THE CONCENTRATION OF THE AGRICULTURE AND LIVESTOCK SECTOR IN THE VISEGRAD GROUP AFTER MEMBERSHIP TO THE EUROPEAN UNION

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ABSTRACT

In the study, after the European Union (EU) membership of the Visegrad group (since 2004), both export and import levels were analyzed in products representing the agriculture and livestock sector. The results of the analysis show us that. The fact that the Visegrad group has EU membership has reduced the level of concentration over time. CR and HHI, the two most commonly used concentration analyses in the literature, were used as methods. Among the Visegrad countries, the country with the highest concentration of exports in agricultural and livestock products is Hungary and the country with the lowest is Poland. On the contrary, the country with the highest concentration of imports is Poland and the country with the lowest concentration is Hungary.

Introduction

The Visegrád countries (Hungary, Poland, Czech Republic, Slovakia) officially became members of the EU in 2004, although it was established in 1991. Although membership of the European Union was seen as a chance for Central European countries, was it really so? As stated on the official site of the Visegrad Group, the purpose of its accession to the EU was to promote optimum cooperation, especially with its neighbours. The Visegrad Group aimed to contribute to the construction of a European security architecture based on effective, functionally complementary and mutually reinforcing cooperation and coordination within the existing European and transatlantic institutions. The participating countries perceived cooperation as a challenge and its success as the best proof of their ability to integrate into such structures as the EU. Of course, after EU membership, the Visegrad group gained significant advantages both geographically and in terms of the ease of foreign trade. How has the post-EU accession period really affected the foreign trade of these countries? The Visegrad group was in a state of integration in which it could diversify its foreign trade, but in reality, how was the concentration of its foreign trade affected? Agriculture and livestock sector is one of

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the most strategic sectors for all countries. Especially in this period when the world population is increasing, the production and trade of agriculture and animal husbandry are gaining more importance day by day. Therefore, it is very important to carry out an analysis of these sectors. In this context, in the study, we examined the levels of concentration of both imports and exports in the agricultural and livestock sector of the Visegrad group countries. In particular, in the study that dealt with the post-EU accession period (2004-2021), we considered the 3-digit product groups that included the agriculture and livestock section of the Standard International Trade Classification (SITC). In the analysis of 36 product groups, we determined the concentration levels using trade concentration (CR) and the Herfindahl-Hirschman index (HHI).

There are many studies in the literature in which the agricultural sector of the Visegrád group is examined. Some of these studies examined the competitiveness of agricultural products, while others examined the level of concentration. Some studies have examined the level of concentration on both sectoral and geographical basis. For example; Kněžáčková and Pásler (2017) examined the level of concentration of specialization of the Visegrád group countries on a regional and sectoral basis, while Svatoš and Smutka (2012) examined both the product and regional competitiveness of the agricultural trade of the Visegrad Group countries in 1993-2008. The analyses show that the EU accession process reflects positively on the agricultural trade results, especially in Poland. In the Czech Republic and Slovakia, accession to the EU has likewise not led to a worsening of the consequences in the field of agricultural trade. In Hungary alone, serious structural problems are encountered in agricultural trade after joining the EU. Similarly, Zdráhal et al. (2018) investigate the effects of sector-by-sector concentration on the profitability of the dairy industry of the Visegrad countries between 2006 and 2014. The findings suggest that concentration has a significant impact on the performance of dairy businesses. Hegyi-Kéri (2013) tried to determine which sectors of specialization and concentration there were in the Visegrád countries between 2000 and 2007. Some studies have calculated the competitiveness and concentration levels of agricultural products together. For example; Vasary et al. (2014) analyzed the competitiveness of the Visegrád countries in agricultural products between 2001 and 2011 with the RCA and Export-Import ratio index and the level of concentration with the Herfindahl-Hirschman Index. Nagy and Jámbor (2019) focus on the dairy exports of the European Union (EU) and the Visegrad Group between 2000 and 2017 and analyze this with Balassa's RCA index. Similarly, Miklós (2012) analyzed the competitiveness of agricultural products of the Visegrad group countries with the export-import ratio and the Balassa index, and the level of concentration with the Herfindahl-Hirschman Index. The results of the analysis showed that the highest level of concentration was in Slovakia and the Czech Republic. Some studies have only analyzed the competitiveness of agricultural products. For example; Bielik et al. (2012) analyzed the comparative advantage of the Visegrad countries in agricultural trade with the RCA index in their study. According to the results of the analysis, the Czech Republic, Slovakia and Hungary do not have a global competitive advantage in agricultural trade. Szabo et al. (2018) examined the agricultural sector

performance of the Visegrad group between 2004-2013 through input-output analysis. The results of the analysis show that more investment is needed for the development of the agricultural sector.

In the literature, the competitiveness and concentration levels of the Visegrád countries in the agricultural sector have been examined in general, but no studies involving both export and import concentration have been found. This strengthens the originality of the study and its contribution to the literature. State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Materials and methods

The CR index is one of the most widely used methods in concentration analysis. Condensation rate index; It can be used for foreign trade of the company, product, sector or country. The CR index is formulated as follows (Topçu & Sarıgül, 2019):

$$CR = \sum_{i=1}^{k} Pi \ x\ 100$$

The CR index is valued between 0 and 100. If the index is below 30, there is low concentration, between 30 and 50 there is moderate concentration, between 50 and 70 there is high degree of concentration, and above 70 there is a very high degree of concentration (Ünlü & Yıldız, 2019).

HHI is a standard index used to analyze the degree of concentration of a particular industry in a particular geographic market. With the help of HHI, it is possible to measure how close a market is to a monopoly or a fully competitive market (Kozáková & Barteková, 2020). HHI, which is also used in the calculation of export and import concentration, is calculated by taking the square of the export shares of a certain sector in all countries. HHI is formulated as follows (Meilak, 2008):

$$HHI = (Pi)^2$$

Pi represents the share of exports or imports in the total of each of n groups of the selected size (geography or product). The square values of each Pi are added together and the export or import concentration rate of that country is calculated. If this concentration is calculated geographically, it measures the trade distribution between the partners of the exporter or importer in question (Karahan, 2017). The index value varies between 0 and 1. If the index value is below 0.01, there is little to no concentration (diversification is high) and this increases the country's foreign trade competitiveness. An index value below 0.15 indicates that the concentration is at a low level. If the index is between 0.15 and 0.25, there is a moderate level of concentration, and above 0.25 there is a high level of concentration (Vaid, 2018).

If the export or import is carried out only to a single country (trading partner), the index receives its highest value and the concentration is very high. An index value close to 1 indicates a very concentrate market. On the contrary, the larger the number of countries in which foreign trade is carried out (the greater the diversification of exports), the lower the possible value of the index. A value of 0 reflects a completely equal distribution of the countries in which exports or imports are carried out (Laskiene et al., 2017).

Visegrad Group Export Concentration Analysis

In this section, the export concentrations of the agricultural and livestock sectors of the Visegrad Group will be discussed. The product groups for which the concentration analysis was carried out were made on the basis of 36 product groups that deal with Standard International Trade Classification (SITC) Revision 3, 3 digit agricultural and livestock products (0 code in single digits). The product groups we consider for concentration analysis are shown in Table 1. The study covers the period from 2004 to 2021, as it covers the post-EU accession period of the Visegrad Group. Thus, we will try to reveal the structure of foreign trade in the agriculture and livestock sector.

Table 1. SITC Rev. 3, 3 Digit Agricultural and Livestock Products

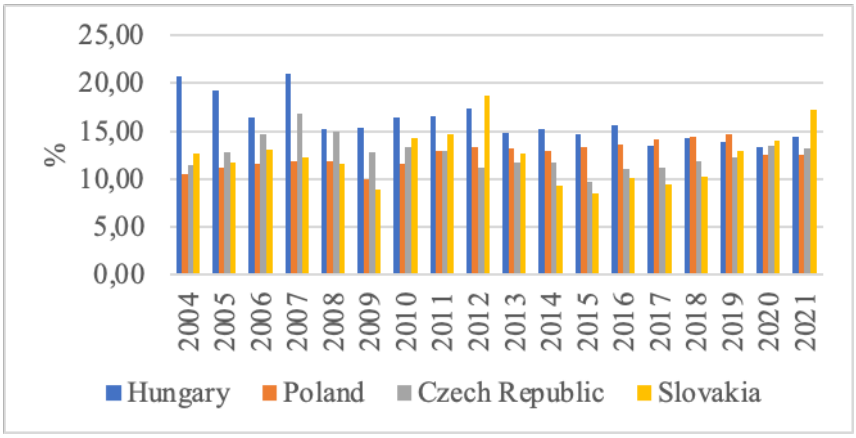
Product Code	Product Name	Product Code	Product Name
001	Live animals except fish	046	Flour/meal wheat/meslin
011	Beef,fresh/chilld/frozen	047	Cereal meal/flour n.e.s
012	Meat nes,fresh/chld/froz	048	Cereal etc flour/starch
016	Meat/offal preserved	054	Vegetables,frsh/chld/frz
017	Meat/offal presvd n.e.s	056	Veg root/tuber prep/pres
022	Milk pr exc buttr/cheese	057	Fruit/nuts, fresh/dried
023	Butter and cheese	058	Fruit presvd/fruit preps
024	Cheese and curd	059	Fruit/veg juices
025	Eggs, albumin	061	Sugar/mollasses/honey
034	Fish,live/frsh/chld/froz	062	Sugar confectionery
035	Fish,dried/salted/smoked	071	Coffee/coffee substitute
036	Crustaceans molluscs etc	072	Cocoa
037	Fish/shellfish,prep/pres	073	Chocolate/cocoa preps
041	Wheat/meslin	074	Tea and mate
042	Rice	075	Spices
043	Barley grain	081	Animal feed ex unml cer.
044	Maize except sweet corn.	091	Margarine/shortening
045	Cereal grains nes	098	Edible products n.e.s

Source: COMTRADE, 2023

When the CR index analysis of the Visegrad group is examined, the country with the highest concentration of single products is Hungary. However, we see that Hungary's concentration in the period from 2004 to 2021 is on a decreasing trend (Figure 1). In 2021, the country with the highest single product concentration analysis is Slovakia. The single crop concentration level in Slovakia and Hungary remains unstable, with

levels much higher in some years. Across the Visegrad countries, crop concentration has declined from around 20% in 2004 to 15% over the years. In fact, it can be said that the only product concentration in the Visegrad group is at the low concentration level.

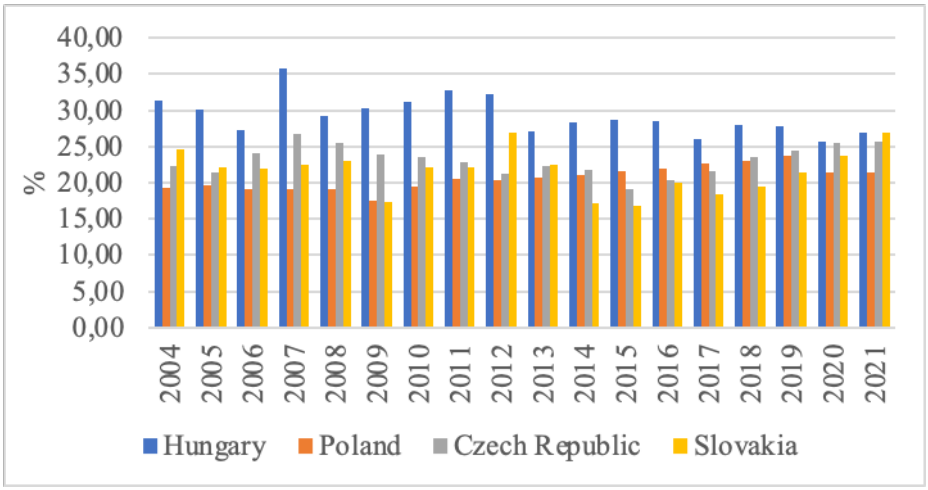
Figure 1. Visegrad Countries CR (1) Analysis Results



Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the country with the highest concentration of the two products according to the agriculture and livestock sector is generally Hungary (Figure 2). But as we get closer to 2021, the two product concentrations of Slovakia and the Czech Republic have undeniably converged. Poland is relatively better positioned than other Visegrád countries. When we examine the Visegrád countries in general, we see that the concentration levels have decreased from 30% to 25%. This shows that the level of concentration in the Visegrad group has decreased relatively after EU membership.

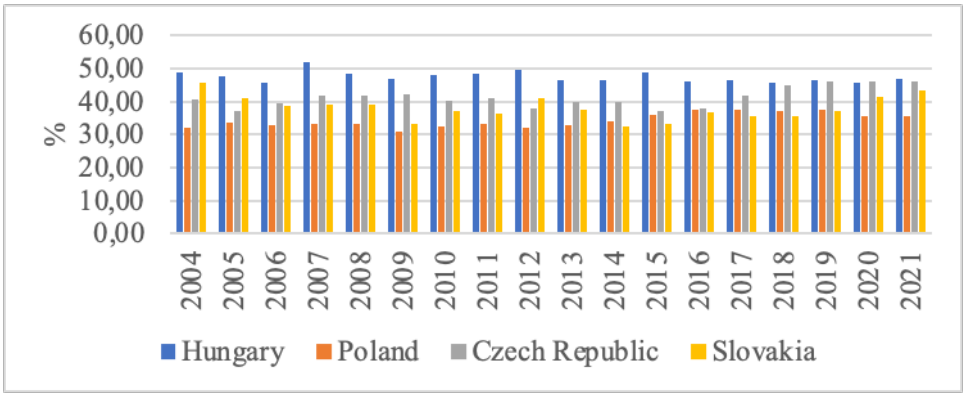
Figure 2. Visegrad Countries CR (2) Analysis Results



Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the country with the highest concentration of four crops by agricultural and livestock sector is generally Hungary and the Czech Republic (Figure 3). As we approach 2021, we see that Poland's product concentration, which is at 30%, is close to 50% in other Visegrad countries. Poland is again in a relatively better position than the other Visegrád countries. When we examine the Visegrád countries in general, we see that their concentration level has increased to 50%.

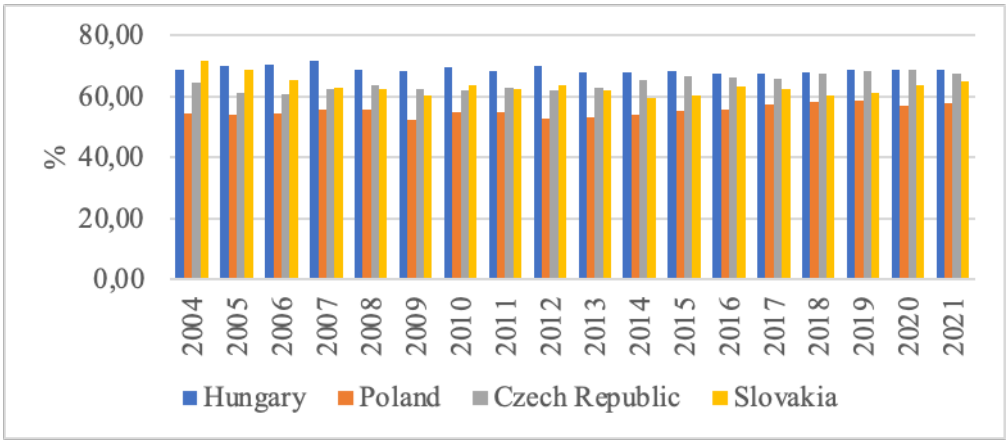
Figure 3. Visegrad Countries CR (4) Analysis Results



Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the countries with the highest concentration of eight crops by agricultural and livestock sector are generally at almost 70% in all countries except Poland (Figure 4). As the number of products increases, it is usual for countries' product concentration levels to increase and converge. Despite this, Poland is again in a relatively better position than the other members of the other Visegrád countries.

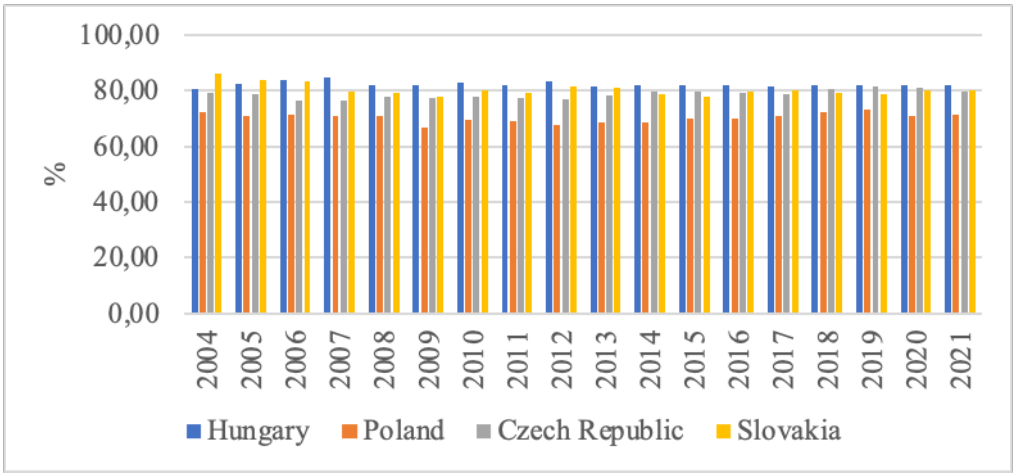
Figure 4. Results of CR (8) Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the countries with the highest concentration of twelve crops by sector of agriculture and livestock are just as in the concentration of eight countries. (Figure 5). As the number of products for which concentration analysis was carried out increased (meaning 3 in 36 products), the product concentration levels of the countries increased and converged. Poland, however, is again in a relatively better position than other members of the other Visegrád countries. The twelve crop concentration levels of the Visegrad group are around 80%, with the exception of Poland, of course.

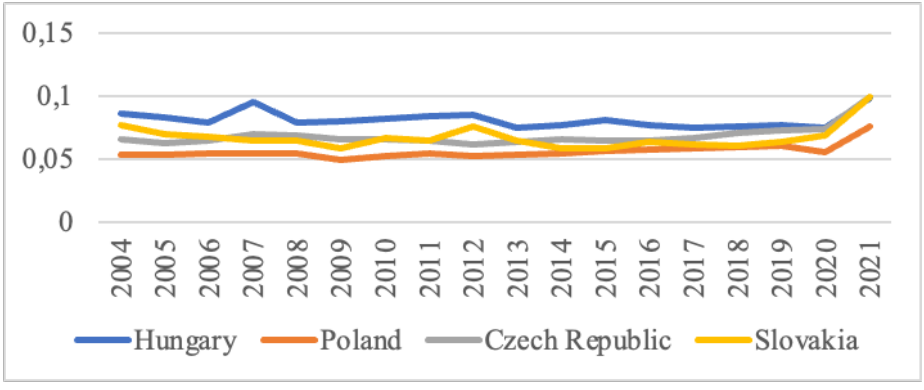
Figure 5. Results of CR (12) Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

The HHI analysis results of the Visegrad countries (Figure 6) are consistent with the CR index. According to HHI analysis scores, Hungary has the highest HHI index value and the highest product concentration. Again consistent with the CR index results, the country with the lowest product concentration is Poland.

Figure 6. HHI Results of Visegrad Countries



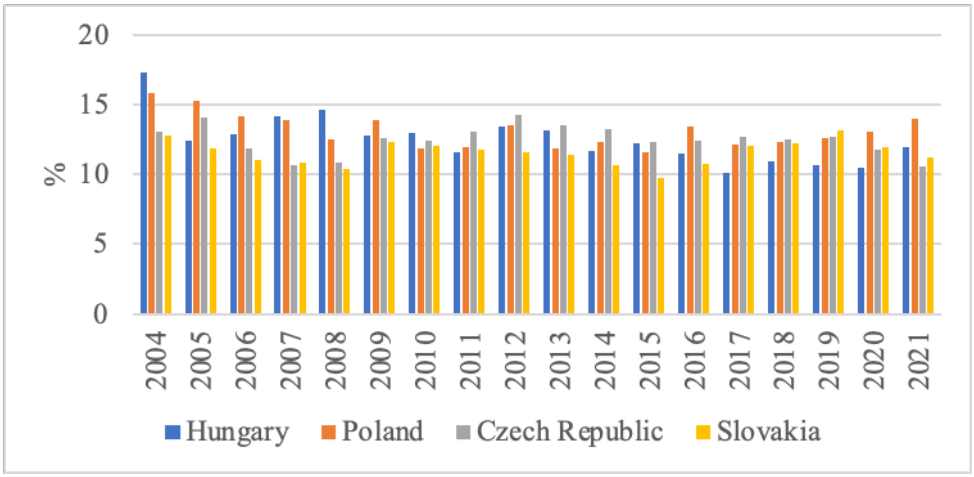
Source: It was calculated by the author using data from the COMTRADE database

Looking at the Visegrad countries in general, the results of the analysis for 36 product groups generally show a low level of product concentration. Again according to Figure 6, HHI values, which had a sharp decline in 2020, increased again in 2021.

Visegrad Group Import Concentration Analysis

In this section, the import concentrations of the agricultural and livestock sectors of the Visegrad Group will be discussed. The product groups for which the concentration analysis was carried out were carried out on the same product groups for which the export concentrations were analyzed (SITC Rev. 3, 3 digit agricultural and livestock products). For the product groups we consider for the analysis of import concentrations, see Table 1.

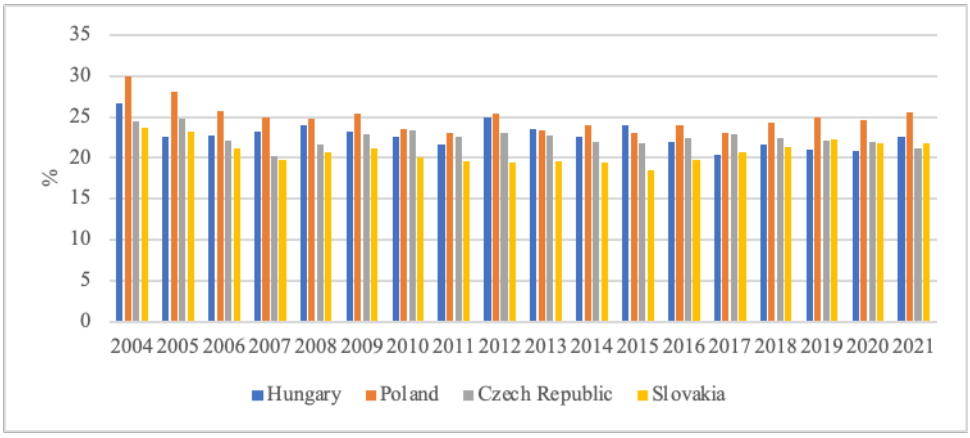
Figure 7. Results of CR (1) Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

When we examine the CR index analysis of the Visegrad group, the countries with the highest concentration of single products are Poland and Slovakia (Figure 7). The country with the highest concentration of imports in 2004 was Hungary, while in 2021 it was Poland. Slovakia and Hungary have a single crop concentration level that remains unstable, with lower levels in some years. Across the Visegrad countries, single crop concentration has declined from around 15% in 2004 to 10% over the years. In fact, it can be said that the only product in the import concentration in the Visegrad group, just like in the export concentration, is at the low concentration level.

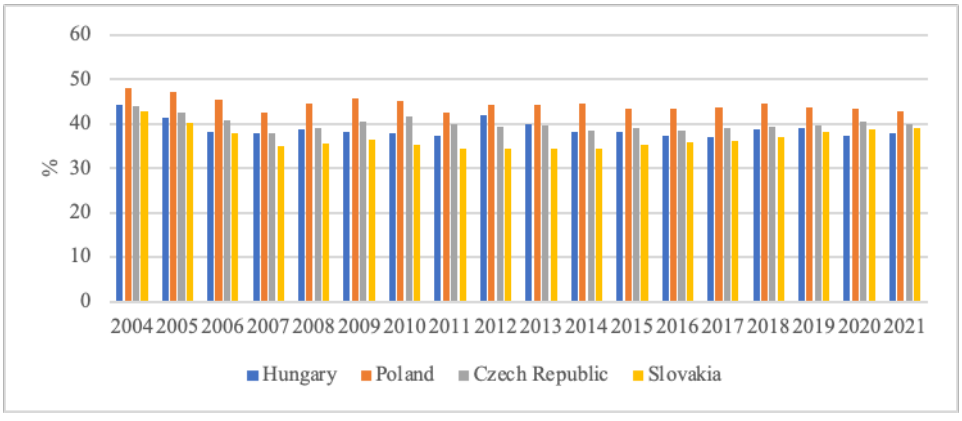
Figure 8. Results of CR (2) Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

In the Visegrad group, the country with the highest concentration of the two products according to the agricultural and livestock sector is generally Poland (Figure 8). However, as we approach 2021, the concentration of products in Slovakia and Hungary has also come undeniably close to each other. The Czech Republic is relatively better positioned than other Visegrád countries. When we examine the general population of Visegrád countries, we see that their concentration levels are in the 25% band.

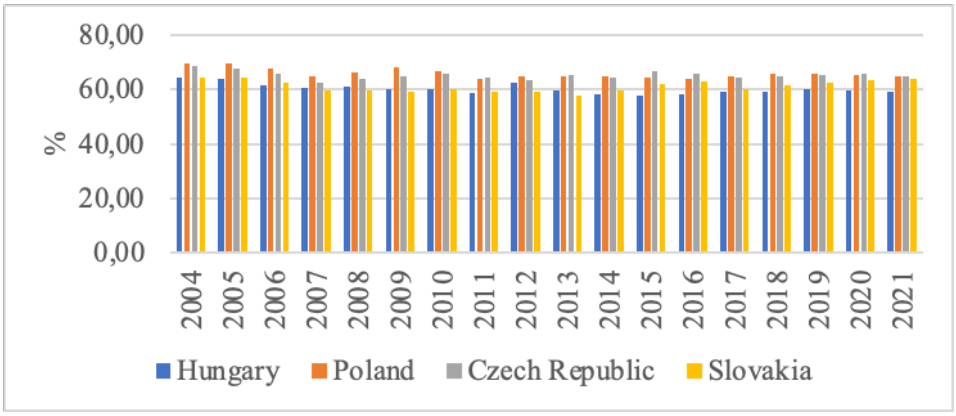
Figure 9. Results of CR (4) Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the country with the highest concentration of four products by agricultural and livestock sector is generally Poland (Figure 9). As we approach 2021, we see that Poland has an import concentration of close to 50%.

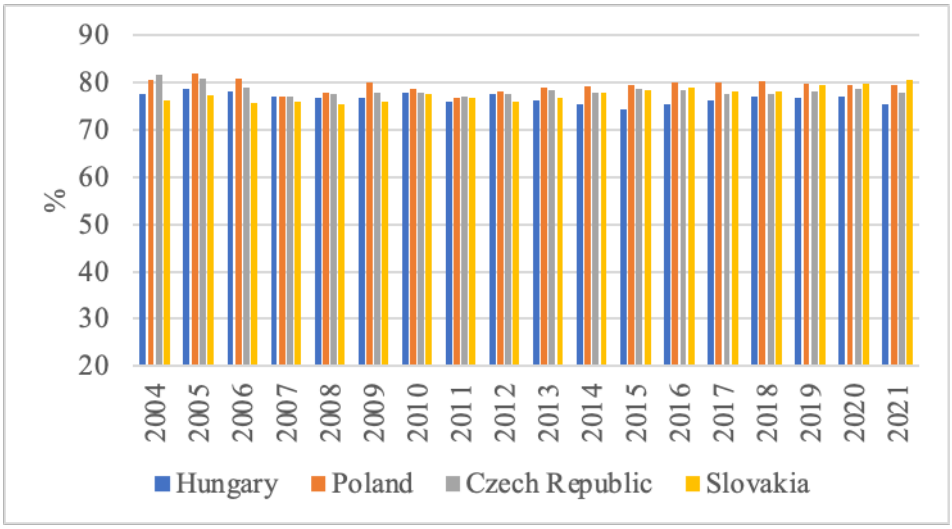
Figure 10. Results of CR (8) Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the countries with the highest concentration of eight products by agricultural and livestock sector are generally above 60% in all countries except Hungary (Figure 10). Just like in export concentration, as the number of products increased in import concentration, the product concentration of the countries approached each other. Despite this, Hungary is again in a relatively better position than the other members of the other Visegrád countries.

Figure 11. Results of CR (12) Analysis of Visegrad Countries

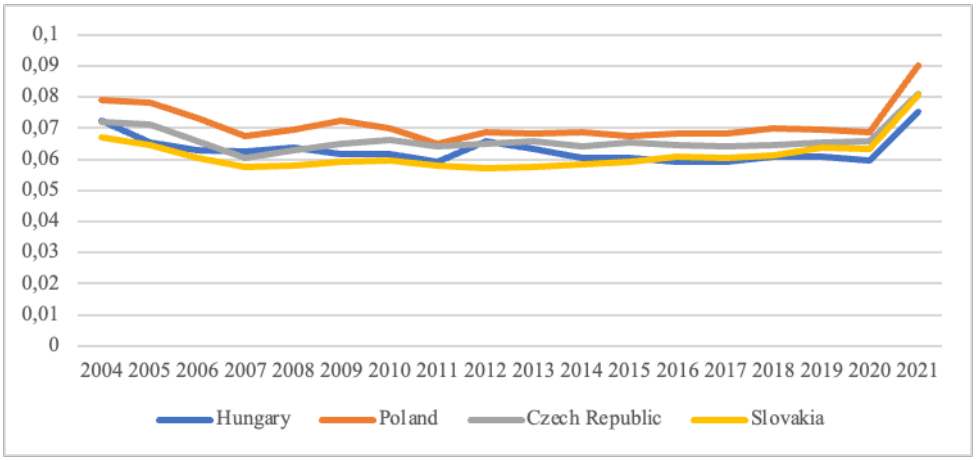


Source: It was calculated by the author using data from the COMTRADE database

Within the Visegrad group, the countries with the highest concentration of twelve crops by sector of agriculture and livestock are just as in the concentration of eight countries. (Figure 11). As the number of products for concentration analysis increased, the product concentration levels of the countries increased and converged. However, Hungary is

again in a relatively better position than the other members of the Visegrád countries. In general, the twelve product condensation levels of the Visgrad group are close to 80%.

Figure 12. Results of HHI Analysis of Visegrad Countries



Source: It was calculated by the author using data from the COMTRADE database

The HHI analysis results of the Visegrad countries (Figure 12) are consistent with the CR index. According to HHI analysis scores, the country with the highest HHI index value and the highest product concentration is Poland. Again consistent with the CR index results, the country with the lowest product concentration is Hungary. Looking at the Visegrad countries in general, the results of the analysis for 36 product groups generally show a low level of product concentration. Again, according to Figure 12, HHI values, which had a sharp decline in 2020, increased again in 2021.

Discussions

In the study, export and import concentrations were analyzed for 36 product groups in the agriculture and livestock sector of the Visegrad Group. First, export concentrations were discussed and it was found that Hungary had the highest concentration among the Visegerad countries in general. However, the fact that Hungary has a high concentration of exports has had the opposite effect in terms of import concentration. Likewise, in Poland, where export concentration is the lowest, import concentration is the highest. This means the following. Hungary exports agricultural and livestock products only to certain countries, but has a wider foreign trade portfolio in imports. Conversely, Poland imports agricultural and livestock products only from certain countries, but has achieved a higher diversification in exports.

Conclusions

The examination of the concentration level of the countries reveals the trade portfolio on both sectoral and product basis. The study helps us to examine the agricultural and livestock sector of the Visegrad countries and to understand the export diversification

of these countries in these sectors. The results of the analysis (CR (1), CR (2), CR (4), CR (8), CR (12) and HHI) show in which countries the concentration of exports and imports is higher. The fact that countries have both export and import concentration shows that they trade more with certain countries. Likewise, the decrease in both export and import concentration levels after EU membership in 2004 is a situation in favor of the Visegrad countries. After EU membership, the Visegrad countries managed to diversify their exports and imports for agricultural and livestock products.

Conflict of interests

The author declare no conflict of interest.

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