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Using the market opportunities in the food economy's foreign trade – measurement of success based on the potential balance

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Abstract

This work was aimed at analysing the effects of the sudden food price explosion followed by price crash which occurred recently on the foreign trade of the food economy. Comparison of the balances of the different countries was difficult due to the differences in the absolute dimensions; therefore a new method was introduced. Firstly, with the help of the "food economic foreign trade profile" extent to which the different product categories (divided by main product groups or by degree of processing) contribute to the foreign trade balance of the given country's food economy was examined. In the second step, with the help of "profile indexing", the extent to which the country in question was able to turn to profit the market opportunities offered by the price boom was demonstrated numerically. It can be stated that the foreign trade of the Hungarian food economy is amongst the winners of the price explosion. The balance improved remarkably between the two periods because exports of cereals and oilseeds increased greatly due to the increasing market prices during 2007 and 2008. As regards the performance of the other sectors, Hungary can be however ranked among the losers as a consequence of the decreasing international competitiveness of the production. The assessment has also demonstrated that some of Hungary's direct competitors (e.g. the Netherlands and Germany) were able to make better use of the opportunities.

Keywords

crisis, food products, foreign trade, price explosion, cereals

1. Introduction

While practically no changes occurred in the world market prices of the food economy during the last twenty years, **in 2007** (and, in the case of dairy products and sugar already from the middle of 2006) **a *de facto* explosion occurred in the prices of agricultural produce followed by a price fall of similar extent in the second half of 2008.** The process caused a **price explosion principally in the agricultural commodities, thus leading to sharp increases in the FAO cereal and oilseed price indices.** The price indices of the processed products – especially those of meat products – have followed the movement of the other price indices only with some delay and to a remarkably lower extent (FAO, 2009).

Of the **factors causing the food price boom, the role of the financial capital**, that is speculation on the agricultural world market, can be considered as a serious price increasing, dangerous factor. For example, Erber et al. (2008) approached the effects of the stock exchange on the market of agricultural produce from two directions. Forward deals transacted on these stock exchanges had in the past an effect which rather mitigated price fluctuations, thus better stabilising the commodity markets. This stable situation has been changed by the market penetration of investment groups with large amounts of available money, that is of the so-called "noise traders". Also the **European Commission has analysed the role of speculation in the price development of the food products** (European Commission, 2008). According to this report, the amount of capital flowing onto the markets of agricultural commodities suddenly increased as of the beginning of 2006. Beyond quick development of the derivatives markets, the over the counter trade of the derivative products has also grown by 30% since 2007.

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The role of the cereal prices and of bio-fuels in the price explosion is evaluated in very different ways by the single sources. Prices of cereals are often considered as "pillar prices" in the trade literature, owing to their effects exercised on the producer and consumer prices of other agricultural produce and of foods. Frenz et al. (1988) had already demonstrated that **changes in cereal prices resulted in a higher quantitative change in the production of other produce than those of any other agricultural product.** And, according to experts of the **World Bank** (World Bank, 2008), production of bio-fuels is responsible for **75%** of the global food price increase. By contrast, Banse et al. (2008) **stated that speculative stock exchange investments in cereals for human consumption might directly cause the increase in prices.** According to Schmidhuber (2007), at a crude oil price of USD 60/barrel, the specific price of bio-fuels may become again competitive with crude oil; that means, **the pulling effect of the crude oil price increases demand for bio-fuels** and consequently the prices of related produce. Abbot et al. (2009) have also demonstrated the relationship between the oil price and the demand for bio-fuels. Ethanol and biodiesel were linked as energy substitutes for petrol and diesel, and usage of crops for these biofuels became large enough to influence world prices. In the last half of 2008 crude oil prices fell rapidly, but petrol prices fell faster and further. Low petrol and crude oil prices reduced the expected use of maize for ethanol which, in turn, put pressure on ethanol prices and maize prices. According to **Popp** (2009), ethanol was manufactured from 6% of the sugar beet and 10% of the sugar cane produced, while 9% of vegetable oils was used for manufacturing bio-diesel in 2008. He also stressed that the **production of bio-fuels highly depended on the political objectives of the user countries and on the allocated means.**

There are two theories that may provide further explanation of the outbreak of the crisis. Heady and Shenggen (2008) developed the hypothesis of **"perfect storm"**, according to which "the interaction of several factors might cause a huge conflagration". This means that none of the possible causes analysed above could be held responsible for the crisis in itself, but their aggregate effects might provide a much more probable explanation. The other hypothesis is called "Rational inattention theory" and describes **the often irrational behaviour of the market participants** (Sims, 2005). The model developed by Sims assumes that the participants have only limited capabilities for receiving and processing information when the economy is influenced by shock effect. Therefore, the majority of them are compelled to disregard part of the information when taking decisions. The economic thinking modified in consequence of the crisis **has again emphasised the schools of trade theories better approaching the reality** (Krugmann et al., 2003). As the structure of agriculture has considerably changed during recent decades – agriculture having been traditionally considered as a perfectly competitive market – the new theory supposing imperfect competition and increasing returns to scale became ever more applicable to the trade of agricultural produce too (Koo et al., 2005).

Thus, based on the above-described extreme processes which occurred on the world market, the question emerges, what were the effects of the recent food price explosion and price drop on the agricultural food trade of Hungary and of the other EU Member States. The **purpose of this work**[2] **was therefore the quantitative determination of to what extent Hungary exploited its potential possibilities** in comparison with its main European competitors.

[2] The article has been prepared on the basis of the study: Wagner (ed.): The Impacts of the Crisis on the Foreign Trade of the Hungarian Food Economy in an International Context, AKI 2009/8.

2. Database and methodology

In the analysis of the food economic foreign trade of Hungary and of its competitors, the first 24 main product categories of the internationally standardised HS nomenclature[3] covering the scope of the agricultural and food industrial products were used. In part of the analyses lower levels of aggregation were used: through breaking down to depth of product groups (HS-4), it was possible to differentiate between agricultural commodity production and primary and secondary food industrial processing. Databases of EUROSTAT and of the HCSO have been principally used from the international statistical databases.

Two new indicators were introduced**:** In the food economy' foreign trade of the individual countries, traditionally there are **sectors that contribute in a positive manner to the balance** and there are those burdening it **through imports.** The first new indicator is the **"foreign trade profile of the food economy" ("ÉKP"** – as abbreviated in Hungarian language); it shows how many units the single **HS-level main product groups have contributed to the foreign trade balance of the food economy of the country under study.** For example, +1.0 means that the main product group (sector) has yielded net returns in an amount exactly corresponding to the (positive) foreign trade balance of the country's food economy. Based on the foreign trade data, ÉKPs characterising each country years 2002-2004 (i.e. the years preceding the EU accession) and during 2006-2008 were calculated.

With the help of the second new indicator, the **foreign trade profile indexing,** an answer was sought to the question, **what were the reactions of the individual countries to the erratic changes.** The ÉKPs of the selected countries were indexed by the product level monthly price index published by the FAO. Comparing this value with the actual monthly balance data, the divergences provide information on the ability of the country concerned to benefit from the opportunities granted by the profile and by the changes.

Thus, the formula of the **indicator showing the exploitation of the foreign trade potential (KPK)** is as follows:

$$KPK = \Sigma[KE_{(monthly)} - (KE_{(monthly,\ profile\ 2002\text{-}2004)} * \text{FAO price index}_{(monthly)})]$$

where KE stays for the foreign trade balance of the main product group as to the HS nomenclature.

In the case of **net exporter countries,** the **positive value** means that the country concerned was **able to better use the possibilities arising from the market** than might be expected in compliance with the opportunities granted by its profile. A **negative value** demonstrates that the country **performed below its capabilities.** The situation is similar for a **net importer country:** a **positive value** of the indicator shows that the country was able to **better pull through the** import growth due to the price explosion, with less deterioration of the balance, while the **negative value** ranks the country among the **losers of the crisis.**

[3] HS: Harmonised Commodity Description and Coding System, in short: Harmonised System. An internationally recognised and applied categorisation system of the products traded internationally. Annex 1 includes the description of the 24 main categories covering the agricultural and food industrial products.

3. Results

3.1. Development of the food economy's foreign trade in Hungary and of its most important European competitors during the price cycle under study

It turned out from the development of the foreign trade balances of the individual Member States' food economies that of the **large net exporters, the Netherlands, France, Belgium, Poland (and Hungary) were able to increase their positive food economy balance during the period under study while the balance of Denmark deteriorated.** Among the large net importers, **Germany slightly improved its deficit.** The **remaining countries** may be ranked **more or less among the losers of the crisis, based on the development of their food economy's foreign trade balance.**

Hungary

Exports of the Hungarian food economy fluctuated in the years prior to the accession to the EU, increasing only slightly, while it grew continuously following accession. The increase of the imports accelerated during the following years , but it slowed down again after 2006. Consequently, the balance of the food economy's foreign trade continuously deteriorated from 2001, remaining below 1 billion EUR in 2005 and 2006. Since that time, it has shown a continuously improving trend and approached EUR 2 billion in 2008. Considering the averages of the periods of the years 2002 to 2004 and 2006 to 2008, the exports of the Hungarian food economy increased by 62% while the imports increased by 99%; as a result, the balance grew by just 16%.

Analysis of the foreign trade of the Hungarian food economy by degree of processing for the two periods under study demonstrated that the **share of the production of agricultural raw materials** increased remarkably (from 33% to 39%) within the exports, while, **within the imports**, **the ratio of the secondary processed products grew most of all** (from 40% to 48%). As a consequence, the **foreign trade balance of the entire food economy continues to remain highly positive**, even though presenting pronounced deteriorating trends compared to the pre-accession years. The decreasing values have been almost exclusively caused by the falling – and, in 2006-2007, negative – balance of the secondary processed products (Juhász et al., 2009). Figure 1 shows the ÉKP of Hungary.

The foreign trade of the Hungarian food economy has essentially **"four pillars": meat** (HS-02), **cereals** (HS-10), **oilseeds** (HS-12) and **preparations of fruits and vegetables** (HS-20). Upon examining the two periods, it is however obvious that the "construction" is tilting; that is, during the period between 2006 and 2008, the main product group of oilseeds maintained the balance high, while the shares of the other main categories decreased (meat, preparations of fruits and vegetables) or even turned to negative for milk and dairy products.

Of course, the changes of the world market prices also have to be taken into account, as these changes influenced adversely several sectors, but comparison with the international competitors has demonstrated that these sectors in other countries were able to better live through the crisis than in Hungary.

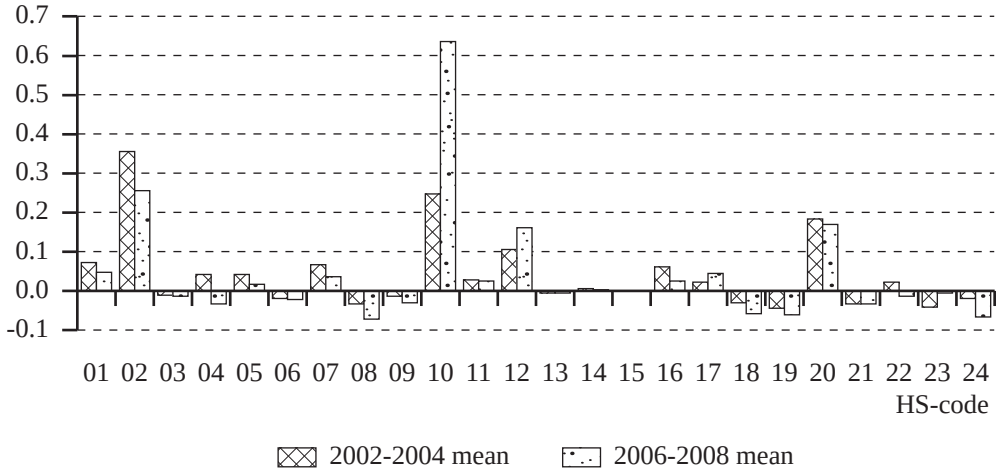

Figure 1: Hungary's average ÉKP in the periods under study

Source: own calculation based on HCSO data

The Netherlands

The Netherlands has a multifaceted food economy, a real great power in foreign trade. Its food economy's foreign trade increased considerably both as regards exports and imports during the period under study. Though the dynamism of import growth exceeded that of the exports, the country's balance of food economic foreign trade increased even during the crisis of 2006-2008. One of the **root causes of the successful development of the food economy's foreign trade lies in the fact that 50% of the European distribution centres are to be found in the Netherlands,** in consequence of the combined effects of several factors. The Netherlands continuously spends important budgetary funds on the development of the distribution sector's infrastructure (road, railway and channel network) and, due to its central location, access to 170 million consumers is granted within a radius of 500 km (Datamonitor, 2005).

The **balanced product structure** constitutes another **factor of the success** of the Netherlands. The food economy's trade balance increased in the average for all three processing levels between the periods 2002-2004 and 2006-2008: by 12% in the agricultural raw material production, by 29% in the primary food processing and by 15% as regards the secondary processed products. This means that the country **was able to maintain its top position not with the help of a "raw material-oriented" export structure (as for example Brazil or the US) but through its well-organised food processing sector.** This is well illustrated by the ÉKP of the Netherlands (Figure 2).

Upon examining the "indentation" of the Dutch ÉKP, it becomes clear that in 19 of the 24 main product categories of the HS the country was able to present positive balances even in the climacteric period of 2006-2008 as well as in 2002-2004. The largest deficit was detected in the main group of cereals and oilseeds; due to the rapid price increase, the balance of the Netherlands has further deteriorated in this product group. Remarkable excess imports were generated also in the group of fruits and in the main category of coffee and tea, that is, in the imports of plants not grown in the Netherlands. However, the negative balance thus generated was by far compensated by surplus of exports in the remaining main product categories. The main product category of plants (HS-06 – including the ornamental plants) is the most salient of them, and contributed more than one quarter

of the positive balance, despite its decreasing share. It is however remarkable that, except for this, there are no other dominant main product groups, implying that in the aggregate **the foreign trade of the Dutch food economy is less sensitive to the market disturbances and price fluctuations that may emerge from time to time in the single main product categories.**

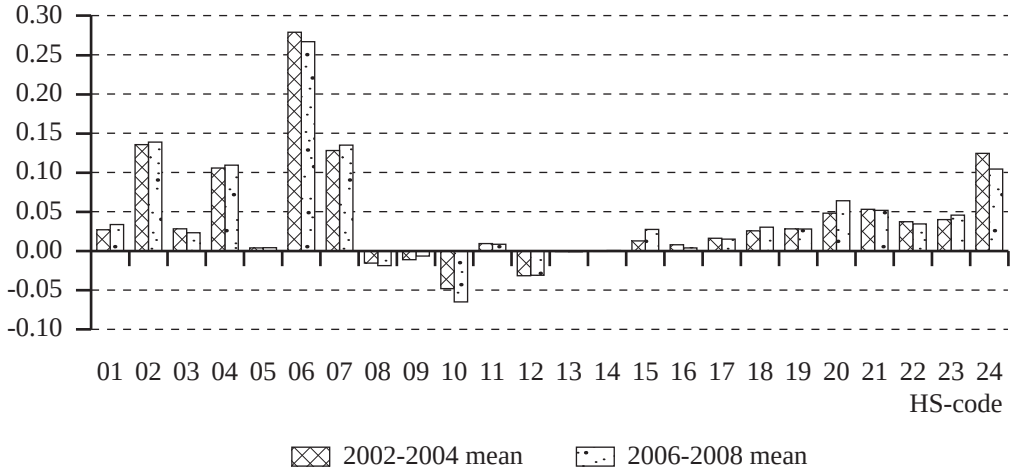

Figure 2: ÉKP of the Netherlands in the periods under study

Source: Own calculations based on Eurostat data

Germany

Germany is the second largest net food importer in the European Union, all the same it was one of the few Member States where the development of the exports was more dynamic than that of imports. In the foreign trade of the German food economy, the amount of the exports almost doubled between 2000 and 2008, while that of imports increased by little more than a half. Thanks to this, the **balance of the German food economy did not deteriorate considerably even in the period 2006 to 2008, furthermore, it improved by 4% in 2008 compared to the previous year.** In the averages of the periods 2002-2004 and 2006-2008, the balance of the German food economy further deteriorated at two processing levels: in the raw material production (by 22%) and in the primary food processing (by 29%), while it turned from negative (EUR -157 million) into remarkably positive (EUR 2,910 million). Like the Netherlands, Germany was able to improve its foreign trade balance of the food economy even during the crisis thanks to its well-organised food processing sector, as also demonstrated by the ÉKP of Germany (Figure 3).

Among the main product groups realising considerable additional imports the fruits (HS-08), vegetables (HS-07), oilseeds and oleaginous fruits (HS-12), preparations of fruits and vegetables (HS-20) and fish (HS-03) have to be mentioned. These main product groups highly contributed to the negative balance during the crisis. In the period 2006-2008, the main group of animal or vegetable fats and oils (HS-15) joined them. By contrast, the balance of the beverages and spirits (HS-22) improved (Figure 19). Positive changes occurred beyond the tobacco products[4] (HS-24), bakery and confectionary products (HS-19) and other edible preparations (HS-21), also in the balance of the main product groups of **meat** (HS-02), **turning from negative into positive** and of dairy products

[4] Like other countries, the German and French statistics rank ever more foodstuffs sole in duty free turnover under the product category HS-24BB, therefore the balance of the main product category increase – not only from tobacco products – by EUR 1.1 billion in Germany and by EUR 2.4 billion in France between the two periods.

(HS-04), improving remarkably. The expansion aspirations of Germany are also demonstrated by the fact that it became the **world's biggest exporter of pork meat** (with export returns approaching EUR 2.7 billion), **overtaking Denmark, in 2008, during the crisis** and its average annual import surplus of EUR 239 million of cheese (HS-0406) between the two periods was replaced by average annual export surplus of EUR 188 million.

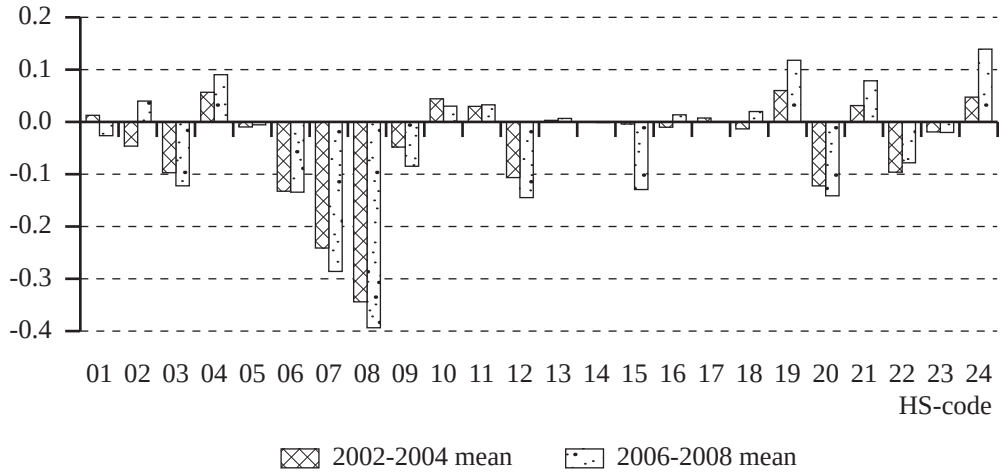

Figure 3: ÉKP of Germany in the periods under study

Source: Own calculations based on Eurostat data

France

During the crisis, France increased its foreign trade balance of food economy mainly due to the production of agricultural raw materials and to secondary food processing. Its exports of foods exceeded EUR 50 billion and the imports EUR 40 billion in 2008. The rate of growth of the exports and imports did not differ remarkably, all the same, in 2006 a significant balance improvement occurred. In the average of the two periods under study, the balance improved by 25% as regards basic material production and by 75% in the secondary processing, while the foreign trade of the primary food processing deteriorated by nearly EUR 1.4 billion, presenting a negative balance. Like the Netherlands and Germany, France was also able to **improve its foreign trade balance of the food economy thanks to the secondary food processing sector**, but also the decreasing competitiveness of the primary food processing is only really shown by the tendencies of the country's foreign trade profile of the food economy.

In compliance with the data, in the average of the two periods under study, the balance of the main product group 22 (beverages) increased by EUR 1.3 billion, that of the main product group 24 by EUR 2.3 billion turning into positive. This was due to the increasing exports of wine and spirits to third countries. Also the fact contributed to this improvement that French statistics – similar to Germany – included the value of the duty free products sold on airplanes and ships into the HS-24BB product category, from 2005. Therefore the balance of the main product category 24 shows favourable trends, but this amount (EUR 2.3 billion on average) should not be taken entirely into account during evaluation of the main product group. **As an exporter of cereals, France gained through the increasing cereal prices during the price explosion**, the positive balance of the sector growing from EUR 3.4 to 4.4 billion. In spite of this, the **share of the sector in the aggregate balance did not increase.** France remained a net importer of fruits and vegetables (HS-07 and HS-08)

and also of preparations of fruits and vegetables. Also its balance of meats (HS-02) became negative, contributing to the negative balance of the primary food processing sector (Figure 4).

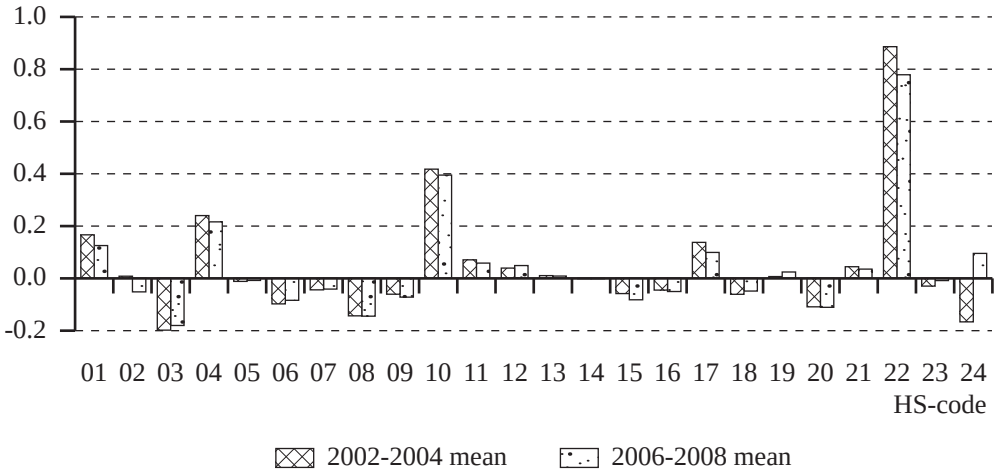

Figure 4: ÉKPs of France in the periods under study

Source: Own calculations based on Eurostat data

3.2. Measuring the performance of the foreign trade of the food economy through profile indexing

The increase of the global demand was powerful in the field of cereals and oilseeds. Starting out from the supposition that the growth of demand makes things smooth for exporters, we examined the **possible** (calculated on the basis of price indices) **and the actual development of the cereals balances** of two EU countries each, being net cereal exporters and net importers by the help of the FAO's cereals price index (Figure 5).

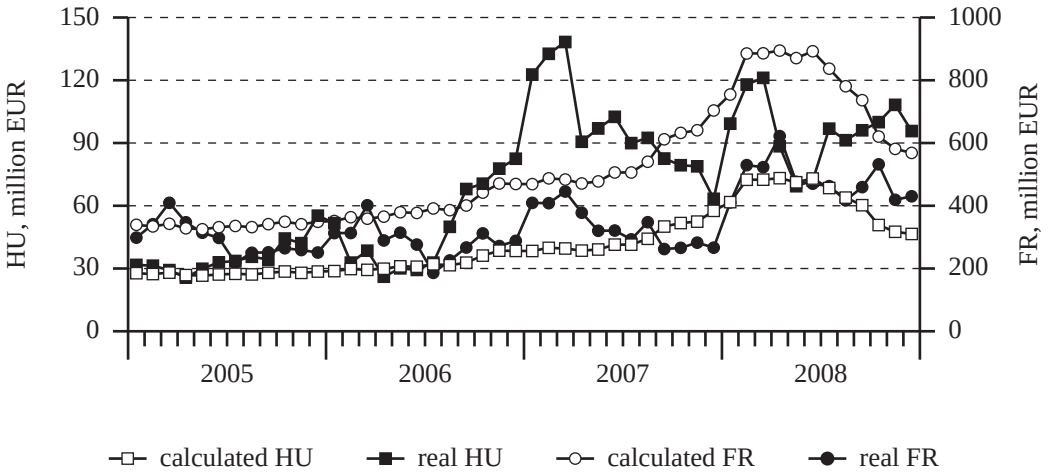

Figure 5: Development of the cereals foreign trade balance of Hungary and France between 2005 and 2008 based on the actual data and as calculated through profile indexing

Source: Own calculations based on data of Eurostat and FAO

On the basis of the resulting values, we have calculated the **indicator showing the degree of exploitation of the foreign trade potential (KPK)** of the two net cereals exporter EU countries – Hungary and France. In the four years under study, **Hungary realised a value higher by EUR 1,327 million** than its calculated potential, while **France performed under its potential by EUR 7,932 million**. In consideration of the actual exports of cereals, **Hungary exported during the four years two thirds more than its calculated path, while France exported one third less.**

Breaking up the overfulfilment[5] of Hungary by years, EUR 380 and EUR 394 million of overfulfilment fall in the period of crisis (2007 and 2008 respectively). However corrected by the maize intervention value (Rieger, 2008) – that is, 4 million tons multiplied by the EUR 180/tonne average export price calculated for the above-mentioned supply period – just EUR 54 million remains of the EUR 774 million overfulfilment for the crisis period.

Splitting the performance of France to the four years concerned, it is clear that the large cereal exporter country was not able to benefit from the crisis' price wave. It exported EUR 2.5 billion less in 2007 and EUR 3.5 billion less in 2008 than its potential. This latter statement becomes really interesting in the light of the fact that the percentage reduction of the cereal production in France was not higher during the crisis years than that of the Hungarian cereal production.

What was the situation on the "other" side, in the **net cereal importer countries**? To determine this, we have examined the possible and the actual trends of the cereal foreign trade balances of two net cereal importer EU countries – **Italy and Belgium** – during the 2005-2008 period, by the help of profile indexing (Figure 6).

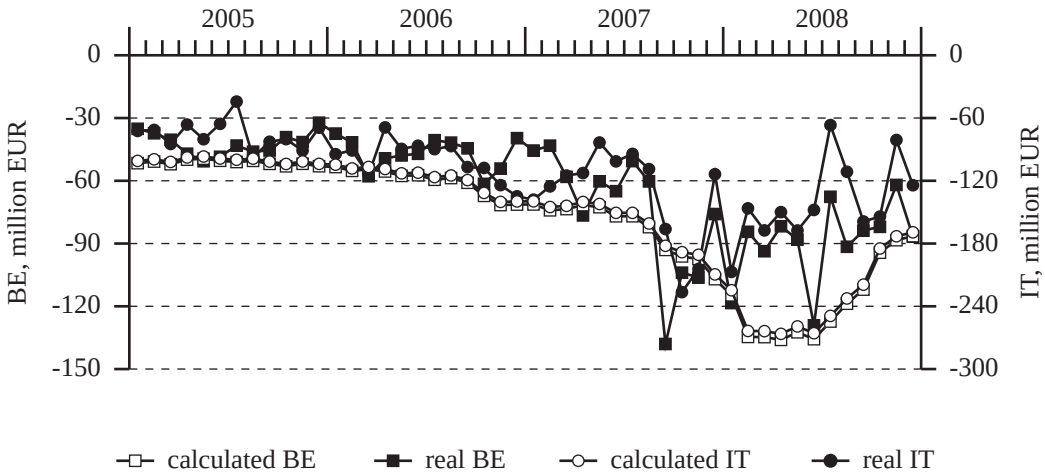

Figure 6: Development of the cereals foreign trade balance of Italy and Belgium between 2005 and 2008 based on the actual data and as calculated through profile indexing

Source: Own calculations based on data of Eurostat and FAO

The calculations have given two surprising results. Firstly, the **coefficient of determination had a higher value for Belgium than in the case of the exporter countries** ($r^2 = 0.79$), but also the value of Italy was relatively high ($r^2 = 0.66$). Except for some fluctuations, the actual curves of

[5] It is important to emphasise that the troubles of the HUF had no major role in the acceleration of the cereal exports until the end of the period under study, because the HUF/EUR exchange rate increased to a remarkable extent only at the beginning of 2009.

the two importer countries – until beginning of 2007 for Belgium and the middle of 2007 for Italy – followed essentially the calculated curve, while thereafter – in the climacteric period – **the negative value of the actual balances decreased considerably, meaning that the Member States under study slowed down their imports.** In the case of Italy, for example, the coefficient of determination of the two curves calculated between 2005 and 2007 was much higher ($r^2 = 0.78$) than that calculated for the entire period. Both **net cereal importer countries tried to parry the high cereal prices**, probably seeking alternative solutions for feeding (e.g. tapioca). Splitting down to the single years the "deficiency" in figures results in savings amounting to EUR 370 million and EUR 1,089 million for years 2007 and 2008 respectively in Italy, while Belgium relieved its negative balance by EUR 80 million and EUR 350 million respectively in the same years. **On the basis of the actual cereal imports, Italy purchased 27% less and Belgium 19% less during the four years under study than was expected on the basis of the curve calculated from the price indices.**

4. Conclusions

On the face of it, Hungary's foreign trade of food economy may be ranked among winners of the price cycle and, within it, principally of the **price explosion.** Its balance improved considerably between the two periods, the exports of cereals and oilseeds increased greatly in 2007 and 2008 owing to the increasing market prices. However, taking into account **the development of the other sectors, Hungary rather belongs to the group of losers, first of all as regards the meat market** (with the exception of the poultry sector), the milk and dairy industry, and due to the **decreasing international competitiveness** of the fruit and vegetable production.

Comparing the **evolution of Hungary's foreign trade in food products with that of its main competitors,** the resulting picture is even more ambivalent. **The Netherlands**, for example, attained a remarkable balance improvement not as a consequence of the rising raw material prices, and furthermore, succeeded in controlling the level of imports when they became more expensive. In the meat sector, even Germany, a net food economy importer, increasingly endangered the foreign market position of Hungary. The **exporters of the countries listed were able to better exploit the price scissor developed as a consequence of the crisis, increasing their market share in spite of the strengthening price competition through their aggressive price policy.** From among the net exporter countries, **France also qualifies as a winner of the crisis, though it was less successful** than the other Member States under study.

In the case of **cereals where there was an excess in demand,** the method of profile indexing demonstrated that **Hungary was essentially able to benefit from the food economy's foreign trade potential** through generating sufficient commodities, while **France did not use** its potential possibilities deriving from its balance. In the case of **cereal importers**, it may be stated in compliance with profile indexing that **reaction to price changes is operable in the importer countries**, resulting in a relatively high correlation between the calculated and real balance indices up to a certain price level, while the substituting factors came into force above a certain threshold.

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Annex 1

Harmonisation System Codes Commodity Classification from Chapter 01 to 24 (agricultural products and foodstuffs)

HS code	Description
1	Live animals
2	Meat and edible meat offal
3	Fish and crustaceans, molluscs and other aquatic invertebrates
4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included
5	Products of animal origin, not elsewhere specified or included
6	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage
7	Edible vegetables and certain roots and tubers
8	Edible fruit and nuts; peel of citrus fruit or melons
9	Coffee, tea, maté and spices
10	Cereals
11	Products of the milling industry; malt; starches; inulin; wheat gluten
12	Oilseeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder
13	Lac; gums, resins and other vegetable saps and extracts
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes
16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates
17	Sugars and sugar confectionery
18	Cocoa and cocoa preparations
19	Preparations of cereals, flour, starch or milk; pastrycooks' products
20	Preparations of vegetables, fruit, nuts or other parts of plants
21	Miscellaneous edible preparations
22	Beverages, spirits and vinegar
23	Residues and waste from the food industries; prepared animal fodder
24	Tobacco and manufactured tobacco substitutes

Source: HCSO