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ARE AGRICULTURAL SUBSIDIES EFFICIENT TOOL FOR AGRICULTURAL SECTOR OF THE REPUBLIC OF MACEDONIA?

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Abstract

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Over the years in the Republic of Macedonia, agricultural subsidies are enlisted as determinant of farm incomes, farm productivity and the overall national agricultural sector evident in her national budgets, grants and aids from the European Union. However, there is yet empirical findings that evaluate the impact of agricultural subsidy on the performance of agricultural sector of the Republic of Macedonia. Therefore, this paper aimed at examining the causal relationship between agricultural subsidy and performance of agricultural sector, using time series data for the study obtained from State Statistical Office and World Bank and analysed using Augmented Dickey Fuller and Pairwise Granger Causality Test. Also. We found that though the relationship between subsidies and agricultural development was not significant, subsidies had a negative impact on agricultural productivity. This clearly reflects the inefficiencies of government subsidization policy of the agricultural production.

Key words: casual relationship; Republic of Macedonia; subsidies

Abbreviations: ADF – Augmented Dickey Fuller, CAP – European Common Agricultural Policy, CEFTA – Central European Free Trade Agreement, EU – European Union, GVA – Gross value added, IPARD – Instrument for Pre-accession Assistance for Agriculture and Rural Development, MAFWE – Ministry of Agriculture Forestry and Water Economy, SSO – State Statistical Office, UAA – Utilized Agricultural Area, WTO – World Trade Organisation

Introduction

The agricultural sector of the Republic of Macedonia is dominated by small-scale farms with a high level of land fragmentation and unsolved land rights. The average size of UAA per household is on average 1.85 ha and average standard farm output per holding up to EUR 4825 (SSO, 2015). Beside the relatively small declination of the agricultural contribution to total GDP of the Republic of Macedonia, the breakeven point of less than 10% is not achieved. In the last ten years, agricultural contribution stagnate on the same point even there are many agricultural policy supports and

financial instruments to be achieve the governmental goal, to modernise the agricultural sector and increase the farm productivity.

Agricultural policy of the Republic of Macedonia is focused and adjusted towards the CAP of the EU. The adjustment and implementation started more intensively after the Republic of Macedonia gained the status of candidate country for EU accession in 2005. The CAP objectives have been adopted as goals of the national agricultural policy and strategy through sets of laws, strategies, programmes and long-term plans with increased budget for the agricultural sector to achieve the objectives set in them (MAFWE, 2014).

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For that reason, especially from the beginning of 2000's the governmental subsidies and financial aid for agriculture and rural development increased continuously (Figure 1). From EUR 29 million in 1998 to EUR 155 million in 2013 with continuously tendency to keep on yearly the same amount by 2020 (MAFWE, 2014). The budget transfers in 2014 was EUR 128.7 million which comparing to 2008 (EUR 52.7 million) are more than doubled (MAFWE, 2014). Therefore, the additional source of funding the agricultural development is the IPARD programme. The total available budget from the IPARD programme for 2007–2013 period was EUR 64.3 million which distribution was aimed for investments in restructuring and modernisation of agricultural holdings, processing and marketing of agricultural and fishery products (MAFWE, 2014).

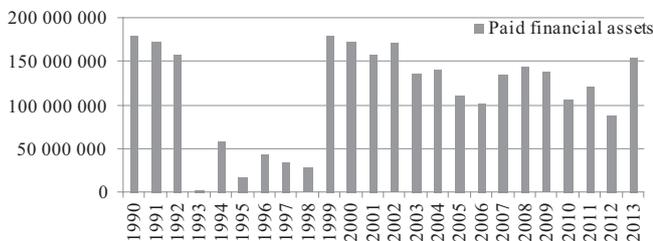


Fig. 1. Agricultural subsidies and government financial aid in the agricultural sector in Republic of Macedonia (in EUR million)

Source: World Bank, 2014

The main instruments of the Macedonian agricultural policy are the direct payments. They are distributed per unit of produced agricultural product, per area of cultivated agricultural land and per livestock unit. During the implementation and harmonization of the agricultural policy with the CAP of the EU, direct payments have been the major form of subsidy that aimed to support the Macedonian farmer throughout the whole period. In the recent years (within the framework of the new agricultural strategy for 2014-2020 period), direct payments have switched from payments per output to payment per capacity. However, their main aim remains to be increased farm productivity and agri-food export oriented agricultural sector.

If the trust in finance (subsidies) and economy does not return rapidly, economic reform, socio-economic growth and political stability will suffer (Vasa and Magda, 2014). Taking into consideration the significant increase in the food price index, agri-food import and slight increasing or decreasing of the yields for the main agricultural products in the Republic of Macedonia, a simple question arises in authors mind whether: the governmental subsidies on agricultural sector

cause benefits and wellbeing or not? The huge amount of governmental direct payment on the agricultural sector to increase its productivity either plays the significant role for agricultural development and modern farming or not?

Total trade balance of the Macedonian agri-food import-export products showing negative increasing beside the expectations and main goal of the government that subsidy will bring self-sufficient and less dependent food import country. However, vice-versa scenario happened in the last decades after the subsidy programme was announced. The import of agri-food products increased for EUR 193 million between 2007-2013 programme period, followed by extended gap in the trade balance with more than EUR 200 million by 2013 (Figure 2).

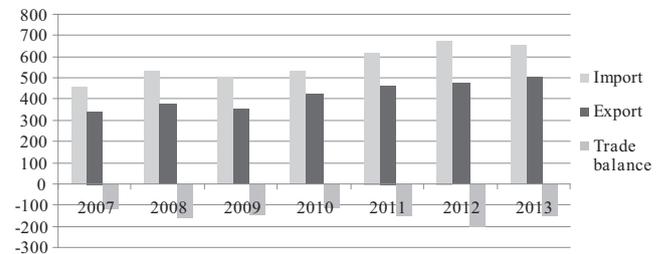


Fig. 2. Import-export of agri-food products in Republic of Macedonia (in EUR million)

Source: SSO and MAFWE, 2014

In the past period one of the key factor for increasing the gap of the Macedonian trade balance is liberation process for tax decreasing by 2008 in previous agreement with WTO and the Free Trade Agreement with EU from 2011. In addition, CEFTA from 2006 causes non-tariff agreement in the region to boost the import-export volume of the agri-food sector.

Gross value added (GVA) in Macedonian agricultural sector is generated by 192675 agricultural holdings based on data from the Agricultural Census in 2007 (SSO, 2015). Out of this, 99% are individual households and only 1% agricultural companies that mean that small-scale farming is crucial factor for the GVA contribution. Nowadays, beside the governmental support and many initiatives the number of individual small-scale farms is decreasing continuously and has 12% less in 2013.

Separately, by subsectors vegetables productions contribute 38.35% of the total GVA, followed by 9% of cereals production and 11% of orchards (MAFWE, 2014). In the analysed period it's obvious that a cereal production is decreasing which can cause problems on long-term taking into consideration that total cereals production satisfies only 45%

of the domestic consumption (Figure 3). Therefore, the need and dependency of cereals import will increase in the following period caused by consumption demand of the population and lower yields per hectare comparing with the region and EU as well.

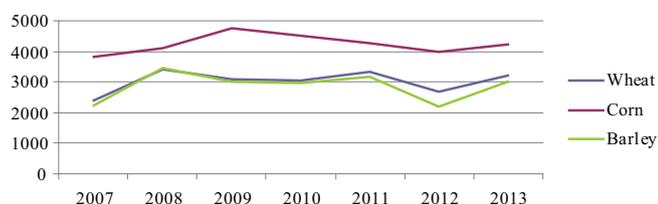


Fig. 3. Average cereal yields in Republic of Macedonia for 2007-2013 (in Kg/ha)

Source: SSO, 2015

Vice-versa of cereal trends, the vegetables sector have significant potential for some products (Figure 4) and might be most significant and export-oriented on a long-term supported by favourable strategy. One more factor for the potential of this sector is the increased total UAA under vegetables production from 11% in 2008 to 20% in 2012 (MAFWE, 2014). Main progress is achieved in the production of cucumbers and cabbages, which production is encouraged by farmers because of the worthwhile subsidies and strong demand on the post-Soviet market.

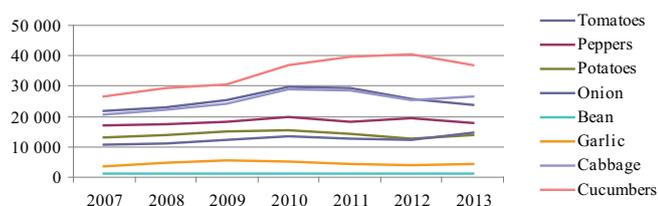


Fig. 4. Average vegetables yield production in Republic of Macedonia 2007-2013 (in Kg/ha)

Source: SSO, 2015

In 2007-2013 period vegetables sector was under significant variations caused mainly by: inadequate parity relation between input-output prices (thus farmers were oriented to low cost input production varieties), strong dependence of vegetable sector to climate changes and lack of technological innovations among the existing agri-food processing companies in the country. Except the increased cucumber production for almost 10000 kg per hectare, cabbage by 6000 kg and less significant onion by 4000 kg (Figure 4), there is no significant increase in terms of the other vegetables within the analysed 2007-2013 period.

Main product among the Macedonian orchards is the apple represented by 45% of the total orchards production, followed by plums 15%, cherries and sour cherries 12% and peaches 12%. More than 60% of the orchards are with size less than 1 ha which make them less productive and limited in the scope of optimizing and increasing their productivity. Lack of cooling places and difficult access to micro-credits makes Macedonian orchards production stagnating (Figure 5).

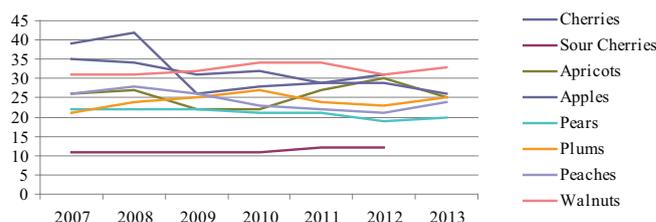


Fig. 5. Average orchards production in R. of Macedonia 2007-2013 (in Kg/tree)

Source: SSO, 2015

Lack of extension services and increased input price on a long-term make Macedonian fruits less competitive. Climate changes and the demand for new attractive varieties also make Macedonian farmer trapped and limited in their market opportunities (Grozđanić, 2013). This sector nowadays satisfied Macedonian market in fresh demand, but lack of processing technology make the Republic of Macedonia net importer for added-value fruit products (Bajramovic, et al., 2016).

In summary of the introduction, the most important indicators for the agricultural productivity in the Republic of Macedonia (Figure 6) are showing partial increase and emergence for different policy and tools. The agri-food indexes show continuous increase from 2003 onward, the time when the country joined WTO. Thus, the Republic of Macedonia opened its border for competitive and liberal trade, leading to import dependency and losing of agriculture productivity.

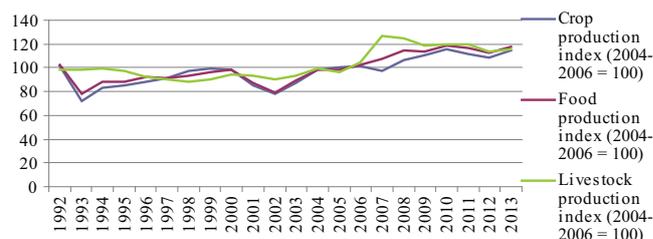


Fig. 6. Agri-food production index in the Republic of Macedonia (1992-2013)

Source: World Bank, 2014

Materials and Methods

Data Sources

The data used in the study was from secondary sources, mainly from the SSO of the Republic of Macedonia and World Bank database over the period of 1990–2014 based on data availability. The publication is designed to serve as an easy reference for statistical information and sources. The dataset provides detailed records on agricultural development, proxied by agricultural production and government subsidies.

Method of Data Analysis

Trend analysis was done using graphs to show the movement of agricultural production and government subsidies with time. Mean, median, minimum, maximum were the various forms of descriptive statistics used to summarize the features of the variables.

It is well known that the usual techniques of regression analysis can result in highly misleading conclusion when variables contains stochastic trend (Stock and Watson, 1988; Granger and Newbold, 1974). In particular, if the dependent variable and at least one independent variable contain stochastic trend, and if they are not co-integrated, the regression results are spurious (Phillips, 1986; Granger and Newbold, 1974). To identify the correct specification of the model, an investigation of the presence of stochastic trend in the variables is needed. Moss and Shonkwiler (1993) followed a similar approach, but using farm level yields with a longer time-series 1930-1990. The authors applied this approach on a shorter period, but empirical evidence on yield models exhibiting stochastic trends was not provided.

The Co-integration Test was used to test if variables share a common stochastic trend and stationary at first differences. Augmented Dickey Fuller (ADF) and Pairwise Granger Causality Test were employed to test for unit root and causality respectively. While the ADF tested for the stationary time series properties of all variables, the Granger Causality Test (Granger et. al., 2000) was used to determine the causal link between the trend of agricultural production and government subsidies in the Republic of Macedonia.

The Augmented Dickey Fuller Model

This study uses the ADF model as presented in Oyinbo and Rekwot (2014):

$$\Delta Y_t = \alpha_1 + \alpha_2 t + \beta Y_{t-1} \sum_{i=1}^n Y_i \Delta Y_{t-1} + \varepsilon_t \quad (1)$$

The Hypothesis to test for unit root is stated below:

The null hypothesis H0: $\beta = 0$ shows that the time series data is not stationary.

The alternative hypothesis H1: $\beta < 0$ shows that the time series data is stationary.

The Co-integration Test

The Hypothesis to test for co-integration is stated below:

The null hypothesis H0: $\beta = 0$ shows that there is no co-integration between variables.

The alternative hypothesis H1: $\beta < 0$ shows that there is co-integration between variables.

The Pairwise Granger Causality Test

The debate over the causal relationship between exports and productivity is an important but empirically testable one with different approaches used. In the approach of Kunst and Marin (1989), the use of Granger causality test shown that the relationship between exports and productivity among Austrian manufacturing does not have causal link. While, there is a positive link from productivity to exports, the improved productivity arising from factors other than trade effects. Used model in this paper on the causality test between variables is stated below according to Oyinbo and Rekwot (2014). This model was employed in this study to examine the causality relationship that exit between agricultural subsidy and agricultural development proxied by agricultural production value and agricultural raw material export.

$$X_t = \beta_0 \sum_{i=1}^k \beta_i X_{t-1} + \sum_{j=1}^k \alpha_j X_{t-j} + \sigma_{1t} \quad (2)$$

$$Y_t = \gamma_0 \sum_{i=1}^{k+1} \gamma_i X_{t-1} + \sum_{j=1}^{k+1} \delta_j X_{t-j} + \sigma_{2t} \quad (3)$$

Regression Analysis for Time Series Data

Regression analysis was employed to examine the effect of agricultural subsidies on agricultural production. The model is specified below:

$$\Delta \text{AGRI_PRODt} = \alpha_0 + \alpha_1 \Delta \text{AGRI_SUB} + \text{Ut}$$

where, AGRI_PRODt = Agricultural Production in logarithmic at time t; AGRI_SUBt = Agricultural subsidies in logarithmic at time t; and Δ stands for first difference.

The model above was specified in this form in order to prevent spurious regression.

Results and Discussion

The Figure 7 below shows a correlating movement between agricultural subsidies, food production index, agricultural production value, agricultural raw material export and average cereals yield. This suggests a possible relation between variables.

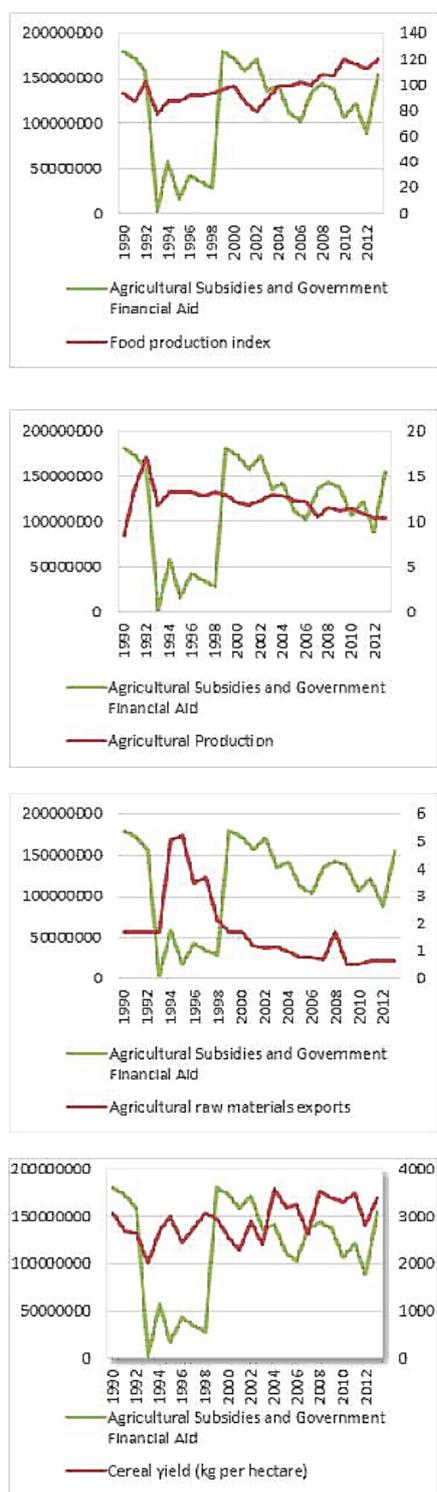


Fig. 7. Correlation between analysed variables
 Source: Authors' Computation, 2016

Test for co-integration

Table 1 below shows the null hypothesis is rejected and the result is interpreted to mean that at least one of the variables are co-integrated, thus the time series data is valid for causality test. This shows that there is long run relationship between agricultural subsidies, agricultural production and agricultural raw material export and mirror those results of Arnade and Vasavada (1995), in which they stated that there is some evidence of long-run causality between agricultural subsidy, production and export.

Table 1
Test of Co-integration Results among selected Variables

Variable	ADF Test	t-statistics (1%)	Probability	Inference
Agric_Production	-6.345	-3.769	0.001	1
Agric_Subsidy	-7.074	-3.769	0	1
Agric_Export	-4.708	-3.769	0.001	1

Variable ADF Test t-statistics (1%) Probability inference
 Source: Author's data analysis 2016

Granger causality test between agricultural subsidies and agricultural development indices

Table 2 below shows the results of the Granger Causality Test among the variables. The result clearly shows that an agricultural subsidy does not granger-cause both agricultural development proxy, that is, agricultural production and agricultural raw material export. In the contrary, agricultural production and agricultural raw material export granger-cause subsidy. Usually, this is unexpected for a country like the Republic of Macedonia with small population engaged in traditional agriculture. Middle-upper income countries like the Republic of Macedonia are most likely to have significant increases in export demand for agricultural products when

Table 2
Pairwise Granger Causality Test Results

Null Hypothesis	F- Statistics	Prob. Value	Decision
Agricultural Subsidies does not granger cause Agricultural Production	0.855	0.445	Accept Ho
Agricultural Production does not granger cause Agricultural Subsidies	3.757	0.044	Reject Ho
Agricultural Subsidies does not granger cause Agricultural Raw material export	2.041	0.16	Accept Ho
Agricultural Raw material export does not granger cause Agricultural Subsidies	2.878	0.083	Reject Ho

Source: Author's data analysis 2016

productivity rises. Thus, it can be said that the government subsidies on agricultural sector does not play significant role for agricultural development in the Republic of Macedonia. This clearly indicates that in the Republic of Macedonia, the government subsidies on agricultural sector are not using properly for agricultural development means that a number of irregularities in the proper management of agricultural subsidies still exist in the agricultural sector.

Regression analysis of short run effect of agricultural subsidies on agricultural production

The regression analysis was employed to examine the association between change of agricultural production and agricultural subsidies. In order to analyse this, the first difference of agricultural subsidies was regressed against the first difference of agricultural production to avoid spurious regression knowing fully well after the unit root test that the two variables are stationary at first difference level.

It was found in Table 3 that agricultural subsidies has a positive effect on agricultural production in the short run, but not statistically significant. The insignificant of this relationship clearly points that agricultural subsidies has not played a significant role on agricultural production, therefore, yet to transform to agricultural development in the Republic of Macedonia. These results clearly imply that governmental efforts and subsidies to promote productivity enhancing promotion of competitiveness, modernization and restructuring of the agricultural holdings will have little influence.

Table 3
Short Run Effect of Agricultural Subsidies on Agricultural Production

Variables	Coefficient	t-values	P-values
Δ AGRI_SUB	0.441	0.741	0.468
Constant	12.491	16.61	0

No of Obs = 24; F-Statistics = 124.1; Prob (F) = 0.001

Source: Author's data analysis 2016

Conclusion

The evidence from this study suggests that Macedonian agricultural export and productivity are not determined primarily by the levels of subsidies. Based on the findings we can conclude slight increasing or continuous stagnation of some products' productivity beside the progressive governmental subsidies. On a long-term, this will bring difficult situation for the Macedonian agriculture and the risk of more food-import dependency. Therefore, the relative lack of evidence that changes in subsidies affect productivity and export trade implies that the Republic of Macedonia may not

enjoy significant growths in agricultural trade with the trade partners in CEFTA and EU, even if the productivity levels are increased significantly over the coming period 2014-2020.

Subsidies may give effects if the government take more responsibility and tidier control over the distribution. Parallel with the primary production the processing agri-food sector have to modernise and extend, but currently is lagging behind in modern technology and capacity to meet local and regional demand. Direct payments, in their current coupled form and distribution per outputs, do not properly address the weaknesses of the agricultural sector or use its potential rationally. An important stage to be implemented is the cancellation of per output financial support for the sectors that are not supported in the EU, such some livestock and vegetable production. After seven years continuous national support and four years of EU assistance in the agricultural sector, Macedonian agricultural productivity is into stagnation phase or slight declination.

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