

# Volatility of agrarian markets aimed at the price development

*Volatilita agrárnych trhov s akcentom na cenový vývoj*

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**Abstract:** Significant price volatility has been observed at the world agri-food markets in these latter years. It has been caused by the triggers of the so-called market shocks that negatively influenced the stability of supply and demand of agri-food commodities. The contribution analyzes the causes of the price volatility incidence, it calls attention to the potential jeopardy of the price volatility transmission on the territory of Slovakia and it finds appropriate measures for its elimination. The price volatility of the Slovak agri-food commodities was reviewed pursuant to the variation coefficient calculation in three consecutive five-year intervals.

**Key words:** world prices, volatility, supply, demand, agri-food commodities

**Abstrakt:** V poslednom období bola na svetových agropotravinárskych trhoch zaznamenaná výrazná volatilita prejavujúca sa dramatickými výkyvmi cien. Spôsobuje ju hlavne výskyt spúšťačov, tzv. trhových šokov, ktoré negatívne ovplyvňujú stabilizáciu dopytu a ponuky agrárnych komodít. Predmetný príspevok analyzuje príčiny vzniku cenovej volatility, upozorňuje na potenciálne riziká jej transmisie na územie Slovenska a hľadá vhodné opatrenia k jej eliminácii. Cenová volatilita slovenských agrárnych komodít bola posúdená na základe výpočtu variačného koeficientu v troch po sebe nasledujúcich päťročných intervaloch.

**Kľúčové slová:** svetové ceny, volatilita, ponuka, dopyt, agropotravinárske komodity

In the recent years, the development in the international agri-food markets was affected by the significant price volatility. The contribution aims at analysing the causes of the price volatility incidence in the international markets, at drawing the reader's attention to the potential jeopardy of its transmission to the area of the Slovak Republic and providing the repeated incidence of the price volatility to find suitable measures for its elimination. It is caused by the fact that managerial strategies of the Slovak farmers and businessmen in the agri-food sector are significantly influenced by the current situation in the international markets. The prediction of the price development of agri-food commodities at the world market and the potential price transmission to the Slovak market is also a component part of the paper.

## THEORETICAL BASIS

The contribution was elaborated pursuant to the results of the project that has been solved at the

Research Institute of Agriculture and Food Economics since 2009. In the concrete, it is the project of the technical assistance for the Ministry of Agriculture of the Slovak Republic "The prognosis of the Slovak agriculture development" (Matošková 2009). The topic of agri-food markets including the price development is exposed in many publications and scientific articles.

Křížová (2009) stated that at present, the globalization trend penetrated also into the agricultural sector, processor industry and trade. For all that, the Slovak Republic is not able to avoid the effects pertinent to the afflation and convergence of the economy that exercise an influence on the price level of agri-food products. Gálik (2010) observed that since 2004, the share of the EU-27 countries in the total agri-food trade has increased continually.

According to Božík (2008), the future development of the Common Agricultural Policy (through specific forms of policies) can contribute to the price increase (following the reduction of supply) and also to the

volatility and unexpected price development not only in the world markets but also in the domestic market.

Balcomb (2009) stated that price volatility is induced by market shocks which can come into existence on the demand side (expansion and recession) or on the supply side (market with agri-food products, inputs and energy ...). Shocks can be transferred also through macroeconomic variables (exchange rate, trade indicators).

Čechura with Šobrová (2008) dealt with the price transmission analysis and they focused on the agri-food vertical of pig meat. They confirmed the long-term relation between the farm price of the slaughter pigs and the wholesale price of processed products from pig meat.

In the light of the jeopardy of the price volatility incidence, it would be useful to diversify the agricultural production into the commodities which prices do not correlate with each other. Also according to Buday et al. (2009), the diversification of activities has to ensure the competitiveness increase of rural economy and the enhancement of living standard in the countryside.

## MATERIAL AND METHODS

The main information sources were the data from the publications of prestigious world institutions (OECD and FAO) periodically publishing updated prognosis of the world agri-food markets, from scientific papers of the Research Institute of Agriculture and Food Economics (RIAFE) and the Statistical

Office of the Slovak Republic (SO SR). In accordance with the OECD and the FAO methodology, the price volatility (eventually price variability) of agri-food commodities was evaluated pursuant to the variation coefficient.

The following calculations were used in the contribution:

$$v = s/x$$

$v$  = variation coefficient

$s$  = standard deviation

$x$  = arithmetical average

The value of the variation coefficient close to 0 indicates a lower volatility and the higher value indicates a higher volatility

## RESULTS AND DISCUSSION

The significant price volatility has been observed in the world agri-food markets in these latter years. It has been manifested through the dramatic price variation. Within the last decade, the years 2007–2008 were critical. In the mentioned period, significant upward tendencies were marked by prices of several agrarian commodities (Figure 1 and 2). The price development of grains and oilseeds was the most striking. In the inscribed period, they reached their historical maximum.

The price increase of agri-food commodities was a result of several sequences of production downswings that were induced by unfavourable weather conditions (drought) in the period of low world grain stocks, by the increasing integration of food and

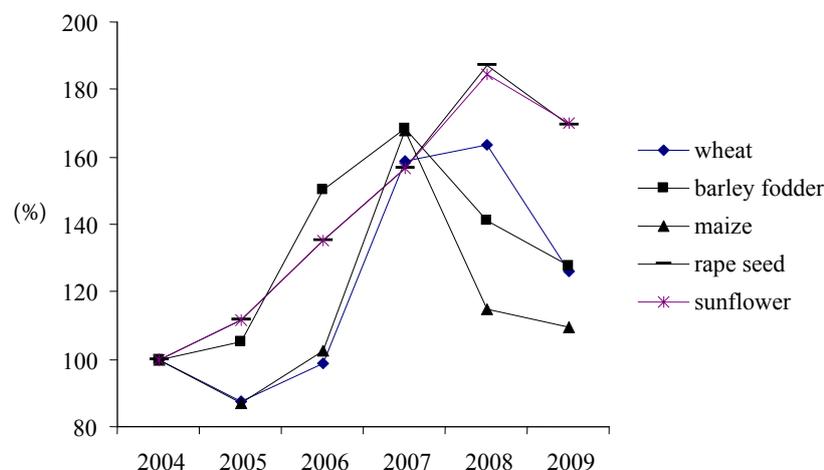


Figure 1. Development of the world prices of plant commodities in 2005–2009 (2004 = 100%)

Source: OECD-FAO (2010), FAPRI (2010), own calculations (calculations were realized following the world commodity prices in €/t)

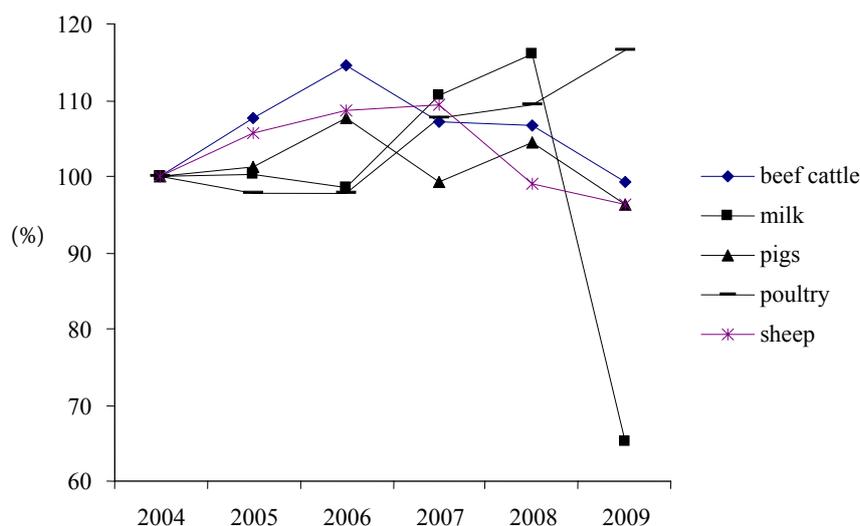


Figure 2. Development of the world prices of animal commodities in 2005–2009 (2004 = 100%)

Source: OECD-FAO (2010), FAPRI (2010), own calculations (calculations were realized following the world commodity prices in €/t of live weight; litre)

energy markets (biodiesel production development) and unsuitable political decisions. Furthermore, the mentioned topic has its background in the global macroeconomic development, a rapid economic progress of developing countries and in the monetary impacts including the exchange rates movement (in the main, dollar devaluation) in the international markets.

Price is a motivation power of the supply and demand development in the world markets. Supply of agrarian markets can be characterized through the low elasticity to the realized production. Furthermore, the production has been changed every year pursuant to the variable weather conditions. In general, demand for basic agri-food commodities has been increased steadily in compliance with the population growth and it does not indicate a higher flexibility. The low demand elasticity of agri-food products causes the fact that a relatively small production volume variability can induce significant changes (so-called shocks) in supply and demand, and consequently in price levels. Pursuant to the presented facts, it is necessary to remark that the low demand elasticity may be partially compensated by the stocks creation. In the event of low production, the mentioned facts can enable meeting the demand.

A cultivating medium for the incidence of the potential price volatility can be also the presence of *strong investors, speculative business activities* (higher prices attract attention and intention to invest) and also the *elimination of stability policy measures*.

Price volatility is influenced by the degree of price transmission, it means by the price interactivity in

the domestic and world (foreign, regional) market. The transmission of international prices to the domestic market is adequate to the level of foreign trade liberalization of the given country and its effect can be different by individual commodities. The relation between liberalization and volatility is complicated. In the event of poor production, the import of the given commodity can limit the increase of domestic prices. Vice versa, in the event of the oversize production, its export can limit the price decrease in the domestic market.

Price transmission can be obstructed (blocked) through various political measures (export and import restrictions, customs duties, quotas, sanitary and phyto-sanitary measures, minimal price fixing, intervention purchases and alike) and also through the deficiently developed infrastructure.

In connection with the price transmission, it is necessary to remark that Slovakia is a country with the small market space. For all that, prices of agrarian commodities have been significantly affected by the international market. The presented tendencies were shown very markedly by maize and pig meat (Figure 3). In the evaluated period, prices of beef, poultry and wheat did not reach the world price level.

Volatility relates to the macroeconomic level (governmental decisions) and also to the microeconomic level (decisions of producers and consumers). At the macroeconomic level, the price volatility plays an important role mostly in less developed countries that have poor opportunities to diversify their production. On the demand side, high prices of basic agri-food commodities can affect the living standard of inhabit-

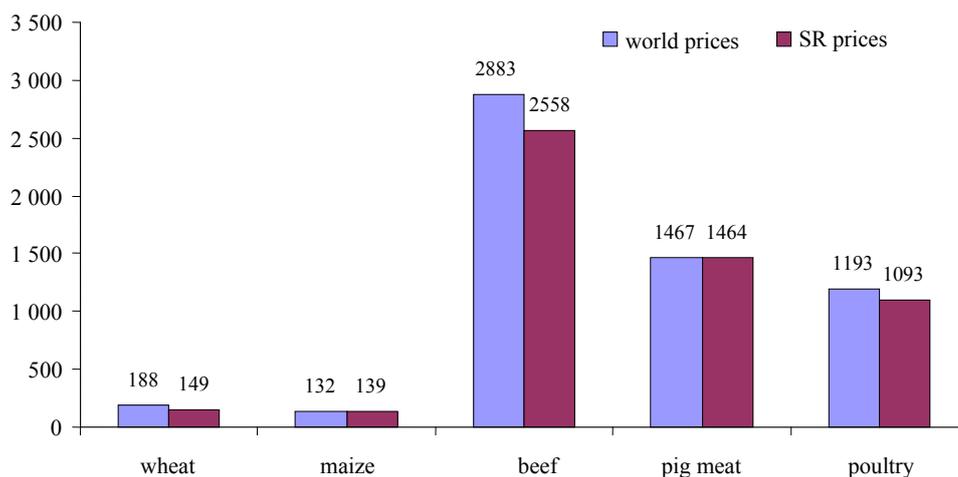


Figure 3. Comparison of the world and Slovak prices of the selected commodities (average of 2006–2008, €/t)

Source: SO SR databases, OECD-FAO (2010)

ants. For all that, the governments of the endangered countries have taken stability measures.

The response of the individual countries (eventually the aggregations of countries) to the high price volatility of agri-food commodities was miscellaneous in 2007–2008. The following measures were taken very frequently: decreasing of the foodstuffs VAT (value added tax), subsidization of the basic foodstuffs, the imposition of import duties and export barriers, unlocking of the governmental reserves, the stimulation of domestic production, the control of retail prices, and the change of political measures concerning biodiesel and so on.

Price volatility can be identified through the calculation of the variation coefficient in the selected period. That manner is used in the FAO and the OECD analyzes. The mentioned methods enable to compare variation coefficient among the individual commodities. It is measured ex post pursuant to the current prices. In this connection, it is necessary to note that the selection of the compared time series is very important for the objective examination of the price level development.

Pursuant to the comparison of variation coefficients regarding grains (calculated per 4 decades), it is im-

possible to draw clear conclusions about the dramatic price volatility increasing in the world agrarian markets (Table 1). Price volatility of agrarian commodities in the Slovak market (calculated through the variation coefficient in five years intervals) shows an upward trend for grains and oilseeds. As to the animal commodities, the price variability was increased for milk and less by poultry, but the same tendencies were not confirmed for beef and pig meat (Table 2).

Estimations of the future supply and demand development the international agrarian markets (including price development) are very important for the strategic decisions of businessmen undertaking in agriculture. According to the mentioned estimations, businessmen make decisions on their future production structure and its volume. Predictions of prices in the world markets are yearly published by the OECD in collaboration with the FAO. Forasmuch as it is not possible to predict an incidence of the price volatility triggers, the predictions were done providing the standard climatic and macroeconomic conditions, it means without an impact of the so-called “shocks”.

According to the OECD-FAO prognosis, in the future decade the world prices of agri-food commodi-

Table 1. Development of variation coefficient by grains world prices

Commodity/period	1970–1979	1980–1989	1990–1999	2000–2009
Maize	0.194	0.185	0.089	0.135
Rice	0.183	0.157	0.121	0.116
Wheat	0.280	0.123	0.096	0.112

Source: OECD-FAO (2010)

Table 2. Development of variation coefficient of farm prices of selected agrarian commodities at the SR market

Commodity/period	1995–1999	2000–2004	2005–2009
Wheat food	0.101	0.040	0.234
Wheat industrial	0.087	0.044	0.197
Maize	0.130	0.038	0.258
Barley malt	0.110	0.058	0.196
Barley food	0.093	0.055	0.169
Sunflower seed	0.017	0.091	0.234
Rape seed	0.028	0.070	0.260
Milk – class I	0.072	0.035	0.188
Poultry (carcass weight)	0.070	0.068	0.081
Slaughter bulls (carcass weight) – class E (up to 2002 class A)	0.041	0.026	0.016
Slaughter pigs (carcass weight) – class E (up to 2002 class I)	0.046	0.108	0.073

Source: SO SR, own calculations

ties are expected to be at a higher level than in the previous 10 years, but the price level of 2007–2008 will be not reached by many commodities (Figure 4). The mentioned price development is conditioned by the progressive trend in the world economy.

With regard to the assumed conditions, the presented trends of the world agri-food commodities prices development ought to be obtained also in the Slovak market. However, the question is the future advancement of the Common Agricultural Policy of the EU after 2013. According to our opinion, the price volatility in the agrarian markets is assumed to occur relatively often in the future. This theory is supported by the significant dependency of some agri-food

commodities on energy prices, namely it means the commodities used as the raw material for the energy production (grains, oilseeds), but also butter.

The price volatility is an international trouble; it runs over the state frontiers and to a certain extent, it resembles an epidemic contagious disease. Because of this, it is necessary to search for an effective remedy. For the venture elimination resulting from the price volatility, it would be advisable to improve the information market system, to enforce the transparency and credibility of the provided information in the domestic and international markets and to strengthen the institutional competences for the purpose of price stability assurance in the agri-food

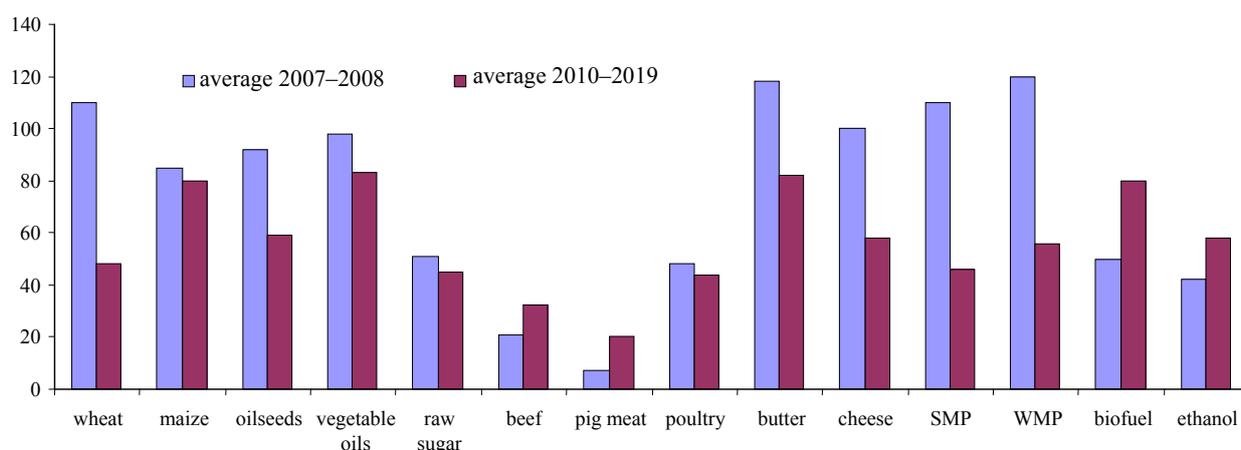


Figure 4. Development of the average world prices of the selected commodities in comparison with the average of 1997–2006 (%)

Note: The years 2001–2006 are the basic period for biofuels and ethanol

Source: The OECD-FAO (2010)

markets. With the view to affect supply and demand, it would be efficient to define clear rules how to act if import tariffs, export and import restriction were imposed etc. These questions are subjects to international negotiations and have to be in compliance with the WTO rules.

## CONCLUSION

The significant price volatility has been observed in the world agri-food markets in these latter years. It has been caused by the triggers of the so-called market shocks that negatively influenced the stability of supply and demand of agri-food commodities. The price volatility of the Slovak agri-food commodities was reviewed pursuant to the variation coefficient calculation in three consecutive five-year intervals. From the results, it was ensued that in the mentioned period, the price volatility was increased for grains, oilseeds, milk and poultry meat. This trend was not confirmed for beef and pork meat.

In connection with the real jeopardy of the significant price volatility occurrence (mainly in connection with a notified energy price increase) that impedes the harmonic structural development of the Slovak agri-food sector, within the research activities it would be useful to pay attention to the depth analysis of agrarian markets in the future. The accomplishment of the mentioned analysis is conditioned by the improvement of the relevant market information system including the regular data actualization concerning the stock level of the basic agrarian commodities and the regular actualization (eventually establishing) of the information system on the agrarian political measures affecting supply and demand in the international markets.

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