The Impact of Rising Oil Prices on Agricultural Products

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Abstract

Fluctuations in the price of oil have increased the cost of production all over the world, putting several industries in difficulty. One of the most important pillars of economy is agriculture, due to its crucial role and ability to grow food and sustain life. The purpose of this article is to observe the influence of the price of oil on the level of agricultural production in Romania. Using the Least Squares method was established the direct and positive influence of oil price over cereal production in Romania. The main conclusion reached by this article is the major impact that the price of oil has on agricultural products in Romania suggesting the importance of the policy that cap the price of oil and allowances to reduce the agricultural production cost.

Key words: price of oil, agricultural products, agriculture sector.
J.E.L. classification: Q10, Q18.

1. Introduction

Recent socio-economic events have made the cost of living quite high, and the speculation about rising food prices is a reality. At the same time as inflation, the price of oil has risen exponentially, making agricultural production much more expensive. In the current context, there is a need for a study on how the price of oil affects agricultural production.

The present paper aims to study this topic due to the importance of agriculture in the economy and the research purpose is to study the correlation between the price of oil and agricultural production in Romania.

The paper is structured as follows. The theoretical background presents some important research regarding the link between the price of oil and the influence over the agricultural market. The research methodology deals with the presentation of the research method and data used for empirical study. The findings section exposes the results of the econometric study and the final section are presented the main conclusions of the paper and offers new trajectories to be addressed in future studies.

2. Theoretical background

The importance of agriculture is given by the biological, economic, ecological, and cultural role it holds (Andrei et al., 2016). The Covid 19 pandemic has made its presence felt in all economic sectors, including the agricultural sector and the variation of prices in the agricultural sector has a significant impact on the economy of a country (Akpaeti, 2018).

Several authors had studied the impact of the agricultural price on the economy. Adams and Ichino (1995) noted that the presence of shocks and rising world commodity prices, including the agricultural products will have an inflationary effect. On the same note, Akpan and Udoh (2009) showed that the high instability of prices of cereals increases inflation. Durevall et al. (2013) studied the influence of globalization and showed that international prices of food determine the long-term evolution of domestic prices.

Tweeten (1980) argued that monetary shocks have a negligible impact on agricultural prices, but Devadoss and Meyer (1987) highlighted that agricultural prices were influenced by the change in the money supply in the case of the USA. A study made by Robles and Torero showed that when prices rise by 10%, farmers' net income decreases by 2.3% over the next 1-2 years and 1.2% over the long term.

Other authors have researched the relationship between the price of agricultural products and energy price variations. Koirala et al. (2015) established the positive correlation between energy futures prices of natural gas, crude oil, gasoline, diesel, biodiesel, and, futures prices of corn, soybeans, and cattle futures. Similar results were obtained by De Nicola and De Pace (2016) who analyze the link between energy and agricultural goods. As it can be seen, the energy prices influence the prices of the agricultural products, their increase could become a financial burden, especially for poor members of society.

In the context of the recent increases in energy prices, our article aimed to establish the correlation between oil price and agricultural production of cereals in Romania and tried to answer to the question if the oil price is a significant factor in determining the production of cereals in Romania.

3. Research methodology

The paper aims to analyze if oil prices have an influence on the agricultural production of Romania, respectively the cereal production. Therefore, the research methods used in this paper are the method of bibliographic study, the method of comparison, the method of synthesis, the graphic method, and the case study.

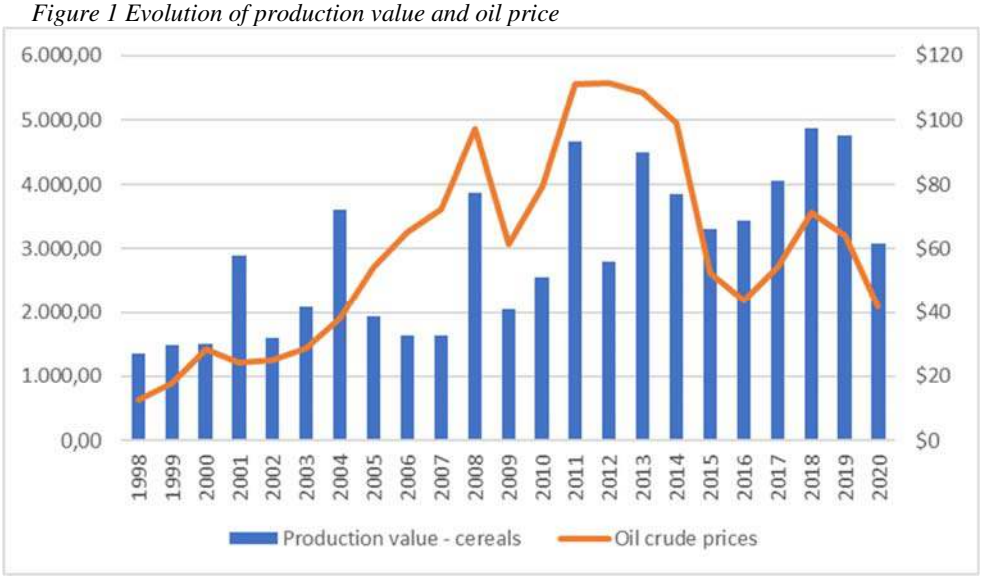
In accordance with the purpose of the paper, it was established the following research hypothesis: *"The oil price is a significant factor in determining the production of cereals in Romania"*. The research method used to test this hypothesis was the Least Squares method using the following regression equation:

$$PROD=C(1)+C(2)*OIL \quad \text{(Eq.1)}$$

$$PROD=1659.06856456+21.5873071514*OIL \quad \text{(Eq.1a)}$$

The data used for the empirical study was retrieved from the Eurostat database and https://ourworldindata.org/ for the period 1998 – 2020. It can be observed the increase in the production value of cereals in Romania (+128%), but also the growth of oil price (+229%).

Figure 1 Evolution of production value and oil price



Source: Own processing

The descriptive statistics of the variables reflect the abnormal distribution (p > 5%) with a positive skewness (Skewness > 1) and a platykurtic kurtosis (Kurtosis < 3).

Table 1 Descriptive statistics of variables

	PROD	OIL
Mean	2939.687	59.32275
Median	2897.640	54.52109
Maximum	4877.450	111.6697
Minimum	1352.930	12.71566
Std. Dev.	1183.745	30.82929
Skewness	0.182043	0.319503
Kurtosis	1.674602	2.003556
Jarque-Bera	1.810522	1.342844
Probability	0.404436	0.510981
Sum	67612.80	1364.423
Sum Sq. Dev.	30827546	20909.80
Observations	23	23

Source: Own processing

4. Findings

The results of the first regression equations reflect the positive correlation between agricultural production of cereals in Romania and the oil price, which means that an increase in oil prices will lead to an increase in the production value of cereals in Romania. Oil price is a significant determining factor of production, having the p-value less than 1%. However, this model is not a significant one, R-squared being only 31,61%, and the Adjusted R-squared being 28,35%.

Table 2. Empirical results

Dependent Variable: PROD				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Sample: 1998 2020				
Included observations: 23				
PROD=C(1)+C(2)*OIL				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1659.069	461.1095	3.597992	0.0017
C(2)	21.58731	6.929232	3.115397	0.0052
R-squared	0.316088	Mean dependent var		2939.687
Adjusted R-squared	0.283521	S.D. dependent var		1183.745
S.E. of regression	1001.982	Akaike info criterion		16.74029
Sum squared resid	21083333	Schwarz criterion		16.83903
Log likelihood	-190.5133	Hannan-Quinn criter.		16.76512
F-statistic	9.705698	Durbin-Watson stat		1.190857
Prob(F-statistic)	0.005234			

Source: Own processing

5. Conclusions

The result of the regression confirms the expected hypothesis according to which, in the case of Romania, there is a positive and direct correlation between the production of cereals and the price of oil. And in the event of an increase in the price of oil, the value of cereal production and the agricultural sector, in general, will increase due to the incorporation of this cost in the production costs of cereals. The results of the paper suggest that the authorities should intervene and cap the price of oil similar to other EU countries, or intervene through allowances to reduce the agricultural production cost.

This study is not limited to the research of the influence of oil price on the production of cereals, therefore one of the interesting aspects to study in the future may be the correlation between the price of oil and agricultural production derivatives such as the price of fertilizer. Also, the study can be extended by including other variables such as inflation.

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