SUBSIDIES AS A TOOL FOR EMPOWERING SMEs: FROM EMPIRICAL EFFECTS TO FUTURE OPPORTUNITIES IN AGRI-FOOD SECTOR

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Abstract

Subsidies for small and medium-sized enterprises (SMEs) are the most important agricultural policy instruments in developing countries. They can be used to finance various needs of enterprises in primary agricultural production, food industry or in rural tourism. The expected impact of the granted subsidies is aligned with the primary objective of the enterprise's activities: to achieve growing profit as the most significant financial outcome.

The analysis in this paper aims to estimate the impact of subsidies on selected business results of SMEs in Serbia from 2013 to 2018, as well as their alignment with the basic postulates of business activity. The sample consists of 226 enterprises registered for activities belonging to the agri-food sector. The effects of subsidies were estimated using the econometric analysis of panel data, with net profit as the dependent variable and total assets and total liabilities as the independent variables.

Key words: *agribusiness, SMEs, subsidies, profit, panel analysis, Serbia.*

Introduction

Subsidies or incentives are an important agricultural policy instrument, especially in developing countries where the agricultural sector plays a significant role in the overall economy. In Serbia, the right to receive subsidies is granted if the conditions in the tenders of the Directorate for Agricultural Payments within the Ministry of Agriculture, Forestry, and Water Management are met. The incentive system is designed to address the needs of modern farmers, taking into account sector-specific characteristics such as seasonal production,

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sensitivity to climatic conditions, and limited resources, while respecting the budgetary constraints of the Republic of Serbia.

For effective planning and further development of the incentive system, conducting quantitative evaluations is of great importance. This process enables the objective measurement of the economic and social impacts of subsidies and provides convincing arguments for increasing the allocation of funds to support agricultural producers. Research shows that a well-designed incentive system not only stimulates production but also improves the competitiveness of the agricultural sector, promotes rural development, and contributes to poverty reduction in rural areas.

In Serbia, there is a consistent demand from farmers for increased subsidy funding. At the same time, policymakers often promise funding increases without detailed plans or guidelines. These situations showed the need for structured analyses of the effects of granted subsidies. Such analyses can provide important insights into how subsidies influence the business activities of the beneficiary enterprises. This study focuses in particular on legal entities in the agri-food sector, which are significant beneficiaries of subsidies and play a key role in the food value chain.

The unique contribution of this research lies in the application of econometric panel techniques to quantify the effects of subsidies. This methodological approach enables a deeper understanding of the impact of subsidies on the performance of enterprises in the agri-food sector and provides a dual contribution—both theoretical and practical. From a theoretical perspective, the paper enriches the field of agricultural economics by employing advanced analytical methods in the analysis of Serbia's agricultural sector. In practice, the findings can serve as a basis for informed decision-making in shaping agricultural policies and improving the subsidy system, with the aim of achieving sustainable development of the agri-food sector.

Methodology

To assess the effects of subsidies on selected financial outcomes of small and medium-sized enterprises (SMEs) in the agri-food sector in Serbia, econometric analysis was conducted using panel data. Primary agricultural production and the food industry jointly represent the agro-food system of one country (Jovanović & Zubović, 2023). The dataset includes observations where the dependent variable (and some independent variables) varies across two dimen-

sions: time (t) and individual (i). In this case, data were collected for a large number of the same observation units (SMEs in the agri-food sector) over five consecutive periods (T=5). The values were taken from the financial reports submitted by the companies to the Serbian Business Registers Agency.

The basic specification for evaluating the effects of subsidies on SMEs' financial performance relies on individual effects models. Two main types of such models are distinguished in the literature (Cameron & Trivedi, 2010): the fixed-effects model (FE model) and the random-effects model (RE model). According to Dragutinović-Mitrović (2002), the application of the fixed-effects model requires that the independent variable vary both across individuals and over time, while the random-effects model assumes no correlation between random effects and regressors. If both conditions are met, the estimates of both models are unbiased and consistent, with the random-effects estimates being more efficient due to their lower variance (Cameron & Trivedi, 2010).

The Hausman specification test confirmed use of the fixed-effects model to evaluate the impact of subsidies on SMEs' financial outcomes (Hausman, 1978). Business performances were quantified using financial variables such as net profit, net assets, total assets, and total liabilities. The dependent variable was net profit, while the independent variables included total assets and liabilities.

We used the Bisnode database. It is based on financial reports and other documentation submitted by enterprises in Serbia to the Serbian Business Registers Agency. Data were selected for small and medium-sized enterprises whose primary activity codes fall within the ranges 01.1 to 01.7 and 10.1 to 10.9, covering the period from 2013 to 2018.

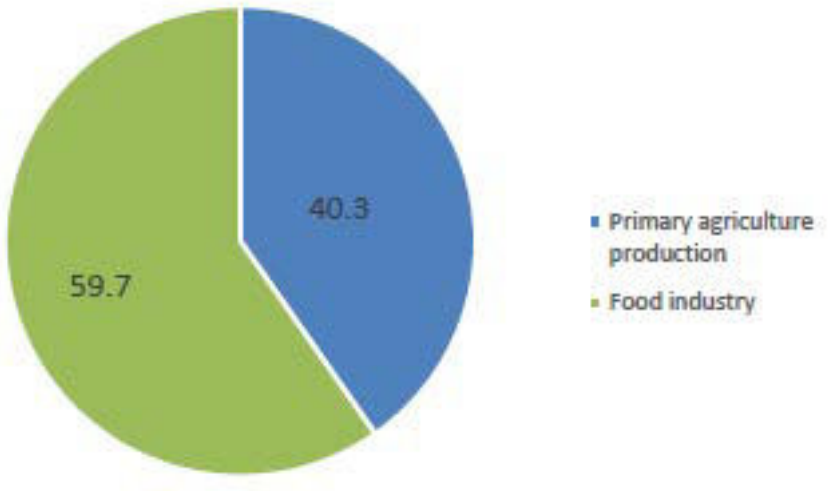
In most cases within the agricultural sector, balance sheet item 1016 *Income from premiums, subsidies, grants, and appropriations* is linked to subsidies provided through the budget of the Republic of Serbia, specifically via the Directorate for Agricultural Payments. Therefore, it is reasonable to approximate subsidy levels using this balance sheet item.

The total number of small and medium-sized enterprises (SMEs) registered in the agri-food sector, according to the available database, is 5,401. The largest number of SMEs in Serbia's agri-food sector is registered in the *Production of bread, fresh pastry goods, and cakes* (1071), accounting for 17.2% of the total.

The second largest group is *Growing of cereals* (0111), with a share of 14.5%. The third is *Other processing and preserving of fruit and vegetables*, repre-

senting 10.5% of the total. The fourth and fifth places in the structure of the agri-food sector are *Mixed farming* (3.2%) *and Growing of other trees and bush fruits and nuts* (3.0%).

Figure 1. *Structure of SMEs in the Agri-Food Sector by type of activity, in %*



Sources: *Author's calculation based on the Bisnode database accessed on February 1, 2020*

The data indicates that more business entities were registered in food production (59.7%) compared to primary agricultural production (40.3%) in line with Figure 1.

In the database, micro-enterprises have the largest share. Nearly nine out of ten enterprises in the agri-food sector are micro-sized. Small and medium-sized enterprises are significantly lower; their combined share is less than ten percent. The analysis in this paper included only enterprises that operated continuously throughout all the observed years. Their financial indicators varied over the years but remained within the intervals defined by the Accounting Law. In other words, the indicators met the required criteria, ensuring that the size of the enterprises remained consistent over time. For instance, there were no recorded transitions of enterprises from the small to the medium-sized category or vice versa.

All outliers that could undermine the reliability of the final conclusions were eliminated from the database. Enterprises that were active for only one year and were deleted from the Business Registers Agency (due to various rea-

sons for their cessation, and it should be noted that these enterprises were not subsidy beneficiaries) were excluded from the database. Due to the nature of the financial analysis, enterprises with a negative value for net assets, known as "loss-making enterprises," were removed from the database. Furthermore, enterprises classified as individual entrepreneurs were excluded from the database, as the subsidy effect analysis refers to legal entities. Therefore, individual entrepreneurs and agricultural holdings were not considered.

Due to unreliable data on *liabilities* in the database, 2013 was excluded from the analysis. The final evaluation used data from the five-year period (2014–2018). The exclusion of 2013 was based on numerous missing values and extreme values for liabilities, which undermined data reliability. As liabilities were an independent variable tested in the model, it was essential to properly manage the data. This resulted in a final sample of 1,130 observations. The literature review indicates that the sample met the criteria of previous authors, with sample sizes ranging from 30 to 500 observations, as defined by Roscoe (1975). Furthermore, the maximum number of independent variables included in the model was four, meeting the criteria set by Green (1991) and Haschim (2010), stating that the number of observations should be 5 to 10 times greater than the number of independent variables, a criterion also applied by Tomaševic (2020).

The selection of *net profit* as the dependent variable is in line with the findings of Carstea et al. (2017) and Sugiyanto and Kusiawan (2018). The main independent variable is the amount of subsidies received from the state budget. During the observed period, there were no other grants from international funds for micro, small, and medium-sized enterprises in the agri-food sector, so balance sheet item 1016 was used to approximate subsidies received from the government. A limitation of the research refers to the availability of data on the subsidies. Since this data is managed by the Directorate for Agricultural Payments and has not been made publicly available or permitted for academic use, it is assumed that balance sheet item 1016 has reasonable reliability. In addition, two other internal determinants were selected, whose effects have been previously tested by other authors: liabilities and the size of the enterprise (Carstea et al., 2017; Sugiyanto & Kusiawan, 2018).

The size of the enterprise was approximated using one of the criteria by which the Agency for Business Registers classifies business entities into micro, small, and medium, such as total assets of the enterprise. The GDP growth rate was chosen

as the external determinant of profitabilty, following the literature and previous research, such as Tomasevic (2020). All variables in the model were transformed using the natural logarithm, with the exception of the GDP growth rate. As part of the stationarity check for time series, the Fisher test (Fisher Augmented Dickey Fuller - ADF) was used, in accordance with the relevant literature (Fisher, 1932; Maddala & Wu, 1999; Choi, 2001; Bogunović, 2015; Obradović & Obradović, 2019). The obtained p-values are less than 0.01 for each variable, leading us to conclude that the panel data does not possess a unit root, meaning that it is stationary.

Results

The estimation of the effects of subsidies approved to small and medium-sized enterprises in the agri-food system from 2014 to 2018 is based on the assumption that subsidies for small and medium-sized enterprises in the agri-food system have positive effects on improving their financial performances. The results of the fixed effects model are provided in Table 1.

Table 1. *Results of the evaluation of the effects of subsidies on the profitability of small and medium-sized enterprises in the agro-food system of Serbia in the period from 2014 to 2018*

	Model 1	**Model 2**	**Model 3**	**Model 4**
Subsidies	0,08738*	0,08142*	0,06263**	0,06140**
	(0,03179)	(0,03132)	(0,03046)	(0,03027)
Liabilities		0,03121**	0,01795	0,01819
		(0,01579)	(0,01584)	(0,01594)
Assets			0,43289*	0.43741*
			(0,09225)	(0,09285)
GDP			0,01367	0,01367
				(0,01260)
Const.	2,19338*	2,18565*	-5,36261 *	-5,46741 *
	(0,06115)	(0,06119)	(1,61814)	(1,63021)

Sources: *Author's calculation*

If the regression estimator with the independent variable subsidies shows a positive and statistically significant effect on net profit, this indicates a positive influence of this agricultural policy measure on the improvement of company performance and thus on the further development of the company. Negative or neutral effects indicate a decline in company profits or stagnation

Based on the results obtained from several different models, the following conclusions can be made:

- **Subsidies**: The estimated coefficients for the independent variable *subsidies* are positive in each of the models, with statistical significance confirmed by their respective p-values. In other words, the effect of subsidies on the profitability of small and medium-sized enterprises in the agro-food system is positive and statistically significant. The effect is slightly higher in Models 1 and 2 than in Models 3 and 4, indicating that the econometric analysis suggests that subsidies are an important determinant of the activity of agro-food firms, as a 10% increase in subsidies leads to a 0.61% (model 4) or 0.87% (model 1) increase in the firm's net profit.

- **Liabilities:** The variable *liabilities* is an approximation for the debt of small and medium-sized enterprises in the agri-food sector. Since liabilities were introduced as the second internal determinant of profitability, they appear in three of the four models. The firm's debt is only statistically significant in Model 2, which finds that an increase in debt leads to an increase in the net profit of agri-food firms. In models 3 and 4, the estimated coefficient has a positive sign but is not statistically significant.

- **Assets**: The results indicate a positive and statistically significant effect of company size on profit. In both models (Model 3 and Model 4), the estimated coefficient values are very similar, suggesting that a 10% increase in the enterprise's assets leads to a 4.32% and 4.37% increase in net profit, respectively. In other words, as the enterprise grows, its profitability also increases. This result is consistent with the findings from other studies.

- **GDP**: The impact of the external determinant could not be confirmed, as the regression coefficient estimated in Model 4 was found to be statistically insignificant based on the p-value.

Based on the econometric analysis and the estimated regression coefficients, a clear conclusion can be drawn about the positive effects of subsidies on improving the financial performance of companies. In other words, subsidies have a positive and statistically significant impact on the profits of micro, small, and medium-sized enterprises in the agro-food system of Serbia.

Conclusion

The results of the evaluation of the subsidy policy represent an important contribution to the future formulation of agricultural policy in our country. Strategic documents, development plans, measures, and instruments can be improved and adapted to the needs of the state and farmers if the outcomes of agricultural policy are quantified. Although several documents address the qualitative analysis of the subsidy policy, using descriptive methods, the lack of quantitative assessment has been identified as a major barrier to the modern development of agriculture in the Republic of Serbia.

The results of the comprehensive (qualitative and quantitative) evaluation of the incentive system in the agro-food sector of the Republic of Serbia indicated a positive impact of state support to small and medium-sized enterprises. The positive impact was measured by the increase in financial performance. However, based on the results, problems in the existing system were identified, that should be addressed in the future to accelerate the development of agricultural production. These include the regular implementation of cost-benefit analyses of the subsidy policy, as well as the creation of indicators to monitor the implementation of the incentive system and assess its impact.

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