

Are agricultural subsidies causing more harm than good? Evidence from agricultural sector of the Republic of Macedonia

Nikola Trendov¹, Kehinde Olagunju², Mile Pesevski³

Szent Istvan University^{1,2}

Faculty of Economics and Social Sciences, Doctoral School for MBA

Pater Karoly ut.1

Godollo, Hungary

Ss.Cyril and Methodius University³

Faculty of Agricultural Sciences and Food, Institute for Agroecconomics

Bul. A. Makedonski bb

Skopje, Republic of Macedonia

email^{1,2,3}: trendov.nikola@gmail.com, olagunjukehindeoluseyi@gmail.com

milepesevski@yahoo.com

Abstract

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 (ADF) 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.

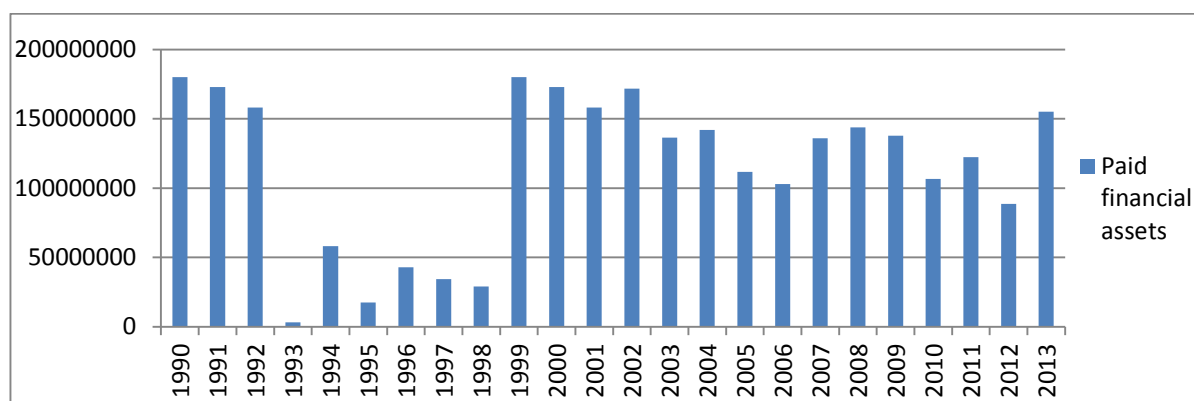
Keywords: Agricultural sector, casual relationship, Republic of Macedonia, subsidies

JEL Classification: C12, C32, C53, Q14, Q18

1. Introduction

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 stagnating on same point even there are many supports and financial instruments to achieve the governmental goal, to modernise the agricultural sector. For that reason, especially from the beginning of 2000`s the governmental subsidies and financial aid for agriculture and rural development increased continuously. From EUR 29 million in 1998 to EUR 155 million in 2013 with continuously tendency to keep on yearly the same amount by 2020 (Ministry of Agriculture Forestry and Water Economy [MAFWE], 2014). With this strategy the Macedonian agricultural will require using agricultural inputs more efficiently and utilize more agricultural land, to follow and harmonise with the European Union agricultural policy and make more competitive agricultural sector. Therefore, a simple question arises in authors mind whether: the governmental subsidies on agricultural sector cause benefits and wellbeing or not. The huge amount of government subsidies on agricultural sector either plays the significant role for agricultural development and modern farming or not.

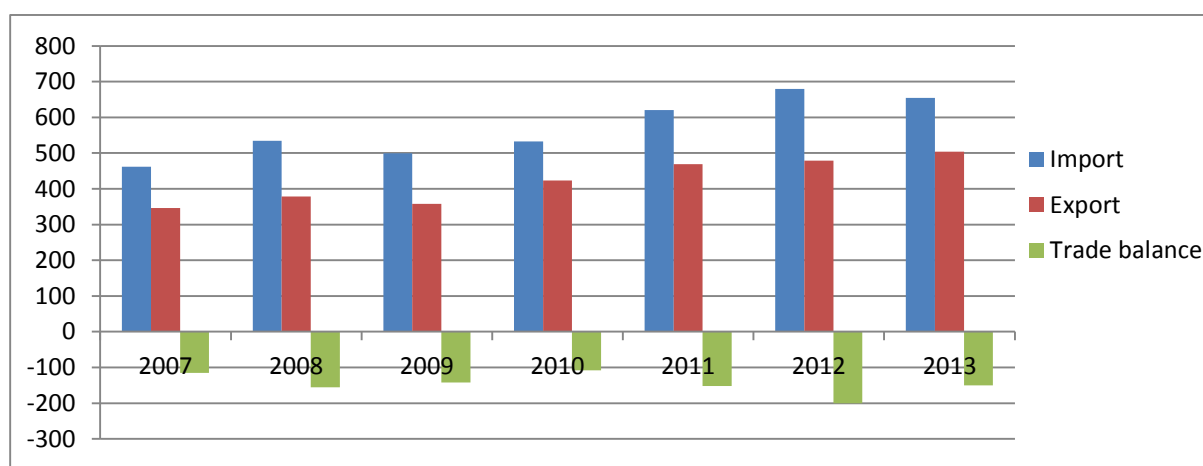
Figure 1. Agricultural subsidies and government financial aid in the agricultural sector in Republic of Macedonia (in EUR million)



Source: World Bank, 2014

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



Source: SSO and MAFWE, 2014

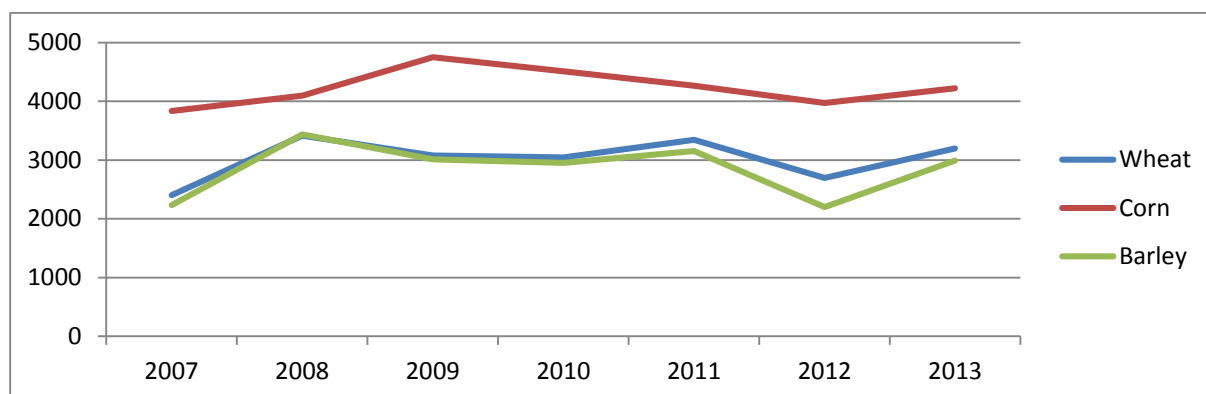
In the past period one of the key factor for increasing the gap of the Macedonian trade balance is liberation process for tax decreasing by 2008 in previous agreement with World Trade Organisation (WTO) and the Free Trade Agreement with EU from 2011. Also, Central European Free Trade Agreement (CEFTA) 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 State Statistical Office [SSO] (2007). Out of this, 99% are individual households and only 1% agricultural companies which 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. 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.

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

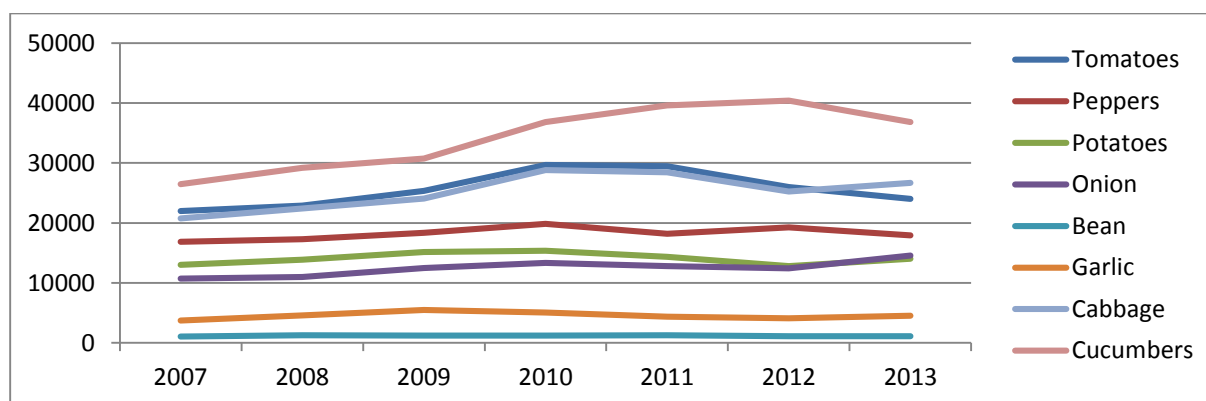


Source: SSO, 2016

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 utilized agricultural area (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.

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.

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



Source: SSO, 2016

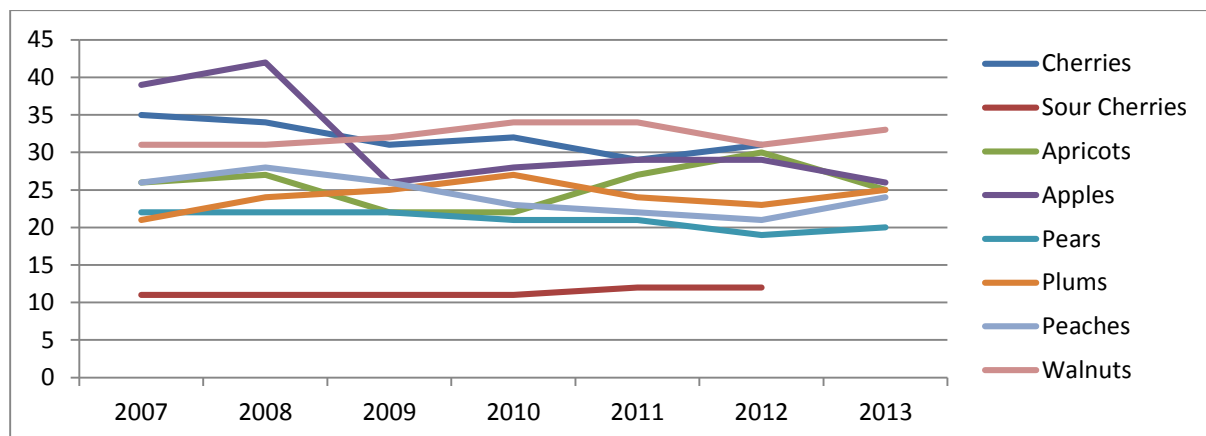
Except the increased cabbage production per hectare and less significant pepper production, there is no evidence for subsidies` influence for optimized progressive production within the analysed period. Neither significant technological improvement nor total production increasing in the vegetable sector is shown within the analysed period.

Main product among the Macedonian orchards is the apple, which is 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 for optimizing and increasing of their productivity. Lack of cooling places and difficult access to micro-credits makes Macedonian orchards production stagnating.

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. 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.

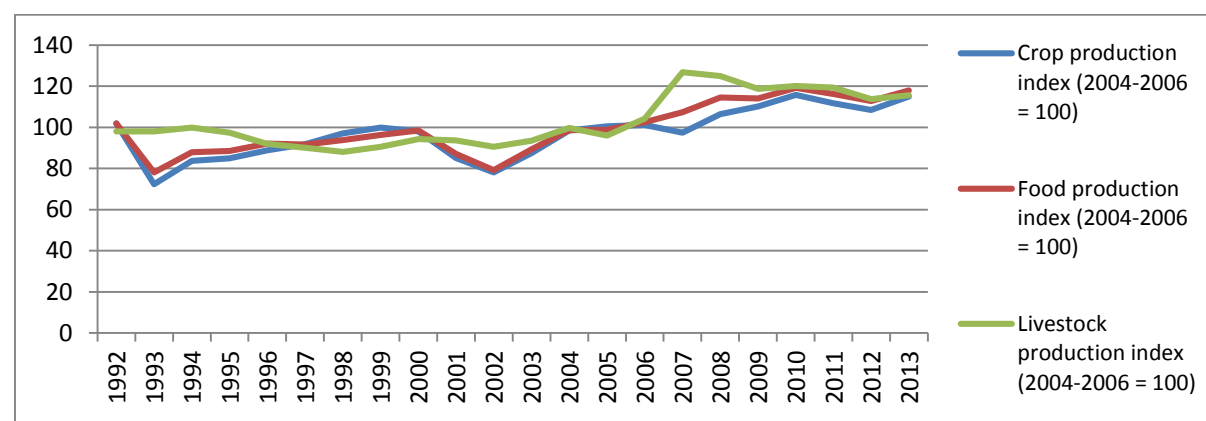
Figure 5. Average orchards production in R. of Macedonia 2007-2013 (in Kg/tree)



Source: SSO, 2016

In summary of the introduction the most important indicators for the agricultural productivity in the Republic of Macedonia (Figure 6) are showing continuous increasing and emergence for different policy and tools to approach to cope with this trends which are emerging in the developing countries. The agri-food indexes shows continuous increase from 2003 onward, time when the country joined WTO and opened its border for competitive and liberal trade, leading to import dependency and losing of agriculture productivity.

Figure 6. Agri-food production index in the Republic of Macedonia



Source: World Bank, 2014

2. Data and Methods

2.1 Data Sources

The data used in the study was basically from secondary sources, mainly from the State Statistical Office 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.

2.2 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 & Watson (1988), Granger & 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 & Newbold (1974)). To identify the correct specification of the model, an investigation of the presence of stochastic trend in the variables is needed. 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 was used to determine the causal link between the trend of agricultural production and government subsidies in the Republic of Macedonia.

2.2.1 The Augmented Dickey Fuller Model

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

$$\Delta Y_t = a_1 + a_2 t + \beta Y_{t-1} + \sum_{i=1}^n \gamma_i \Delta Y_{t-1} + \varepsilon_t \quad (1)$$

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.

2.2.2 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.

2.2.3 The Pairwise Granger Causality Test

Model on the causality test between variables is stated below according to Oyinbo & Rekwot (2014). This model was employed in this study to examine the causality relationship that exist between agricultural subsidy and agricultural development proxied by agricultural production value and agricultural raw material export.

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

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

2.2.4 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:

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

Where, AGRI_PROD_t = Agricultural Production in logarithmic at time t;

AGRI_SUB_t = Agricultural subsidies in logarithmic at time t

Δ stands for first difference

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

3. 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.

Figure 7. Correlation between analysed variables



Source: Authors' Computation, 2016

3.1 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 subsidy, agricultural production and agricultural raw material 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	0.000	1
Agric_Export	-4.708	-3.769	0.001	1

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

3.2 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. 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.

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 H ₀
Agricultural Production does not granger cause Agricultural Subsidies	3.757	0.044	Reject H ₀
Agricultural Subsidies does not granger cause Agricultural Raw material export	2.041	0.160	Accept H ₀
Agricultural Raw material export does not granger cause Agricultural Subsidies	2.878	0.083	Reject H ₀

Source: Author’s data analysis 2016

3.3 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.

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	16.610	0.000

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

Source: Author's data analysis 2016

4. Conclusion

Based on the findings we can conclude significant decreasing in the productivity of some products or continuous stagnation beside the progressive governmental subsidies. Even in some cases we have increased import of some products (raw or processed), and significant gap in the trade balance with negative pre-sign. On a long-term this will bring difficult situation for the Macedonian agriculture and the risk of more food-import dependency and hunger poverty.

Subsidies may give effects if the government take more responsibility and tidier control over the distribution. Parallel with the primary production must go on the processing agri-food sector which currently lacking in modern technology and capacity to meet local and regional demand. Therefore, the country is not yet prepared or facing lack of human capacity to follow the European Common Agricultural Policy (CAP) in terms of direct payments and financial distribution. 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. Such a situation will not harm only agricultural but also can make negative consequences on the whole national economy in general.

References

- [1] Granger, C. W. J., & Newbold, P. (1974). Spurious Regression in Econometrics, *Journal of Econometrics*, 2, 111-120
- [2] Ministry of Agriculture Forestry and Water Economy MAFWE, (2014). *National agricultural and rural development strategy 2014-2020 (NARDS)* - in Macedonian (Official Gazette, 69/13, 106/13). Skopje, Retrieved from <http://www.mzsv.gov.mk/NSZRR%202014-2020.pdf>
- [3] Oyinbo, O., & Rekwot, G.Z. (2014). The Relationship of Inflationary Trend, Agricultural Productivity and Economic Growth in Nigeria. *CBN Journal of Applied Statistics*, 5(1), 35-47.
- [4] Phillips, P.C.B. (1986). Understanding Spurious Regression in Econometrics, *Journal of Econometrics*, 33, 331-340.
- [5] State Statistical Office of the Republic of Macedonia SSO, (2016). *Crops, orchards and vineyards production*, Various publications [statistics]. Available at SSO Database.
- [6] Stock, J.H. & M.W. Watson (1988). Testing for Common Trends. *Journal of the American Statistical Association*, 83, 1097-1107.
- [7] World Bank, (2014). *FYR Macedonia, Country Report*. Various Publications [Statistics]. Available at World Bank Database

* Online full-text paper availability: doi:<http://dx.doi.org/10.15414/isd2016.s1.07>