual trust," "Ancient Silk Road Story," "Action Speaks Louder than Words," "China is a Partner, not a Colonialist," and "Win-Win". However, Matura (2019) emphasizes that the

growing and intensifying cooperation between China and 16 Central and Eastern European countries has drawn widespread criticism from EU institutions and western European countries, who believe China is attempting to gain political leverage in the EU via its CEE members. Meanwhile, the never materialized Chinese trade and investment promises have contributed to rising disillusionment in a number of Central and Eastern European countries. Nevertheless, a realistic view of the cooperation within the 16+1 framework is needed. This article examines how the value-density index, which is mostly applied in logistics, may be used as a comprehensive metric for sustainability in exports to China.

Table 2 shows that CEE countries' exports have seen a twofold rise since 2010. Certain countries managed to raise their exports tenfold or even more. While some may view this as a success, others may find it disappointing. However, the CEECs' exports to China must be viewed in the context of their global exports. The value density enables comparisons between the price per kilogram of a product exported to China and the price of the same product sold globally. A positive price difference indicates an additional benefit of exporting to China, whilst a negative difference is a sign of sales at a lower price than the products are sold for elsewhere. The sum of these gains and losses from exports to China constitutes a comprehensive measure $g^{A,B,W}$ (in millions of USD) of the exports of a given CEE country to China.

Farrell (2005) considers value density a vital part of a country's prosperity since the value-per-weight ratio constitutes one of the tree dimensions of his sustainability triangle. The results show that EU members of the CEE region outperformed non-EU nations on average, with V4 members outperforming significantly.

The higher the value-per-weight ratio of a product, the lower the transportation costs as a percentage of the total value of the product delivered to distant markets, meaning that a greater proportion of the product's value can be used to cover other costs or to generate a profit margin. The exported goods that have lower value-per-weight ratio tent to face more competition as there is usually higher number of available producers with substitute goods at the distant market, which, in order to cover higher transport costs, consequently, drives its selling prices below the price levels on markets in its closer proximity.

These findings support (Lashkaripour, 2020) conclusion that the value-to-weight ratio of exports grows significantly with both the exporter's GDP per capita and bilateral distance, all the more so given that China is one of the most geographically distant markets relevant to CEE exporters.

Conclusion

The CEE region is not a uniform entity but rather a diverse group of countries at different levels of industrialisation and development. The 16+1 format is more of a regionally defined group led by a dominant country than a block of countries with shared values or common interests. The diversity of the participants is also evident in their export figures to China (Tab.2). In 2020, almost 70% of all the CEE region's exports to China came from

the V4 countries, another 26% from other participating EU members (Bulgaria, Greece, Romania, Slovenia, Estonia, Latvia and Croatia), and only 4% from the regional non-EU countries participating in the 16+1 format. Except for Albania, the other CCE countries increased their exports to China between 2010 and 2020. Whereas these are absolute figures that do not take the size of the economy or selling prices into consideration, the proposed comprehensive measure $g^{A,B,W}$ in millions of US dollars enables the assessment of the economic gains / losses of exporting to China.

The V4 members managed to increase their gains significantly since 2010. In 2020, Hungary sold its products to China at 23.5% higher prices than it was selling for elsewhere, Czech Republic by 21.2% higher, Poland 18.9% and Slovakia 13.5% higher prices than charged in the rest of the world. Greece has so far failed to substantialize its close ties with China, which stem from China COSCO majority ownership of the Greek Piraeus Port. Nevertheless, Greece's export prices to China are slightly higher (2.4%) than those to the rest of the globe. Bulgaria, on the other hand, seems to be the single most disadvantaged country in this relationship with China. As indicated by the $g^{A,B,W}$ values, Bulgaria's export prices to China are significantly lower than its global average. If Bulgaria's weight data is right, the prices charged in China in 2020 were more than 30% below Bulgaria's average prices in other regions of the world.

Three regional non-EU countries' (Bosnia and Herzegovina, Montenegro, and Serbia) exports to China deteriorated further, with their $g^{A,B,W}$ in 2020 being negative and even lower than a decade ago. Only North Macedonia managed to improve its exports to China in terms of $g^{A,B,W}$ over a ten-year period. This means that these countries are exporting their goods to China at lower prices than they export to other markets. The question here is why these countries would export commodities to China for even lower prices than the adequate price elsewhere. Albania, despite an almost 46% decline in sales to China, achieved about the same gains as it did ten years ago, thanks to much higher selling prices (+ 33%) for its commodities in China than in other export markets in 2020 (Tab. 4).

The findings suggest that the EU membership is perhaps more essential for CEE countries' economic gains from exporting to China than their participation in the 16+1 format. Similar assumptions, however, would require the development of an econometric model with variables such as GDP, EU membership status, and foreign investments.

Acknowledgement

This contribution was supported by project VEGA No. 1/0777/20, "Belt and Road initiative – opportunity or threat to the EU and Slovak export competitiveness?"

References

BĄK M., 2019. Central and Eastern European countries toward the belt and road initiative: The role of 16+1 initiative. *Global Journal of Emerging Market Economies*, **11**(1–2), 11–36. doi: https://doi.org/10.1177/0974910119871374

CHRISTEN O., 2010. *Interdisciplinary and sustainability issues in food and agriculture*. Ramsey: Eolss Publishers Co Ltd. ISBN 978-1-84826-785-5.

DELFMANN W., ALBERS S., 2000. *Supply chain management in the global context*.

DETTMER B., FREYTAG A., DRAPER P., 2014. Air cargo beyond trade barriers in Africa. *Journal of Economic Integration*, **29**, 95–138. doi: https://doi.org/10.11130/jei.2014.29.1.95

FARRELL D., 2005. Beyond offshoring: assess your company's global potential. *Harvard Business Review*, **82**, 82–90, 148.

GAO M., 2019. Frames and facilitators by China in promoting the belt and road initiative (BRI). *Thunderbird International Business Review*, **62**. doi: https://doi.org/10.1002/tie.22108

GHEZZI A., MANGIARACINA R., PEREGO A., 2012. Shaping the e-commerce logistics strategy: A decision framework. *International Journal of Engineering Business Management*, **4**, 1–13. doi: https://doi.org/10.5772/51647

HUMMELS D., KLENOW P., 2005. The variety and quality of a nation's trade. *American Economic Review*, **95**, 704–723. doi: https://doi.org/10.1257/0002828054201396

KAVALSKI E., 2021. Quo vadis cooperation between China and Eastern Europe in the era of COVID-19? *World Affairs*, **184**, 33–56. doi: https://doi.org/10.1177/0043820021991116

LASHKARIPOUR A., 2020. Weight-based quality specialization. *Journal of International Economics*., **127**, . doi: https://doi.org/10.1016/j.jinteco.2020. 103380

LI Y. , HE Z., 2022. The remaking of China–Europe relations in the new era of US–China antagonism. *Journal of Chinese Political Science*, doi: https://doi.org/10.1007/s11366-022-09792-5

LOVELL A., SAW R., STIMSON J., 2005. Product value-density: Managing diversity through supply chain segmentation. *International Journal of Logistics Management,* **16**, 142–158. doi: https://doi.org/10.1108/09574090510617394

MATURA T., 2019. China–CEE trade, investment and politics. *Europe-Asia Studies*, **71**, 1–20. doi: https://doi.org/10.1080/09668136.2019.1571166

MUSABELLIU M., 2017. China's belt and road initiative extension to Central and Eastern European countries - sixteen nations, five summits, many challenges. *Croatian International Relations Review*, **23**. doi: https://doi.org/10.1515/cirr-2017-0007

PEPERMANS A., 2018. China's 16+1 and belt and road initiative in Central and Eastern Europe: economic and political influence at a cheap price. *Journal of Contemporary Central and Eastern Europe*, **26**(2–3), 181–203. doi: https://doi.org/10.1080/25739638.2018.1515862

PIQUERAS-FISZMAN B., SPENCE C., 2012. The weight of the bottle as a possible extrinsic cue with which to estimate the price (and quality) of the wine? Observed correlations. *Food Quality and Preference*, **25**, 41–45. doi: https://doi.org/10.1016/j.foodqual.2012.01.001

REYNOLDS-FEIGHAN A. J., 2001. *Air freight logistics*. Elsevier Science.

RIET O., JONG G., WALKER, W., 2007. *Drivers of freight transport demand and their policy implications: obstacles, trends, solutions*. 73–102. ISBN 978-0-08-044709-4.

RINNA A. V., 2021. The Beijing–Minsk Partnership and Belarus's role in China's economic relations with the European Union. *China Report*, **57**, (1), 79–94. doi: https://doi.org/10.1177/0009445520984756

SONG W., FÜRST R., 2022. China's bid for international leadership in Central and Eastern Europe: Role conflict and policy responses. *International Relations*, doi: https://doi.org/10.1177/00471178221082871

STAHEL W. R., 2010. *The performance economy*. 2nd ed. Basingstoke: Palgrave Macmillan. ISBN 978-0-230-58466-2338.

STANOJEVIC S., QIU B., CHEN J., 2021. A Study on trade between China and Central and Eastern European countries: Does the 16+1 cooperation lead to significant trade creation? *Eastern European Economics*, **59**(4), 295–316. doi: https://doi.org/10.1080/00128775.2021.1928518

TURCSANYI R., KACHLIKOVA E., 2020. The BRI and China's soft power in Europe: Why Chinese narratives (initially) won. *Journal of Current Chinese Affairs*, **49**(1), 58–81. doi: https://doi.org/10.1177/1868102620963134

TURCSANYI R., QIAOAN R., 2020. Friends or foes? How diverging views of communist past undermine the China-CEE '16+1 platform.' *Asia Europe Journal*, **18**. doi: https://doi.org/10.1007/s10308-019-00550-6

VANGELI A., 2019. Diffusion of ideas in the era of the belt and road: Insights from China–CEE think tank cooperation. *Asia Europe Journal*, **17**. doi: https://doi.org/10.1007/s10308-019-00564-0

VERGERON K. L., 2018. The new silk roads: European perceptions and perspectives. *International Studies*, **55**(4), 339–349. doi: https://doi.org/10.1177/0020881718812308

ZUOKUI L., 2017. China-CEEC cooperation: China's building of a new type of international relations. *Croatian International Relations Review*, **23**. doi: https://doi.org/10.1515/cirr-2017-0005

Contact address of the author:

Ing. Ondrej Tomčík, University of Economics, Faculty of Commerce, Dolnozemská cesta 1, 852 35, Bratislava-Petržalka, Slovak Republic, email: ondrej.tomcik@euba.sk