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VEGETABLES PRICE VOLATILITY IN REGIONAL PROFILE

VOLATILITATEA PREŢURILOR LEGUMELOR ÎN PROFIL REGIONAL

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Abstract: *The volatility of vegetables production and prices is very high in Romania, which determines a high level of risk in this sector, a high volatility of farmers' incomes as well as difficulties related to the insurance system. In this context, the paper attempts a thorough analysis of vegetables price volatility based upon the variation coefficient. The results prove a very high volatility of vegetables prices, the highest volatility being found in tomatoes. At the same time, the variation coefficient calculation and the comparisons to other EU countries reveal that the Romanian vegetables prices have the highest volatility in the European Union as well.*

Key words*: vegetables price volatility, variation coefficient*
JEL Classification: **Q110**

INTRODUCTION

The vegetables sector in Romania is characterized by high risk and uncertainty. Owing to the great climate variations from one year to another, the total productions and the average yields have great variations. As a result, price volatility is extremely high. As a rule, prices decrease in the years with good yields and total productions, and they increase in the years with low productions. It seems that Romania's integration into the European Union did not contribute either to the diminution of vegetables price volatility.

Objective: the aim of the paper is to investigate the vegetables productions and prices in order to study:

1) the volatility of vegetable productions and prices in Romania and certain EU Member States

2) historical evolution of vegetable prices with the specification of trends for the considered period

The vegetables market in Romania has certain particularities that differentiates it from the markets of the other agricultural products, among which the most important are the following: atomization of supply and demand, seasonality of vegetable products, zonality of vegetables and existence of a weakly developed marketing system; at the same time, the demand for vegetable products has a continuous character, while the supply is seasonal. This leads to an increased variability of prices. As long as the area under hothouses is small, the producers cannot benefit from the high prices over winter; in this period of the year, most vegetables come from imports, mainly from Greece, Netherlands and Turkey. In the vegetable farming sector, the individual holdings have the largest share of cultivated areas (over 95%), which practically leads to an excessive fragmentation of supply also with implications upon the prices of vegetables. The quality of vegetables also influences the vegetable prices. Among the factors that influence production quality, the following should be mentioned: seed quality, plant density, optimum water supply. Certain farmers do not respect plant density, and this influences production quantity and quality. The specific water consumption must be also respected, and the inefficiency of the irrigation system (irrigation water is not received at the right moment) adversely impact production quality. At the same time, farmers do not have sorting and packaging equipment, which constrains their access to the large store chains and prevent them from obtaining stable and constant prices throughout the year.

PREVIOUS STUDIES AND RESEARCH METHODOLOGY

The evolution of prices and price volatility calculation have been investigated in many studies worldwide and at EU level. DG Agri conducted a study on price volatility for the main products produced at the EU and world level, and the conclusions of this study are that the world prices are more volatile than those in EU (DG Agri, 2010). The variation coefficients and the study of production and price volatility were also used in order to determine the areas with the highest risk in Europe from the point of view of risk calculation and risk insurance in agriculture (Bielza Diaz-Caneja et all, 2006). The integration into the world trade, and mainly along the chain of products with high value added such as the vegetable

chain, is considered as a promoter of growth and poverty alleviation (Aksoy and Beghin, 2005), even though the subject remains quite controversial. Thus, the horticultural products proved to generate high incomes per hectare unit (Weinberger and Lumpkin, 2007) and they are known as products that need intensive labour. In spite of this, the incomes are very much conditioned by price volatility in this sector.

In this paper, time series have been used with regard to the evolution of vegetable prices from Tempo on line database. The study of production, yields and price variations in the vegetables sector was based on the variation coefficient. A simple modality to determine this coefficient is the calculation of standard deviation and of the average evolution of certain data series on vegetable production and prices. The standard deviation is given by the following formula:

$$\text{Standard Dev.} = \sqrt{\frac{1}{n-1}} * \sum_t (y_t - \bar{y})^{2-}$$

Y_t= considered time series

$\bar{y}_t$ = *average Average* of considered series

The variation coefficient is calculated as ratio of standard deviation to the mean as measure of data dispersion as against mean. The volatility is higher when the variation coefficient is higher.

RESULTS AND DISCUSSION

This section presents the evolution of variation coefficients calculated on the basis of the methodology presented above. Price variation is very important in the production decision as well as in the calculation of vegetable farmers' incomes. Table 1 presents the values of variation coefficients of the monthly procurement prices by development regions and by types of vegetables.

Table 1: Variation coefficient of procurement prices by regions %

Macroregions and development regions	Variation coefficient of farmgate prices 2004-2010 %				
	Tomatoes	Cucumbers	Pimiento peppers	Green peppers	Red peppers
TOTAL	89	75	22	40	24
Region NORTH-EAST	65	45	31	36	30
Region SOUTH-WEST OLTENIA	69	35	30	38	18
Region NORTH-WEST	na	31	23	23	na
Region BUCHAREST - ILFOV	28	28	na	18	18
Region SOUTH-MUNTENIA	30	42	na	19	14
Region WEST	na	23	na	26	44
Region SOUTH-EAST	na	na	na	na	22

Source: own calculations on the basis of data from Tempo on line data base 2004-2008, NIS

Owing to the high variability of total productions and average yields, the variability of procurement prices is even higher. The tomatoes have the highest price volatility in all the 6 investigated regions (Table 1).

The vegetables have a very high seasonality as these are mainly grown in open field and are highly perishable products. Table 2 presents annual variation coefficients for tomatoes, by regions. A very high variability can be noticed, mainly in the case of tomatoes. Owing to tomato cultivation particularity, the harvest/production has a high seasonal character, with a large supply in a short period of time, which results in high competition among farmers in a short period of time.

Table 2: Annual variation coefficient of tomato procurement prices

Tomatoes %	VC 2004	VC 2005	VC 2006	VC 2007	VC 2009	VC 2010
TOTAL	18	29	143	41	21	30
Region NORTH-EAST	13	25	98	na	1	26
Region SOUTH-WEST OLTENIA	22	22	na	na	na	18
Region NORTH-WEST	na	na	na	na	na	Na
Region BUCHAREST - ILFOV	na	7	19	0	14	Na
Region SOUTH-MUNTENIA	na	8	32	0	24	Na
Region WEST	7	22	na	na	na	Na
Region SOUTH-EAST	0	na	36	na	na	Na

Source: own calculations on the basis of data from Tempo on line database 2004-2010, NIS

At the same time, owing to the pests and diseases and the extreme weather conditions, the supply is very variable and as a result prices have a high volatility. Farmers should improve the production decision and extend the production season on a correlated basis so as to be less confronted with price variation. Unfortunately, there is no continuity and frequency of data at regional level in tempo database, so that not very accurate conclusions can be drawn with regard to procurement price volatility at regional level. In the year 2006, there was an extremely high volatility of tomato prices due to the price in the month of June of the respective year compared to the other months of the year.

Table 3: Annual variation coefficient of procurement prices in cucumbers

Cucumbers %	VC 2004	VC 2005	VC 2006	VC 2008	VC 2009	VC 2010
TOTAL	19	51	18	19	26	42
Region NORTH-EAST	25	56	22	26	39	69
Region SOUTH-WEST OLTENIA	na	26	na	na	na	30
Region BUCHAREST – IF	na	5	35	7	7	na
Region SOUTH-MUNTENIA	na	21	na	22	21	18
Region WEST	33	na	na	na	na	na
Region SOUTH-EAST	na	23	na	na	na	na

Source: own calculations on the basis of data from Tempo on line database 2004-2010, NIS

Table 3 presents the variation coefficient of cucumber procurement prices, in which it can be noticed that the price variation is higher in the region N-E compared to the region South-Muntenia. Per total, the highest price variation was found in the year 2005, 51% respectively and in 2010, 42%.

Table 4: Annual variation coefficient of procurement prices in peppers

Peppers	VC 2004	VC 2005	VC 2006	VC 2007	VC 2008	VC 2009	VC 2010
TOTAL	37	24	66	23	20	17	37

Source: own calculations on the basis of data from Tempo on line database 2004-2010, NIS

Owing to the lack of data continuity, the evolution of the annual price variation coefficient in cucumbers at regional level cannot be

presented. However, at country level, the variation coefficient was extremely high, i.e. 66% in the year 2006 and quite high in 2004 and 2010 (37%) (Table 4). In the case of cucumbers, there is also a very high seasonality of supply, which leads to very high price variations.

Table 5: Annual variation coefficient of average prices

Year	Variation coefficient of annual average prices %			
	Field tomatoes	**Winter white cabbages**	**Onions**	**Green peppers**
2004	21	42	21	27
2005	19	27	7	19
2006	42	56	11	36
2007	19	24	7	19
2008	19	39	5	13
2009	28	27	4	27
2010	9	6	11	11

Source: own calculations on the basis of data from Tempo on line database 2004-2010, NIS

Table 5 presents the evolution of variation coefficients of average prices for field tomatoes, white cabbages and green peppers. It can be noticed that the tomatoes and winter cabbage had the highest price volatility in the year 2006, i.e. 42% and 56% respectively. Throughout the investigated period, onions had the lowest price volatility. The green pepper prices were also less volatile compared to the tomato and cabbage prices.

CONCLUSIONS

Using the variation coefficient for comparing the price volatility of vegetables, we can draw the conclusion that tomato price had the highest volatility in the period 2004-2010. Yet it is worth noticing that tomato price had a maximum level in June 2006 in the region N-E, which overall contributed to an extremely high volatility in the respective year. Onion lies

at the opposite pole, with a lower and more constant variation coefficient, which reached 4% in 2009.

The prices of green peppers are also less volatile compared to the tomato and cabbage prices. However, it can be concluded that throughout the investigated period, the prices had an increasing trend.

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