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DIFFERENTIATION OF FOOD PRICES IN THE EUROPEAN UNION

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Abstract

The purpose of the paper is to analyse the differentiation of food prices in the European Union. The analysis is based on data from Eurostat, that periodically compares prices of consumer goods and services in households in the EU-28. As regards food products, the comparative analysis covers prices of approximately 440 comparable products. For each country, Price Level Index (PLI) is calculated with respect to food, non-alcoholic beverages, alcoholic beverages and tobacco, to compare price levels in different countries with the average food price level in the EU. PLI values are calculated taking into account the ratio of Purchasing Power Parity (PPP) to the official exchange rate in each country against EUR (for countries outside the euro area), which makes it possible to compare the prices of the same food products in one common currency. The analysis of the differentiation of prices of food product in particular groups in the EU was based on differentiation coefficients, calculated for particular food product groups. The comparative analysis of food price differentiation was carried out for all EU-28 countries. The analysis covers the period of 2004-2017.

The analysis shows that PLIs of food and non-alcoholic beverages vary significantly between particular EU Member States. At the same time, prices of these products in the "new" EU Member States (EU-13) are much lower than in the "old" Member States (EU-15). Gradual levelling of food prices in the EU can also be observed. The convergence of food prices, despite being a long-term process, means that cost-price advantages gradually cease to be a key determinant of international competitiveness for producers from the EU-13 countries. Due to globalization and European integration, the importance of non-price competitiveness factors is systematically growing. This phenomenon compels food producers from particular countries to seek new sources of competitive advantages on the demanding EU market.

Key words**:** Food, Prices, Differentiation, Convergence, European Union.

JEL classification**:** E31, O13, Q11, Q13.

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1. Introduction

The classic market mechanism, which describes causal relations between particular elements of the market, i.e. supply, demand and prices, works only in conditions of perfect competition. When prices get stiffed or are affected not only by changes in supply or demand, the market mechanism is restricted. The market mechanism can be restricted by total stiffening of prices by the state or by setting minimum and maximum prices. More often, however, the market mechanism is disturbed as a result of monopolistic or monopsonistic activities, when an increase in supply is not accompanied by a drop in prices, and an increase in demand is not accompanied by their increase. In the short term, the likelihood of changes is also influenced by financial and material constraints related to production capacities, availability of inputs, low degree of their mobility or a seasonal nature of their production (Wrzosek, 2002). Due to differences between the European Union (EU) countries in the degree of monopolization of markets and in the extent of financial and material restrictions, as well as due to the emerging differences as regards state interference, despite the Common Agricultural Policy (CAP), food prices in the EU turn out to be rather varied.

Contemporary markets are more or less imperfect, and geographically – very large and distant from each other, which often leads to some sort of price differentiation. Segmentation of markets is also enhanced by the existence of state borders and trade barriers, the operation of market regulation instruments as well as the lack of a single currency. The specific characteristics of particular markets, resulting e.g. from historical or cultural constraints, are also important. It is also often the case that also particular companies apply price differentiation strategies, i.e. to obtain additional profits, they sell the same products in different markets at different prices. Where these markets represent particular countries, international price differentiation exists (Szczepaniak, 2014, p.p. 102-115).

Convergence (approximation, levelling) of prices occurs most often in the context of economic integration. It results from changes taking place in the integrating markets, related to removing trade barriers, harmonization of tax systems, greater price transparency and exchange rate risk reduction. Economic integration of markets should help reduce differences in prices of the same products. Particularly strong price convergence in the integrated area occurs with respect to commercial goods in sectors that until now were characterized by significant trade and non-trade barriers. Unification of prices is a source of benefits for countries with high prices, in which convergence leads to their lowering (beneficial for consumers), as well as for low-price countries, for which convergence means higher prices (beneficial for producers).

The theoretical reasons for price convergence are based on the law of one price which provides that "on a competitive market with no transport costs and official trade barriers (such as customs duties), identical goods sold in two different countries must be sold for the same price when prices are expressed in a common currency" (Krugman and Obstfeld, 2007, p. 127). This law gives grounds for the movement of goods from countries in which they are cheaper, to countries where they are more expensive, but only until the prices of these goods in both countries are levelled out. Issues related to the law of one price can be found in works of numerous economists; e.g. according to A. Marshall – the more ideal the market is, the stronger tendency occurs to pay the same

price for the same good in different areas of this market, while according to G.J. Stigler – the market is an area where the prices of the same goods tend to level out taking due account of transport costs and various trade barriers (Wolszczak-Derlacz, 2007). This law applies irrespective of whether the markets in question are part of one country or belong to different countries. If different currencies are used in these countries, then this law implies that the prices of the same goods converted into the same currency should be identical (Wolszczak-Derlacz, 2008).

The basic assumptions underlying this approach in food markets are described in detail by N. Minot (2010) who points out that in competitive markets, free of transport costs and official trade barriers, homogeneous goods are sold at the same price. Otherwise, price differences would make arbitration possible. Analysing the role of European integration in the process of food price integration, N. Minot assumed that this convergence occurs when price dispersion (differentiation) decreases over time.

The Single European Market (SEM), in which the free movement of goods, labour, services and capital has been ensured, has also contributed to price convergence, while being proof of the effectiveness of this market. One can even say that price convergence, and thus the decline in dispersion, is the most synthetic measure of market integration. On the other hand, despite increasing convergence, price differentiation between particular EU countries continues to exist, which testifies to the continuing segmentation of the SEM.

2. Purpose and method

The purpose of this paper is to analyse the differentiation in food prices between particular European Union Member States. The comparison of prices in the EU food consumer market, i.e. at the last link of the food chain, has been causing many problems for years. These problems result e.g. from insufficient availability of data, heterogeneity of compared products or diverse regulatory systems. This analysis is based on data derived from Eurostat that periodically compares prices of services and goods consumed in households in 38 countries, including the 28 EU Member States. As regards food products, the comparative analysis covers prices of approximately 440 comparable products. Statistical tools that make it possible to compare prices at the aggregate level in particular countries (in time and space) include Price Level Indexes (PLI) calculated for each country with respect to food, non-alcoholic beverages, alcoholic beverages and tobacco. PLIs make it possible to compare price levels in particular countries relative to the average level of food prices in the EU. PLI values are calculated taking into account the ratio of Purchasing Power Parity (PPP) to the official exchange rate in each country against EUR (in the case of countries outside the euro area), which makes it possible to compare the prices of the same food products in one common currency (Eurostat, 2017, 2018). A PLI value higher than 100 means that in a given country the prices of products in a given group are higher than the EU average, while a PLI value below 100 indicates lower prices in a given country than in the EU, and thus competitive advantages of food producers in this country due to such lower prices[1].

[1] Full description of the methodology applied by Eurostat is available at: http://ec.europa.eu/eurostat/cache/metadata/en/prc_ppp_esms.htm, 21.09.2018.

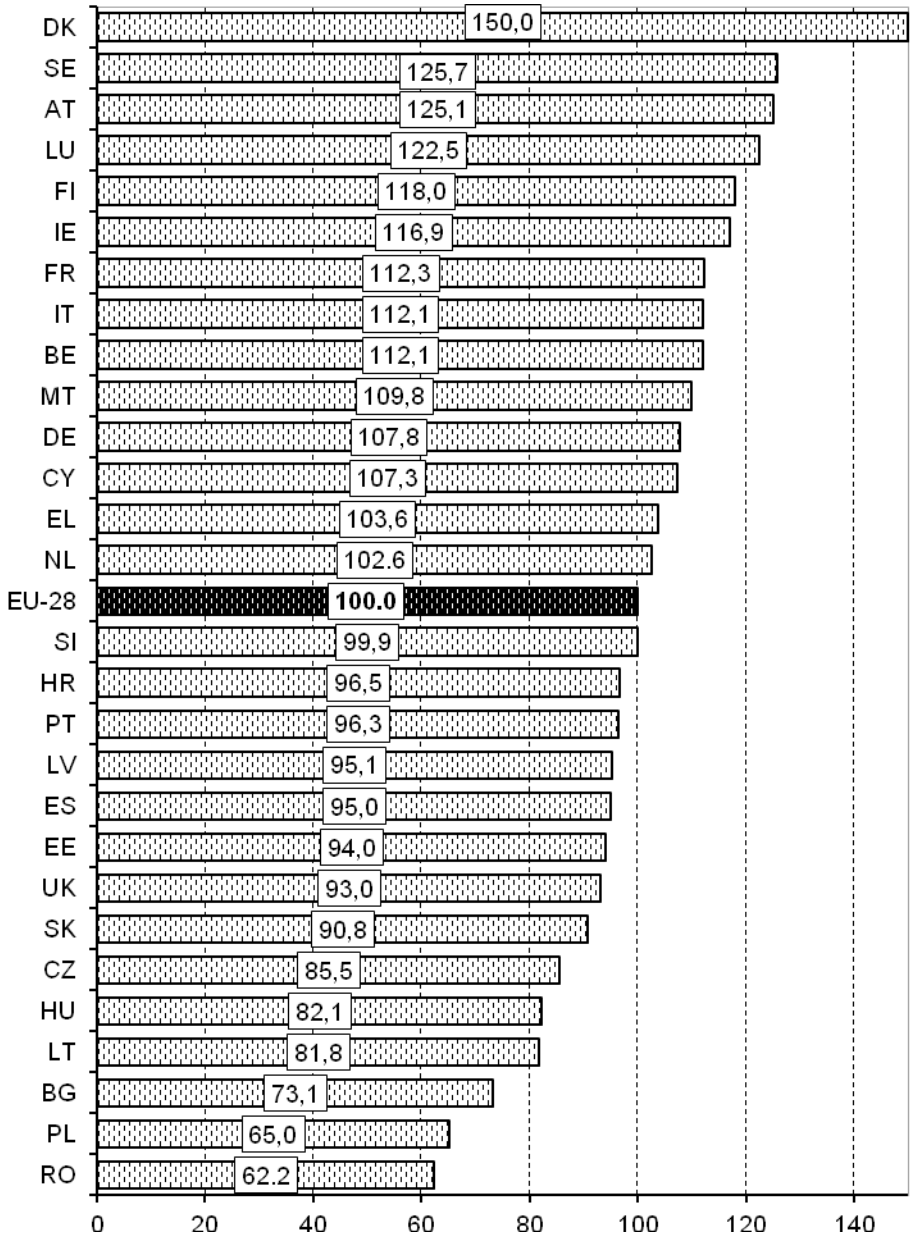
The analysis of the differentiation of prices of particular food product groups in the EU was based on differentiation coefficients, calculated for particular food product groups. The higher the differentiation coefficient, the greater the dispersion of prices in a given group of products. On the other hand, the lower the differentiation coefficient, the smaller price dispersion around the average.

The comparative analysis of food price differentiation was conducted for 28 EU Member States. The period covered by the analysis includes primarily 2017, but in some cases it was extended to 2004-2017.

3. Differentiation of food product prices in the European Union in 2017

The classification of EU Member States according to the PLI of food and non-alcoholic beverages (the basic category among food products) indicates significant differentiation of prices of these products between particular countries. In 2017, the lowest value of this index was recorded in Romania (61.6%), while the highest one – in Denmark (150.0%). This means that a comparable basket of food and non-alcoholic beverages in Denmark was more expensive than the EU-28 average by 50.0%, while in Romania it was cheaper than the EU average by 38.4%. Prices of food and non-alcoholic beverages in Denmark were therefore almost two and a half times higher than in Romania (Figure 1).

Figure 1. Price level indexes of the food and beverages in the EU countries in 2017 (EU-28 = 100)



Country symbols: AT – Austria, BE – Belgium, BG – Bulgaria, CY – Cyprus, CZ – Czech Republic, DE – Germany, DK – Denmark, EE – Estonia, EL – Greece, ES – Spain, EU-28 – European Union, FI – Finland, FR – France, HR – Croatia, HU – Hungary, IE – Ireland, IT – Italy,

LT – Lithuania, LU – Luxembourg, LV – Latvia, MT – Malta, NL – Netherlands, PL – Poland, PT – Portugal, RO – Romania, SE – Sweden, SI – Slovenia, SK – Slovakia, UK – United Kingdom.

Source: Own elaboration based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

Depending on PLI values for food price and non-alcoholic beverages, all European Union countries can be divided into four groups of countries. In 2017, this division was as follows:

- Group I (≥ 120% of the EU average): Denmark, Sweden, Austria and Luxembourg. This group includes countries where the price level is equal to or higher than the EU average by 20%. It is a group of countries where the prices of food and non-alcoholic beverages are the highest, and thus the least competitive on the EU market.
- Group II (< 120% and ≥ 100% of the EU average): Finland, Ireland, France, Italy, Belgium, Malta, Germany, Cyprus, Greece and the Netherlands. In this group of countries the level of prices of food and non-alcoholic beverages is equal to the EU average or higher, but by less than 20%. These are the "old" EU Member States (EU-15), where food prices do not provide competitive advantages either, but to a lesser extent than in those in group I.
- Group III (< 100% and ≥ 80% of the EU average): Slovenia, Croatia, Portugal, Latvia, Spain, Estonia, the United Kingdom, Slovakia, the Czech Republic, Hungary and Lithuania. Countries in this group achieve relative competitive price advantages (prices are lower than the EU average by up to 20%), but they are not high. This group includes some of the "new" Member States (EU-13).
- Group IV (< 80% of the EU average): Bulgaria, Poland and Romania. It is a group of countries where prices of food and non-alcoholic beverages are lower than the EU average by over 20%, and therefore they have the most competitive prices. This group includes the remaining "new" Member States.

The analysis of PLIs of food products shows that the level of these products' prices in the "new" EU Member States (EU-13) is much lower than in the "old" Member States (EU-15), but in both groups of countries these prices are very varied. In 2017, the most expensive food among the EU-15 countries was in Denmark, Sweden, Austria, Luxembourg, Finland and Ireland, while the cheapest – in the United Kingdom, Portugal and Spain (Tables 1 and 2). In Denmark, cereals, cereal products and bread, as well as oils and other fats were particularly expensive. In Sweden, the most expensive food products included fruit, vegetables, potatoes and processed products thereof, as well as meat, cereals, cereal products and bread. In Austria, cereals, cereal products, bread and meat were also very expensive. In Portugal and Spain, meat and meat products as well as fish and fish products were the cheapest. Non-alcoholic beverages were the most expensive in Denmark, Finland and Ireland, alcoholic beverages – in Finland, Ireland, Sweden and Denmark, while tobacco – definitely in Ireland and the United Kingdom. The relatively cheapest non-alcoholic beverages were sold in Spain, Italy and France, alcoholic beverages – in Spain, Germany, France, Luxembourg and Portugal, while tobacco – in Greece, Spain, Luxembourg, Portugal, Austria and Italy.

Table 1. Price level indexes for food, beverages and tobacco in the EU-15 countries in 2017 (EU-28 = 100)

Country	Food	Non-alcoholic beverages	Alcoholic beverages	Tobacco	Household final consumption expenditure
Austria	126.7	113.5	100.3	85.8	108.3
Belgium	112.3	109.4	103.4	103.9	110.7
Denmark	148.0	170.1	143.5	102.9	141.5
Finland	117.2	125.8	176.9	108.6	122.2
France	114.1	96.2	89.8	125.6	108.8
Germany	108.2	104.9	86.8	104.7	105.0
Greece	102.8	114.3	126.5	79.4	84.3
Ireland	116.0	125.4	166.6	207.6	125.4
Italy	114.0	94.6	101.9	90.9	101.1
Luxembourg	124.3	111.3	95.8	84.1	126.9
Netherlands	102.4	104.7	107.6	110.0	112.3
Portugal	95.1	113.2	98.2	85.6	85.1
Spain	95.6	88.9	84.7	83.4	92.3
Sweden	127.0	115.3	144.4	115.4	125.5
United Kingdom	91.7	105.8	137.1	193.8	116.6

Source: Own elaboration based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

Table 2. Price level indexes in the group "food" in the EU-15 countries in 2017 (EU-28 = 100)

Country	Food	Including:					
		bread and cereals	meat	fish	milk, cheese and eggs	oils and fats	fruits, vegetables and potatoes
Austria	126.7	143.4	138.8	136.1	108.0	130.4	124.0
Belgium	112.3	112.7	123.2	118.4	117.2	116.3	97.9
Denmark	148.0	168.2	138.3	136.5	133.7	154.1	138.8
Finland	117.2	126.4	120.8	121.5	115.7	89.0	123.9
France	114.1	114.5	131.8	112.0	93.1	99.9	121.9
Germany	108.2	103.7	121.6	113.3	97.5	115.2	115.1
Greece	102.8	115.9	88.3	110.4	128.0	122.1	79.9
Ireland	116.0	108.5	104.6	101.4	125.0	109.1	131.3
Italy	114.0	120.5	116.0	107.5	122.0	95.7	109.6
Luxembourg	124.3	119.0	141.1	118.0	125.0	119.5	119.8
Netherlands	102.4	92.3	117.9	107.6	99.2	98.7	108.9
Portugal	95.1	95.7	80.4	93.5	101.2	101.1	94.2
Spain	95.6	105.7	87.2	90.6	96.2	85.7	99.9
Sweden	127.0	130.4	133.1	121.2	117.2	129.3	138.1
United Kingdom	91.7	82.1	91.6	89.3	97.0	87.0	95.2

Source: Own elaboration based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

In 2017, the highest food prices among the EU-13 countries were recorded in Cyprus and Malta (food was more expensive there than the EU average), and this concerned the vast majority of product groups, i.e. cereals, cereal products and bread, fish and fish products, milk and dairy products as well as oils and other fats (Tables 3 and 4). Prices of oils and other fats were also rather high in many countries (including Latvia, Slovakia, Slovenia, Estonia, Lithuania and Bulgaria). The lowest food prices were recorded in Romania, Poland and Bulgaria, followed by Lithuania, Hungary and the Czech Republic.

In Romania, cereals, processed cereals and bread, as well as fruit, vegetables, potatoes and processed products thereof were the cheapest. In Poland, meat and meat products, milk and dairy products as well as oils and other fats were the cheapest. In Bulgaria, the lowest prices of fish and fish products were recorded. Non-alcoholic and alcoholic beverages were the most expensive in Malta, Latvia and Estonia. Non-alcoholic beverages were the cheapest in Romania and Poland, while alcoholic beverages – in Bulgaria, Romania and Hungary. Tobacco was the most expensive in Malta and Cyprus, and the cheapest – in Bulgaria, Croatia, Poland and Lithuania.

Table 3. Price level indexes for food, beverages and tobacco in the EU-13 countries in 2017 (EU-28 = 100)

Country	Food	Non-alcoholic beverages	Alcoholic beverages	Tobacco	Household final consumption expenditure
Bulgaria	71.7	90.0	64.9	50.9	48.4
Croatia	95.5	105.9	98.6	56.9	67.0
Cyprus	107.5	105.9	101.2	78.7	88.5
Czech Republic	84.5	96.3	86.5	65.0	69.0
Estonia	92.4	112.4	123.2	68.8	78.5
Hungary	81.2	91.3	77.8	65.0	62.0
Latvia	92.8	121.2	111.2	63.3	72.4
Lithuania	80.0	104.9	103.3	62.1	64.6
Malta	107.9	127.6	108.4	96.7	82.3
Poland	63.7	78.3	85.2	61.9	56.2
Romania	61.6	69.7	71.0	69.6	52.2
Slovakia	89.0	110.2	80.9	65.2	69.1
Slovenia	101.0	90.4	101.6	68.6	85.3

Source: Own elaboration based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

Table 4. Price level indexes in the group "food" in the EU-13 countries in 2017 (EU-28 = 100)

Country	Food	Including:					
		bread and cereals	meat	fish	milk, cheese and eggs	oils and fats	fruits, vegetables and potatoes
Bulgaria	71.7	59.9	58.2	63.4	91.0	111.0	69.4
Croatia	95.5	98.1	82.1	92.8	97.5	104.3	96.5
Cyprus	107.5	116.3	88.7	110.4	142.0	112.2	91.5
Czech Republic	84.5	80.3	81.5	109.6	90.1	106.0	75.9
Estonia	92.4	92.9	82.0	104.7	95.5	114.4	93.1
Hungary	81.2	73.7	71.4	92.3	89.2	109.6	81.7
Latvia	92.8	86.5	74.4	86.6	111.8	128.6	93.8
Lithuania	80.0	79.7	66.7	76.7	94.8	111.4	76.9
Malta	107.9	107.2	94.0	110.9	116.6	129.5	107.9
Poland	63.7	62.9	56.7	64.8	66.9	77.2	64.7
Romania	61.6	52.5	59.2	65.4	90.2	84.1	48.1
Slovakia	89.0	89.1	73.6	93.8	98.0	127.2	89.9
Slovenia	101.0	104.0	100.7	101.2	103.0	114.7	96.3

Source: Own elaboration based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

The analysis of PLIs of food products in particular EU countries in recent years indicates that despite their apparent convergence, those PLIs were quite stable. More noticeable changes occurred only in a few cases and did not have a major impact on the relations between particular countries, i.e. the relatively most expensive countries have been in the same group of countries for many years, just as the cheapest ones still remain in the same group of countries. The level and differentiation of prices can certainly be associated with the competitiveness of particular markets. An additional thesis is also possible that that prices of consumer goods (thus also food) depend to a large extent on the prosperity level, which is manifested through GDP per capita expressed in the purchasing power standard (Szczepaniak, 2017, p.p. 2-6). This thesis is confirmed by the

fact that prices in countries with a higher level of prosperity are much higher than in less prosperous countries.

4. Convergence of food product prices in the European Union in 2004-2017

According to A. Lindenblatt and S. Feuerstein (2014) the degree of price convergence depends on the applied degree of data aggregation. The authors claim that convergence of prices of aggregated products is possible, but they do not foreclose differences at the level of particular product groups (and vice versa). This thesis was the ground for analysing the dispersion of prices of basic food product groups. The analysis indicates that prices of food products within the European Union are gradually levelling out. This is evidenced by the widespread, though varied, decline in the value of the differentiation coefficient of PLIs of all analysed products, observed in 2004-2017 (Table 5). The process of convergence of food product prices was particularly evident in the first years after the enlargement of the European Union by new Member States. Currently, the process of convergence of prices of this product group is much slower, and in the case of some product groups it has even slowed down.

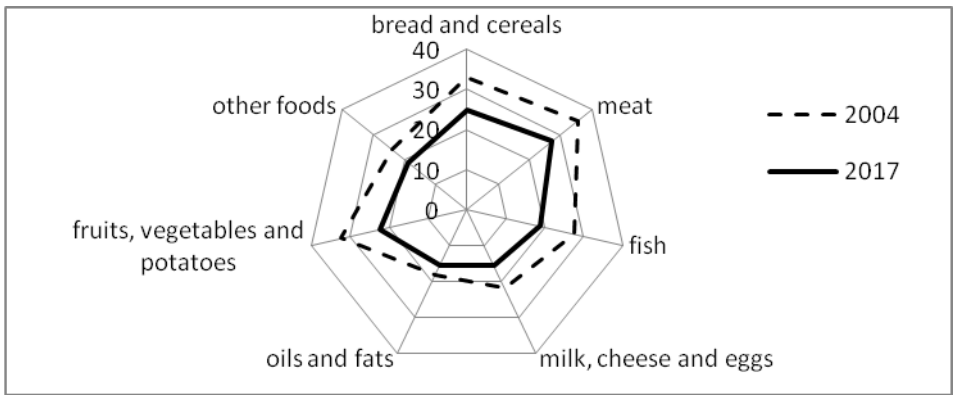
Table 5. The variation coefficients of price level indexes for food, beverages and tobacco in the EU in the period of 2004-2017 (in %)

Specification	2004	2007	2009	2011	2013	2015	2017
Food and non-alcoholic beverages	27.5	22.1	20.2	18.8	18.9	19.5	19.0
including:							
Food	28.1	22.6	20.7	19.2	19.4	20.0	19.6
bread and cereals	32.9	27.3	25.4	24.8	25.4	24.9	25.0
meat	35.7	32.6	27.2	27.2	27.4	27.2	27.3
fish	27.6	26.4	20.8	18.7	18.5	16.8	18.8
milk, cheese and eggs	21.9	19.6	19.7	19.1	17.1	17.1	15.7
oils and fats	18.2	15.5	15.4	14.4	13.4	14.1	15.6
fruits, vegetables and potatoes	32.4	24.6	24.8	22.1	22.5	23.1	22.5
Non-alcoholic beverages	24.8	20.3	20.4	20.0	18.7	18.1	17.4
Alcoholic beverages	30.9	25.7	22.0	24.8	25.5	28.5	25.5
Tobacco	53.3	50.3	42.5	38.3	39.5	42.8	40.2
Household final consumption expenditure	33.2	26.5	25.3	26.3	27.8	29.4	28.1

Source: Own calculation based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

In 2004-2017, prices of products belonging to the "food" group converged by 8.5 p.p. Among the subgroups in this category, the greatest decrease in the differentiation of prices was recorded with respect to cereals, cereal products and bread, fish and fish products, meat and meat products, as well as fruit, vegetables, potatoes and processed products thereof (Figure 2). The smallest dispersion of prices was observed in the case of oils and fats as well as milk, cheese and eggs, but these products were characterized by a relatively low price differentiation already in 2004. In the majority of cases, price convergence took place mainly in the first years of the analysed period – in the subsequent years this process was much weaker.

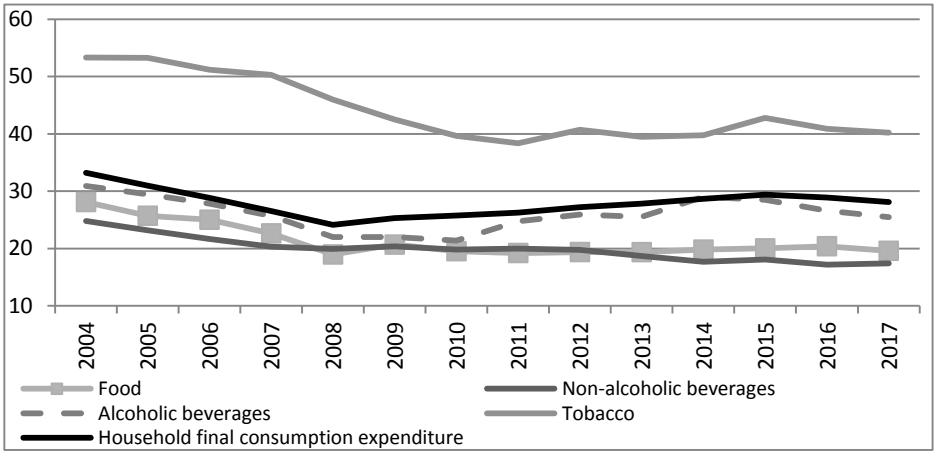
Figure 2. The variation coefficients of price level indexes in the group "food" in the EU in years 2004 and 2017 (in %)



Source: Own calculation based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

The differentiation of prices of all consumer goods and services in the European Union is higher than that of prices of food, non-alcoholic beverages and alcoholic beverages (but smaller than in the case of tobacco and tobacco products), although price convergence was observed also in this case (Figure 3). However, this process lasted only until 2008; since then the dispersion of prices of consumer goods and services in the EU market has increased again (so has that of prices of alcoholic beverages). Throughout the analysed period, the differentiation of prices of food products in the EU market, measured through the differentiation coefficient of the PLI, decreased more than the differentiation of prices of all consumer goods and services.

Figure 3. The variation coefficients of price level indexes in the EU in the period of



2004-2017, by product groups (in %)

Source: Own calculation based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui, 04.10.2018.

5. Summary and conclusions

In recent years, gradual convergence of food product prices within the European Union has been observed, proving the effectiveness of the Single European Market and the progressing economic integration of particular Member States' markets with the EU market. Convergence of food product prices in EU countries is an argument in favour of moving away from the price as a basic element affecting the competitive position of economies.

The spatial differentiation of food prices in the European Union countries in the analysed period decreased. The period of operating in the structures of the European Union and the common currency were factors conducive to lower price differentiation. Deeper economic integration and elimination of the exchange rate risk resulted in a higher level of price convergence.

The greater homogeneity of food prices in the EU-15 countries suggests the positive impact of integration on the "law of one price", and the relatively low price volatility also indicates the limits of the price convergence process. It can be thus concluded that the further price convergence in EU countries will depend on the degree of convergence of prices in the EU-13 countries with the EU average. It should be emphasized, however, that complete elimination of dispersion of food prices in EU countries is not possible. Apart from the degree of economic integration, it is associated with significant differentiation in the sizes and development level of food markets in particular countries.

The convergence of food prices in the European Union, despite being a long-term process, means that cost-price advantages gradually cease to be a key determinant of competitiveness for producers from the "new" Member States. Due to globalization and

European integration, the importance of non-price competitiveness factors is systematically growing. This phenomenon compels food producers from particular countries to seek new sources of competitive advantages in the EU market. This applies particularly to food producers from the "new" Member States, despite the fact that, as shown by the convergence analysis, they still have significant price advantages over competitors from the "old" Member States of the European Union.

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