ROMANIAN VEGETABLE VOLATILITY AND COMPARISONS WITH OTHER EU COUNTRIES

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Abstract: *Studying the vegetable production and price volatility is an important objective having in view the importance of securing a stable vegetable supply and stable prices implicitly. The paper presents the volatility coefficients of the production, yields and prices of vegetables by main vegetable species covering the period 2005-2014. A few comparisons are also made with other European countries as regards the production volume and some aspects are revealed regarding the volatility of food and agriculture production at the level of several European Union member states. The results reveal a high degree of volatility of production and yields per hectare for the main vegetables produced in Romania, leading to a high price volatility including the volatility of vegetable producers' incomes.*

Key words*: vegetables, volatility, farmers'income, JEL Classification: Q110*

INTRODUCTION

The vegetables sector in Romania is characterized by high incertitude and risk, due to the weather variations across seasons and years, which has a direct consequence upon average yields stability and upon volatility implicitly. In the years with good yields and total productions, prices decrease, while in the years with low productions there is an increase of prices. Romania's accession to the European Union has not entailed vegetable price volatility diminution.

The vegetables market in Romania features certain particularities that differentiate it from the markets of other agricultural products, among which the following are mostly important: atomization of demand and supply, seasonality of vegetable products, ecological areas of vegetables and a poorly developed marketing system.

There is a continuous demand for vegetables, while the supply has a seasonal character. This characteristic leads to a high price variation. In the vegetable farming sector, the family farms have the highest share in the cultivated areas (more than 95%), which practically leads to the excessive fragmentation of supply, with direct implications upon price size and volatility. The quality of vegetables also influences their price.

MATERIALS AND METHODS

Price evolution and price volatility calculation have been investigated in many papers worldwide and at EU level. DG Agri conducted a study on price volatility for the main products in EU and worldwide, the conclusions of which reveal that the international prices are more volatile than those in the EU (DG Agri, 2014).

The calculation of variation coefficients and the analysis of production and price volatility also served to the determination of the most risky areas in Europe from the point of view of risk calculation and insurance in agriculture [1].

The integration into the world circuit, and particularly on the high value-added product chain such as the vegetable chain, is considered as a promoter of growth and

poverty alleviation [2], even though this remains quite a controversial issue. Thus, the horticultural products proved to generate high incomes per hectare [3] and are known as labour intensive products. However, the level of incomes is largely conditioned by price volatility in this sector.

This paper used time series on the vegetable price evolution from the database Tempo on line. The analysis of the variation of production, yields and prices of vegetables was based on the variation coefficient. A simple modality to determine this coefficient is the calculation of the standard deviation and of the mean evolution of data series on the production and prices of vegetables. The standard deviation is given by the following formula:

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

Y_t=time series considered

$\bar{y}_t = mean$ of considered series

The variation coefficient is calculated as ratio of standard deviation to mean as a measure of data dispersion versus mean. The higher the variation coefficient the greater the volatility.

RESEARCH RESULTS

This section presents the evolution of variation coefficients calculated on the basis of the methodology presented above. In order to see if there is a correlation between the evolution of production, yields and prices of vegetables we extended the calculation of variation coefficients to the level of productions and yields.

Production and yields volatility in vegetables and by types of vegetables

As regards production volatility, this is quite high in tomatoes and edible roots and lower in onions and cabbages.

Table 1

Romanian vegetable production volatility

	CV 2005-2007	CV 2008-2010	CV 2011-2014	CV 2005-2014
Vegetables – total	14	1	6	14
Tomatoes	17	4	12	11
Dry onions	9	4	5	14
White cabbage	11	2	7	16
Edible roots	18	6	53	34

Source: Own calculations based on Tempo on line data, NIS, 2015

Compared to other EU member states, Romania is on the 7th place as regards the obtained production of vegetables and melons, after countries like Italy, Spain, Poland, France and Netherlands.

Table 2

Total vegetable production in Romania, compared to other EU member states

- Thou. tons -

	Tomatoes	Carrots	Onions
EU-28	15 855	5 185	5 977
Spain	4 074	370	1 170
France	764	541	412
Italy	5 962	543	414
Poland	759	835	642
Portugal	1 393	75	48
Romania	**423**	**111**	**214**
Bulgaria	94	10	10

Source: Eurostat, 2015

The total vegetable production in EU-28 was estimated at 15.8 mil tons of tomatoes in 2013, out of which about two-thirds came from Italy and Spain. Tomatoes production significantly decreased in Italy (from 7.5 mil. tons in 2000 to 6 mil. tons in 2011, while the production of Spain was much more stable, around 4 mil. tons. Romania remains quite an important player, with 423 thousand tons. As regards other vegetables, 5.2 million tons of carrots and 6 million tons of onions were produced in EU-28. Carrot production was relatively high in Poland and Great Britain, together these accounting for more than one quarter, i.e. 16.1% and 12.8% respectively. The Netherlands and Spain are the main producers of onions in the EU, together summing up more than 42% of the onion production of the European Union, our country being on the 7th position in EU.

Besides the volatility determined by the variation of weather conditions, a great scarcity of labour has been noticed, as well as great difficulties in the sale of production, institutional difficulties included, so that farmers could not obtain sufficient incomes to make capital investments in recent years, in modern equipment and technologies and to use quality inputs to increase their yields. The economic efficiency and the yields per hectare in the vegetable sector depend on the economic and environmental factors, on tradition and experience in vegetable farming. The yields slightly increased for the main types of vegetables. Tomatoes have the highest volatility of yields per hectare, which is also reflected in prices (Table 3).

Table 3

Volatility of average yields

	CV 2005-2007	CV 2008-2010	CV 2011-2014
Tomatoes	12	1	9
Dry onions	10	3	8
White cabbage	15	3	6

Source: Own calculations based on Tempo on line data, NIS, 2015

Price volatility. Price variation coefficient

Price variation is a very important factor in production management decisions, as well as in the calculation of vegetable farmers' incomes.

Price volatility is also high and it is influenced by production volatility. The tomatoes and the autumn white cabbage have the highest price volatility, while the carrots and onions have lower volatility coefficients also as a result of better conditioning and storage conditions.

Table 4

Price variation coefficient for the main types of vegetables

	CV 2005	CV 2006	CV 2007	CV 2008	CV 2009	CV 2010	CV 2011	CV 2012	CV 2013	CV 2014	CV 2015
Autumn white cabbage	27	56	24	39	27	24	49	29	34	26	14
Field tomatoes	19	42	19	19	28	8	34	19	24	21	27
Carrots	24	22	15	11	17	7	13	12	14	10	9
Dry onions	7	11	7	5	4	12	17	5	6	12	8

Source: own calculations based on Tempo on line data, NIS, 2015

Due to the high variation of total productions and average yields, the variability of procurement prices is even higher, the greatest price variability being noticed in tomatoes.

According to FAO data, the volatility of food supply per capita expressed in kcal/capita/day is extremely high in Hungary, Poland and Romania. Lower volatilities are found in Germany, Spain and Italy, while France has the lowest volatility (Figure 1)

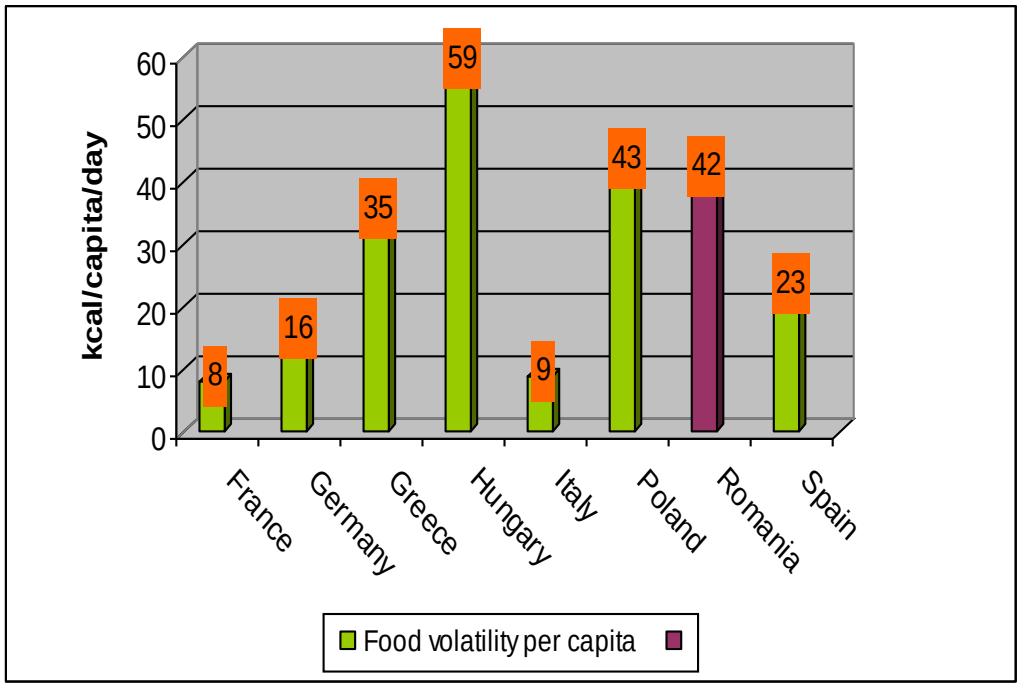

Figure 1 Volatility of food supply per capita

Source: FAO, 2014

As regards the volatility of food supply per capita, this is very high in Hungary, followed by Spain and Romania. Germany has the lowest volatility, followed by France and Poland.

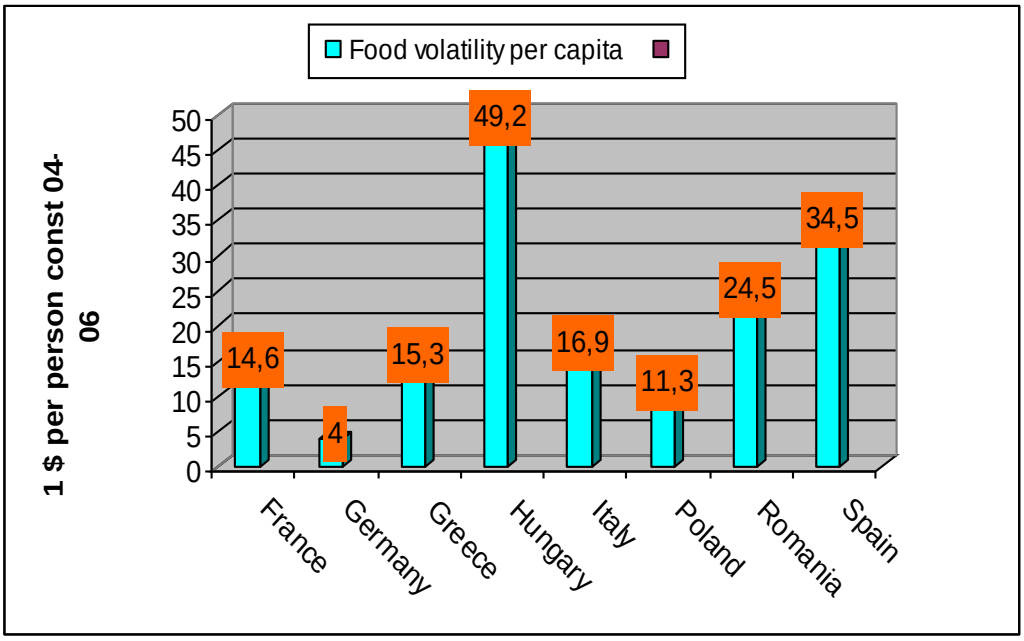

Figure 2 Volatility of food supply per capita
Source: FAO, 2014

CONCLUSIONS

The dispersion of the vegetable total productions and yields was high throughout the investigated period, due to the high seasonality of supply resulting from the non-existence of a constant production throughout the year, of vegetables grown under greenhouses and plastic tunnels inclusively. Practically, this high volatility of production and yields results in an even higher volatility of prices.

Using the variation coefficient to compare the vegetable price volatility, it results that the tomatoes prices had the highest volatility in the period 2005-2015. Onions lay at the opposite pole, with a price variation coefficient slightly lower and more constant, in the year 2009 its value being 4%.

The comparison with a few EU member states reveals that the yields are much lower and the volatility coefficient of vegetables is much higher in Romania.

The high volatility of total productions, of yields and prices also reveal that the vegetable sector lacked a coherent strategy in the period 1997-2010, being characterized by a decreased capacity to face the competition market and to adapt to the weather conditions and market requirements.

The average yield dispersion is higher than the total production dispersion, with higher values in the period 2005-2008. Practically, the high volatility of production and yields are reflected into an even higher volatility of prices.

The results reveal that vegetable consumption in Romania is quite close to recommendation made by nutritionists. However, the self supply is not sufficient and this is why the increase of vegetable green houses is needed. Sector policy should meet the requirements of the market by reducing price fluctuations and the imbalance between supply and demand.

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