Original Scientific paper
10.7251/AGREN2403077M
UDC 631.1.017.3:338.43.01(497.11)

ASSESSMENT OF ECONOMIC VIABILITY AND INCOME GAP OF SERBIAN FARMS

Aleksandar MILJATOVIĆ*, Mirela TOMAŠ SIMIN, Tihomir NOVAKOVIĆ, Veljko VUKOJE

Department of Agricultural Economics, Faculty of Agriculture Novi Sad, Serbia
*Corresponding author: aleksandar.miljatovic@polj.uns.ac.rs

ABSTRACT

The issue of economic viability in agriculture has specially intrigued researchers' attention in recent years. Ensuring economic viability of family farms, as the dominant entities in Serbian agriculture, is the main precondition for survival and development of rural areas. The paper aims to evaluate the level of economic viability of family farms and to determine the income gap for non-viable farms. To assess farm economic viability, an opportunity cost approach was used. Farm net income was compared with reference income in order to make a distinction between viable and non-viable farms. The focus was on non-viable farms and determination the income gap as the difference between farm net income and the viability threshold. The income gap shows how far from the viability threshold were non-viable farms and was calculated as a percentage of the reference income. The research was based on Serbian Farm Accountancy Data Network (FADN) from 2015 to 2021. The results have shown that the proportion of economically viable farms have obvious tendency of growth in the observed period. The highest share of economically viable farms was found in horticulture farming system. In contrast, the highest proportion of non-viable farms was recorded in other grazing livestock. The non-viable grazing livestock farms also have quite high income gap ratio, indicating a significant distance from the viability threshold. This implies the need to empower livestock farming, especially extensive livestock, in order to improve economic viability level of farms.

Key words: *Economic viability, income gap, family farms, FADN, Serbia.*

INTRODUCTION

Family farms are the dominant entities in agriculture in most EU countries. These farms are crucial for the survival and development of rural areas, as they often represents the sole source of income for the local population. In the Republic of Serbia (RS), a similar scenario is noted. Family farms represent approximately 99% of all agricultural entities (*Cvijanović et al., 2014*), highlighting their vital role in the comprehensive development of agriculture in RS.

Family farms rely on the work of the household members, precisely family labour (*Garner and de la O Campos, 2014*). Their work does not incur explicit costs for the farm, which is why there is a need to determine whether investing labour in agriculture ensures an adequate living standard for household members. Moreover, family farms usually invest their own capital and utilize their own land to organize the production process (*Hloušková et al., 2022*). Therefore, it is necessary to evaluate whether the use of own factors of production (labour, capital and land) in agriculture is justified, i.e. to determine if farms are economically viable.

Analysing the economic viability of farms has become increasingly popular in recent research across Europe (*Coppola et al., 2020; Nurmet and Omel, 2020; Wilczyński and Kołoszycz, 2021; Špička and Dereník, 2021*). Farm viability represents its capacity to cover the opportunity costs of own labour and ensure a satisfactory return of own non-land capital and land from the achieved results. Therefore, assessment of economic viability is based on comparison of farm net income and the viability threshold. The viability threshold is the reference income that can be achieved by investing own factors of production in another sector, rather than in agriculture. This assessment of the economic viability of farms is known in the literature as an opportunity cost approach (*O'Donoghue et al., 2016*).

In terms of farm viability, calculating the income gap for non-viable farms is very important part of the analysis (*Loughrey et al., 2022*). The income gap provides information about how far from the viability threshold non-viable farms are. The farther they are, the harder will be for them to achieve economic viability. Thus, the share of endangered farms in terms of economic viability can be accurately established.

The paper primarily focuses on the economic viability of family farms in RS and consequently on establishing the income gap in Serbian farms. The main aim of the research is to evaluate the level of economic viability of different types of farming. The secondary aim is to determine the income gap for non-viable farms.

MATERIAL AND METHODS

The research was conducted on family farms in Republic of Serbia which were in the FADN sample through seven-year period from 2015 to 2021. Farms were divided according to type of farming (TF), whereby official groupings TF8 based on EU Regulation (*EC, 2022*) was used: (1) Fieldcrops, (2) Horticulture, (3) Wine, (4) Other permanent crops, (5) Milk, (6) Other grazing livestock, (7) Granivores and (8) Mixed. At the regional level, farms were divided into two regions corresponding to the nomenclature of territorial units for statistics (NUTS): Serbia North, including the Belgrade region and Autonomous province of Vojvodina, and Serbia South, including Šumadija and Western Serbia, and Southern and Eastern Serbia.

Economic viability of farms was evaluated as the ratio of farm net income (FNI) and reference income (RI). Farm net income is calculated as the following (*EC, 2022*):

$$FNI = TO - IC + BCST - D + BSTI - EF$$

where *TO* is the total output, *IC* is the total intermediate consumption, *BCTS* is the balance of current subsidies and taxes, *D* is depreciation, *BSTI* is the balance of subsidies and taxes on investment, and *EF* is the total external factors (which are not the property of the farm: wages paid, rent paid, interest paid).

Reference income represents the sum of oppotunity costs of own factors of production (labour, non-land capital and land). Opportunity cost of labour is the product of hourly average wage in national economy and the unpaid labour (family labour) hours for a year (*O'Donoghue et al., 2016; Kołoszycz, 2020*). Opportunity cost of non-land capital is the product of total equity minus value of agricultural land of the farm and the 5% rate of return (*Frawley and Commins, 1996; Hennessy and Moran, 2015*). Opportunity cost of land is the product of hectares of own land and average land rent in specific region (*Coppola et al., 2020*).

Share of economically viable farms (SEV) is estimated as the following ratio:

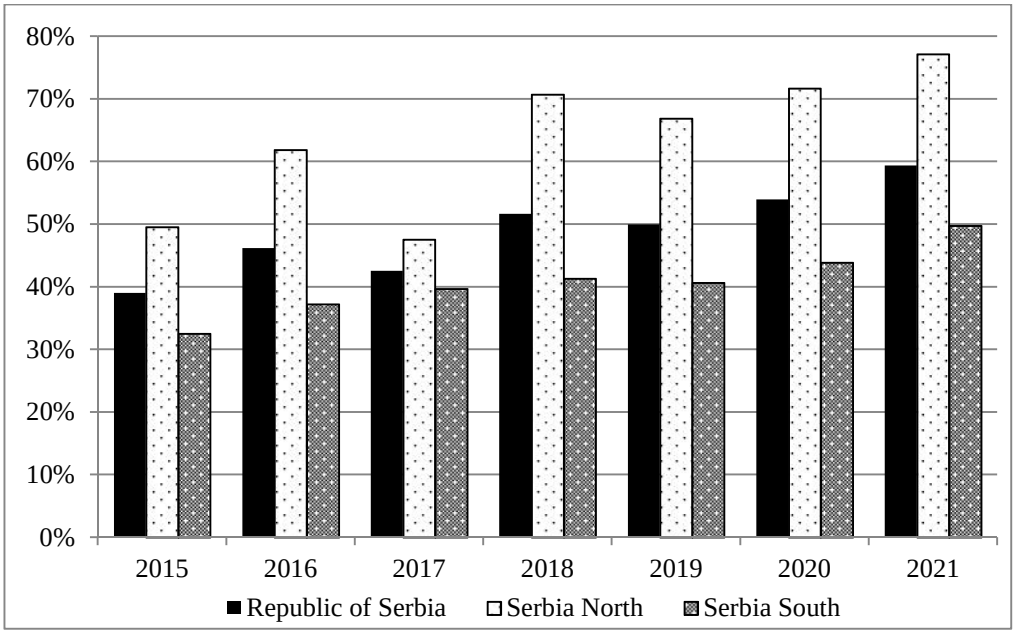
$$SEV = \frac{\text{the number of farms where FNI} \geq \text{RI}}{\text{total number of farms in the sample}}$$

Finally, the income gap (IG) represents the difference between RI and FNI for non-viable farms (*Loughrey et al., 2022*). In line with this, the income gap ratio (IGR) is calculated using the following formula:

$$IGR = \frac{IG}{RI}, \text{for farms where RI} < \text{FNI}.$$

RESULTS AND DISCUSSION

The share of economically viable farms in RS has significantly increased during the observed seven-year period. In 2021, the percentage of viable farms was 59.4%, which was 20.4 percentage points higher than in 2015 (*Graph 1*). In the last four years, the share of viable farms was 50% or higher, meaning that more than half of the farms were economically viable. In addition, farms from the Serbia North region obviously had much better results than those from the Serbia South region. The share of economically viable farms in the North Region was higher than 50% for almost the entire period and reached the highest point in 2021 (77.2%). Conversely, in the Serbia South, the share was steadily below 50%, clearly indicating serious problems with achieving economic viability. This is expected due to lower level of agricultural development in the South Region, which is a result of worse climatic conditions, lower human potential and poorer technical equipment on the farms.



*Source: Author's calculation based on FADN data

Graph 1. Share of economically viable farms from 2015 to 2021

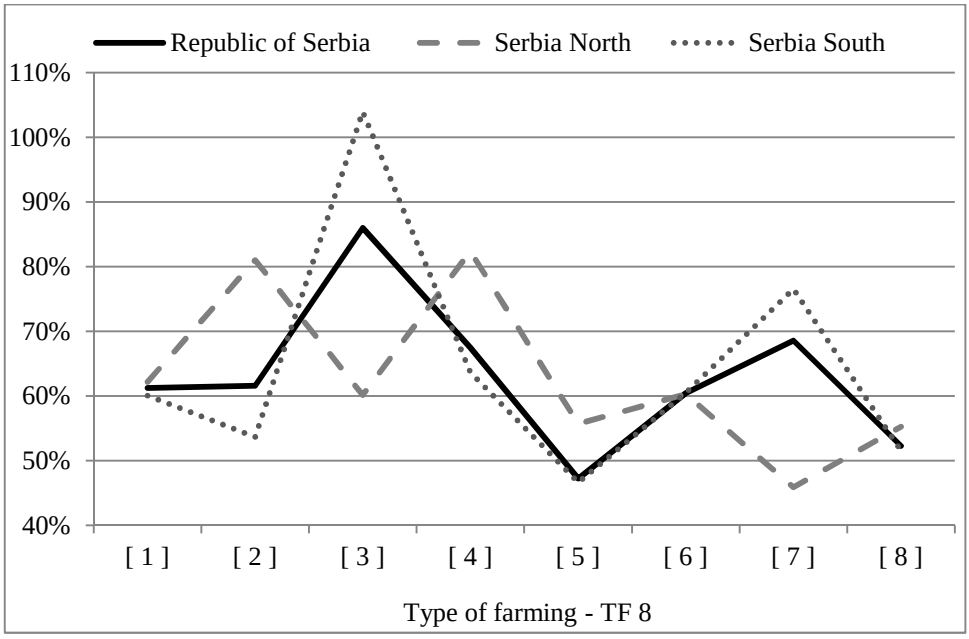
The analysis conducted by type of farming clearly showed that horticulture and granivores had the highest percentage of economically viable farms, at 66.5% and 65.5% respectively (*Table 1*). These farms had a very high asset turnover, and according to *Coppola et al. (2022)*, granivores, due to specific production processes, are more closely aligned with industry. The reason definitely is the relatively short production process, which is also a characteristic of horticulture farms. In horticulture production, multi-cropping can be organized due to the relatively short plant vegetation period. Therefore, the production process is accelerated, resulting in better economic outcomes. On the contrary, other grazing livestock notably recorded the smallest percentage of viable farms (35.6%). The situation was even worse in Serbia South, where only 33.8% of other grazing livestock farms were economically viable. The obtained results are in line with *Hloušková et al. (2022)*, who emphasize that grazing livestock farms were the least economically viable in the Czech Republic. The authors attribute this to the extensive production practices of the observed farms. *Miljatović et al. (2024)* found that other grazing livestock farms had the least favourable economic characteristics compared to all other types of farming in RS during the period 2017-2021. This is certainly the main obstacle to achieving better economic viability coefficients, and consequently, the low share of economically viable farms.

Table 1. Share of economically viable farms by type of farming, 2015-2021

TF 8	Type of farming	Share of economically viable farms (%)		
		Republic of Serbia	Serbia North	Serbia South
[1]	Fieldcrops	58.6	65.6	44.1
[2]	Horticulture	66.5	65.3	66.9
[3]	Wine	52.4	33.3	60.3
[4]	Other permanent crops	52.8	64.4	48.5
[5]	Milk	41.8	73.8	36.8
[6]	Other grazing livestock	35.6	49.6	33.8
[7]	Granivores	65.5	70.0	63.5
[8]	Mixed	42.5	59.7	35.8

*Source: Author's calculation based on FADN data

In order to achieve a comprehensive analysis of economic viability, it is necessary to assess the distance of non-viable farms from the viability threshold, specifically the reference income. The distance was calculated as the difference between RI and FNI for non-viable farms. Further, income gap ratio was calculated as the ratio between income gap and reference income for non-viable farms. Conceivably, the highest IGR of 86.0% was recorded in wine production (*Graph 2*). In the Serbia South, the IGR was even higher (104.0%), indicating that non-viable wine farms were, on average, approximately one reference income distant from the viability threshold. This reflects the extremely challenging conditions faced by farms in the South Region. In other grazing livestock farming system, where the proportion of economically viable farms was the most unfavourable, the IGR was 60.5%. This also represents a significant distance from the viability threshold, confirming that other grazing livestock farms indeed faced serious challenges in achieving economic viability.



*Source: Author's calculation based on FADN data

Graph 2. Income gap of non-viable farms by type of farming, 2015-2021

On the other hand, the smallest distance to the viability threshold was recorded at milk farms. The IGR was 47.2% which still represents a relatively high income gap (*Graph 2*). However, non-viable milk farms are definitely the closest to the viability threshold in comparison with all other types of farming in RS. This is in line with *Loughrey et al. (2022)*, who found that milk farms had the lowest income gap in Ireland over a nine-year period (2010-2018). The non-viable milk farms have the highest development potential of all other types of farming. *Wilczyński and Kołoszycz (2021)* claim that non-viable milk farms could adopt one of several strategies to keep their business, with diversification of production being one of them. By diversifying production, farmers can reduce feed costs or ensure additional income to finance milk production and achieve economic viability.

CONCLUSION

Economic viability of farms was assessed based on opportunity cost approach. In order to obtain more detail information about non-viable farms, the distance from the viability threshold was determined. The analysis was based on the family farms in RS for the period from 2015 to 2021. The research results have shown that the share of economically viable farms in RS has significantly increased in the observed period. The analysis by type of production has shown that horticulture and granivores were the most economically viable types of farming. These farms had the highest asset turnover which places them in a slightly better position in comparison with other types of farming. The least economically viable were other grazing livestock farms, typically oriented towards extensive production. This

certainly influenced on achieved production and economic results of the farms, considering it is a type of farming with mostly non-viable farms in RS.

Further, the highest distance from the viability threshold for non-viable farms was recorded in wine production. Other grazing livestock, as the least viable type of farming, have also recorded a relatively high income gap ratio. This indicates that the viability threshold is quite distant for numerous non-viable grazing livestock farms, confirming the previously recorded very poor state of economic viability. Other grazing livestock farms are definitely most endangered farms, despite recorded income gap ratio was the highest in wine production. The number of farms engaged in wine production in RS is relatively small and, concerning that, the number of non-viable wine farms is negligible. Consequently, there is a need to focus on empowering farms engaged in livestock production, especially those oriented towards extensive production. It concerns farms that are of great importance for the survival and development of rural areas, so agricultural policymakers should pay proper attention to addressing this issue. The possible solution could be to encourage the diversification of production, which should contribute to the farm income growth. Also, increasing the disposable income through off-farm employment could ensure adequate living standard for the household members. In line with previous, further research should conduct a comprehensive analysis focusing on the economic sustainability of agricultural households.

ACKNOWLEDGEMENT

This research was supported by the Science Fund of the Republic of Serbia, grant number: 10843, project name: *Farm Economic Viability in the context of Sustainable Agricultural Development* – ViaFarm.

REFERENCES

Coppola A., Scardera A., Amato M., Verneau F. (2020). Income Levels and Farm Economic Viability in Italian Farms: An Analysis of FADN Data. Sustainability, 12(12): 4898.

Coppola, A., Amato, M., Vistocco, D., Verneau, F. (2022). Measuring the economic sustainability of Italian farms using FADN data. Agricultural Economics – Czech, 68(9): 327-337.

Cvijanović, D., Subić, J., Paraušić, V. (2014). Poljoprivredna gazdinstva prema ekonomskoj veličini i tipu proizvodnje u Republici Srbiji. Republički zavod za statistiku, Beograd, Republika Srbija. ISBN 978-86-6161-129-2

EC (2022). Definitions of Variables used in FADN standard results. European Commission, Directorate-Genereal for Agriculture and Rural Development, Brussels. Available at: https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/farms-farming-and-innovation/structures-and-economics/economics/fadn_en (accessed: 01.04.2024).

Frawley J.P., Commins P. (1996). The Changing Structure of Irish Farming: Trends and Prospects. Rural Economy Research Series No. 1, Teagasc.

Garner, E., de la O Campos, A.P. (2014). Identifying the “family farm”: an informal discussion of the concepts and definitions. ESA Working Paper No. 14-10. Rome, FAO, available at: https://www.fao.org/3/i4306e/i4306e.pdf

Hennessy T., Moran B. (2015). The viability of the Irish farming sector in 2015. Teagasc.

Hloušková Z., Lekešová M., Prajerová A., Doucha T. (2022). Assessing the Economic Viability of Agricultural Holdings with the Inclusion of Opportunity Costs. Sustainability, 14(22): 15087.

Kołoszycz, E. (2020). Economic viability of dairy farms in selected European Union countries. Annals PAAAE, 22(3): 129-139.

Loughrey, J., O’Donoghue, C., Conneely, R. (2022). Alternative measures of Family Farm Viability – Incorporating gap measures. Journal of Rural Studies 89, 257-274.

Miljatović, A., Vukoje, V. (2024). Measuring the economic viability of farms in Serbia using the opporutnity cost approach, Contemporary Agriculture, 73(1-2): 69-77.

Miljatović, A., Vukoje, V., Šarac, V. (2024). The economic characteristics of agricultural holdings in the Republic of Serbia. Thematic Proceedings ”Sustainable agriculture and rural development IV”, Institute of Agricultural Economics, Belgrade, Serbia, ISBN: 978-86-6269-134-7, pp. 135-143.

Nurmet, M., Omel, R. (2020). Economic Viability by farm size of Estonian family farms. Problems of Agricultural Economics, 362(1): 14-28.

O’Donoghue, C., Devisme, S., Ryan, M., Conneely, R., Gillespie, P., Vrolijk, H. (2016). Farm Economic Sustainability in the European Union: A Pilot Study. Studies in Agricultural Economics, 118(3): 163–171.

Špička, J., Dereník, P. (2021). How opportunity costs change the view on the viability of farms? Empirical evidence from the EU. Agricultural Economics – Czech, 67(2): 41-50.

Wilczyński, A., Kołoszycz, E. (2021). Economic Resilience of EU Dairy Farms: An Evaluation of Economic Viability. Agriculture, 11(6): 510.