

Comparative analysis of the financial performance and profitability of Hungarian and Polish agricultural enterprises

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Abstract: The factors influencing the financial situation of agricultural enterprises in the new Member States have fundamentally changed since the EU enlargement in 2004. This research scientifically analyzes the main financial indicators on profitability in 2016-2023. The study is based on a significant amount of data on the financial situation of Hungarian and Polish agricultural enterprises. Descriptive statistical calculations and regression analysis were performed based on data from 1,000 Hungarian and 1,000 Polish enterprises collected from the Crefoport Company Information Database, covering eight years. The research further evaluates and synthesizes relevant domestic and international literature and statistics. The analysis of the data shows that the financial performance of the enterprises in the two countries differs. Based on the trends, it is established that the Hungarian agricultural enterprises underperformed the growth of indicators expressing the financial performance that of Polish agricultural enterprises during the examined period. In order to strengthen these enterprises, the research draws further conclusions and formulates recommendations.

Keywords: agriculture, profitability, ROE, ROA, ROS, profit margin

1 Introduction

The examination of profitability - in addition to the analysis of the financial and asset situation-, is important. Together they provide a more comprehensive picture of the financial situation of agricultural enterprises. In this research, we deal with the profitability in terms of Hungarian- and Polish cooperative agricultural

enterprises. The data for the analysis were provided by the Crefoport Company Information Database, which collects figures from publicly available and authoritative sources in a structured manner. According to their official information, the system collects data from nearly 1 million business companies, sole entrepreneurs, civil organizations and budgetary bodies in Hungary alone, and this is supplemented by some Visegrád 4 countries [3].

Analyses based on the Crefoport database form the basis of numerous studies, especially in the examination of corporate financial performance, competitiveness and regional economic processes. There are analyses that focus on a detailed examination of a particular sector, among others, Lendvai et al. analyzed the economic performance of Hungarian international automotive companies between 2008 and 2020 using the Crefoport database [16]. The main finding of the analysis is that the economic performance of the international automotive companies in Hungary are highly concentrated in space and plays a decisive role in domestic industrial growth, exports and employment, while their performance is sensitive to global economic crises and international market changes. In addition, Molnár et al. examined the profit persistence and market competition of Hungarian plastics companies, also based on the Crefoport database [19]. The authors' most important finding is that in the case of Hungarian plastics companies, profitability proved to be partly permanent, i.e. companies that achieved higher profits in the past were more likely to remain profitable later on. This suggests that market competition does not completely equalize the performance differences between companies in the short term. It is particularly important to identify the factors that contribute to the successful operation of businesses, so that we can later formulate related action proposals [17].

The analysis of the profitability of agricultural enterprises has also been the focus of several studies in recent years. Several authors have pointed out that the sector's profitability is significantly influenced not only by corporate efficiency, but also by farm size, capitalization, the support system, and regional characteristics. Fogarasi and Latruffe, examining the competitiveness and performance of Hungarian agricultural enterprises, concluded that larger, more efficiently operating farms typically have more favorable profitability indicators, while the profitability of smaller players is more vulnerable to market and cost shocks [10]. Economic shocks appeared differently in the profitability indicators of individual enterprises [11]. In addition, Bakucs and his co-authors emphasized that increasing productivity, technological developments, and the stabilizing role of subsidies are of paramount importance in the profitability of agricultural enterprises [1]. Based on research, it can be concluded that the long-term improvement of the profitability of agriculture can be achieved primarily by increasing efficiency, increasing added value and developing policies that support competitiveness [2].

2 Literature review

Hungarian and Polish agriculture have undergone significant structural transformations since 2004, in which accession to the European Union played a decisive role. The support system of the common agricultural policy, the integration of markets and technological modernization have all contributed to the agricultural enterprises of both countries operating in a new competitive environment. Although the economic weight of the sector has decreased, it has remained of strategic importance due to the maintenance of food self-determination, rural employment, export performance and territorial cohesion [5], [24].

When examining financial performance, the literature points out that Hungarian and Polish agricultural enterprises have different structural characteristics. In Hungary, larger-scale corporate enterprises and a more concentrated ownership structure are more typical, while in Poland a higher proportion of smaller family farms can be observed, which results in a specific cost and profitability structure. Polish agriculture has a stronger internal market base and a larger population background, while in the case of Hungarian agriculture, export orientation plays a more prominent role [4], [21].

According to analyses based on the European Commission's FADN database, the profitability of agricultural enterprises in the two countries showed an improving trend after 2004, but this was accompanied by significant fluctuations. Income developments were largely influenced by changes in crop prices, rising input costs, and weather extremes. The role of subsidies is prominent in both countries, and in the case of many farms they form the basis for the stability of operating results [7].

According to FADN data, the net income of Polish agricultural enterprises showed a more dynamic growth trajectory between 2013 and 2023 than that of Hungarian enterprises. While the development of income in Hungary was characterized by greater volatility, in Poland a more sustained and balanced expansion can be observed in the period under review. The difference between the two countries increased further by 2023, when the net income of Polish enterprises per farm approached EUR 44 thousand, compared to EUR 34 thousand in Hungary. This suggests that the Polish agricultural sector adapted more flexibly to the unfavorable macroeconomic environment.

Year	Hungary	Poland
2013	~17 000	~15 000
2016	~18 500	~21 000
2019	~26 000	~29 000
2021	~31 000	~38 000
2022	~39 000	~47 000
2023	~34 000	~44 000

Table 1

Farm Net Income (EUR/farm)

Source: Own editing based on the FSDN Public Database (2026)

The breakdown by farm size shows that in both countries the profitability of medium and larger farms was more favourable compared to smaller farms. At the same time, in Poland medium-sized family farms were also able to maintain a competitive income position, which may indicate more developed market integration and more efficient economies of scale. Overall, farm size can be considered a significant factor in both countries.

Size	Hungary	Poland
Small	Low	Medium
Medium sized	Mediums	High
Large	High	High

Table 2

Net income, 2023 (EUR/farm)

Source: Own editing based on the FSDN Public Database (2026)

The financial performance of Hungarian agricultural enterprises is typically supported by higher asset intensity, mechanization and production volume per larger area, while profitability is more exposed to changes in export market demand. In Poland, on the other hand, a more diversified economic structure and a greater role of family labor can mitigate the impact of cost shocks, while the smaller farm size can limit efficiency reserves [23], [22].

Examining the capital structure, it can be stated that Hungarian agricultural enterprises have a higher proportion of investments financed from loans, especially in the field of machinery and technology developments. In Poland, financing based on own resources and family capital is traditionally more prominent, although EU

resources and preferential loans have increased investment activity here as well. As a result of modernization, productivity improved in both countries, which also supported the increase in profitability indicators in the long term.

The literature also points out that in terms of future success, not only economies of scale, but also increasing added value, increasing the level of processing, digitalization and the spread of sustainable farming models will be decisive. Despite the differences between Hungarian and Polish agriculture, generational change, climate change and managing market volatility appear as common challenges [9].

Overall, it can be stated that the financial success of Hungarian agricultural enterprises is supported by a model based on larger farm size and export orientation, while in Polish agriculture, the broader entrepreneurial base and more flexible family economic structure represent a competitive advantage. In both countries, the support system continues to play a key role, but at the same time, increasing productivity and innovation form the basis for long-term competitiveness.

3 Methodology

The analysis is carried out in a comparative dimension, in which the performance of Hungarian enterprises was compared with the results of Polish agricultural enterprises. The Polish sample was selected because, among the V4 countries, the Crefoport Company Information Database provides the most comparable structured corporate data set with the Hungarian reporting system for Poland.

The research is based on primary and secondary data sources. The empirical study is based on the Crefoport Company Information Database, from which we extracted data from the financial reports of Hungarian and Polish agricultural companies. The use of the database was supplemented by the processing of additional relevant statistical and literature sources in order to address any data gaps, methodological changes and interpretation limitations of the period under review. During the secondary research, we used several scientific databases and search engines to establish the literature background, in particular the systems of MTMT, ResearchGate, Google Scholar and ScienceDirect.

The empirical study is based on a quantitative methodological approach. The sample included 1,000 Hungarian and 1,000 Polish agricultural cooperatives, based on data for the period 2016–2023. The sample size allows for the exploration of trends, correlations and structural features of the studied population.

The applied methodology includes descriptive statistics, correlation analysis and multivariate analysis procedures. As a first step, we performed a descriptive statistical analysis using Microsoft Excel software in order to present the basic

characteristics of the data, during which we determined, among other things, the average, median, minimum, maximum and standard deviation values.

Following the descriptive analysis, we used correlation calculations to explore the relationships between financial variables, and then we examined the impact of the factors determining profitability using regression models. The calculation of the indicators was done by variable, so in each case only valid data belonging to the given indicator were taken into account, as a result of which the number of valid and missing cases may differ by indicator.

The structure of the dataset also enables the future application of panel-data models. It makes it possible to control for unobservable firm-specific effects and temporal heterogeneity, thereby improving the robustness of the estimated relationships between profitability indicators and explanatory variables.

Profitability was measured alternatively by return on equity (ROE), return on assets (ROA), return on sales (ROS), and profit margin indicators. The combined use of these indicators allows for a complex assessment of return on equity, asset utilization, sales efficiency, and operating profit-generating ability.

Return on equity (ROE) expresses the income-generating ability of owner capital, which was calculated as the ratio of after-tax profit to owner capital:

$$\text{ROE} = \text{Revenue after taxation} \div \text{Equity}$$

A higher ROE value indicates more efficient capital utilization, but the distorting effects resulting from the capital structure and possibly low equity must be taken into account when interpreting it.

Return on assets (ROA) measures the income-generating efficiency of the company's total assets:

$$\text{ROA} = \text{Revenue after taxation} \div \text{Total assets}$$

The indicator indicates how effectively the company utilizes its available resources, regardless of the financing structure.

Return on sales (ROS) shows the profitability of sales activities, i.e. what proportion of sales revenue is realized as after-tax profit:

$$\text{ROS} = \text{Revenue after taxation} \div \text{Net sales revenue}$$

A higher ROS value may indicate more favorable cost management and more efficient pricing.

The **profit margin** is used to measure operating efficiency at the plant level, which is defined as the ratio of the result of operating activities to the net sales revenue:

$$\text{Profit margin} = \text{Results of the operation} \div \text{Net sales revenue}$$

This indicator primarily reflects the profit-generating ability of the company's core activity, and is therefore well suited for the comparative assessment of operating performance.

The panel approach allows the separation of time effects related to macroeconomic shocks – such as the COVID-19 pandemic, inflationary pressures and the 2022 drought – from firm-level operational characteristics. Although the present study primarily focuses on descriptive and comparative statistical analysis, the panel-data perspective provides an important methodological basis for future research.

The joint examination of the four indicators enabled the temporal and international comparison of the profitability position of Hungarian and Polish agricultural cooperatives.

As a result of the research, the similarities and differences observed in the profitability of Hungarian and Polish agricultural cooperatives can be revealed, and the financial and external environmental factors that played a decisive role in the development of corporate performance in the examined period can be identified. In future extensions of the research, fixed-effects and random-effects panel estimations could be applied in order to control for unobservable heterogeneity across enterprises and years.

4 Results

4.1 Return on Equity (ROE)

This indicator measures the company's profitability on its equity.

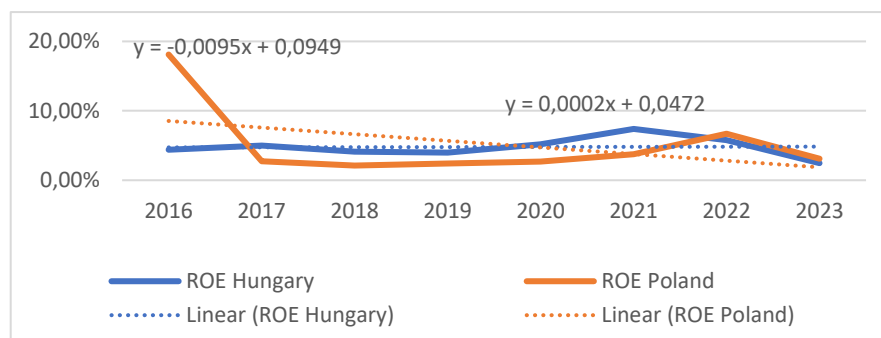


Figure 1

ROE-return on equity, 2016-2023

Source: Own editing, Crefoport Company Information Database (2025)

Based on the development of ROE, moderate owner return could be observed in agricultural enterprises in both countries between 2016 and 2023. In the Hungarian sample, the indicator fluctuated between 2.5–7.4%, with an average of 4.8%, with an essentially stagnant trend. In the case of Polish enterprises, after the outlier in 2016, ROE adjusted between 2.0–6.7%, with the period average being 5.2%.

Neither country consistently reached the band above 10%, which is considered favorable in international comparison, which suggests that the return on owner capital was limited by low operating margins, moderate asset turnover, and restrained financial leverage. According to the results of the ANOVA, no statistically significant difference can be detected between the average ROE values of the two countries ($F = 2.89$; $p = 0.1149$).

4.2 Return on assets (ROA): comparison of alternative measurement approaches

Return on assets (ROA) is one of the most important indicators of corporate performance, as it expresses the efficiency with which the company is able to utilize its available assets to generate profit. In this research, ROA was examined based on two methodologically different data sources: on the one hand, an approximate indicator created from the FADN database, and on the other hand, based on the classic accounting ROA calculated from the company reports of Crefoport. The parallel application of the two approaches made it possible to evaluate the performance of the agricultural sector from both a farm economics and a corporate financial perspective.

The FADN database does not publish a ROA indicator directly, therefore, using an approximate procedure accepted in the literature, we created a return on assets indicator from the ratio of Farm Net Income to Total Assets. Based on the results, Poland showed more favorable values every year between 2019 and 2023, the indicator ranged between 3.3 and 4.5%, while in Hungary it was between 2.5 and 3.8%. This indicates that at the level of average agricultural holdings, Polish farms realized higher income per unit of assets.

Year	Hungary	Poland
2019	2.8%	3.6%
2020	2.5%	3.3%
2021	3.1%	4.0%
2022	3.8%	4.5%
2023	3.0%	4.2%

Table 3

Approximate ROA (%)

Source: Own editing based on the FSDN Public Database (2026)

In contrast, in the case of agricultural partnerships included in the Crefoport database, the classic ROA indicator - based on the ratio of after-tax profit to total assets - showed a difference in favor of Hungarian businesses.

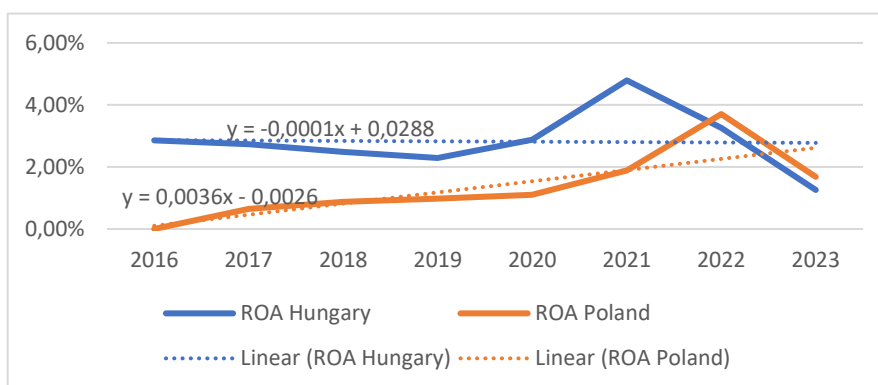


Figure 2

ROA-Return on Assets 2016-2023

Source: Own editing, Crefoport Company Information Database (2025)

During the period under review, the average ROA in the Hungarian sample was 2.8%, while in the Polish enterprises it was 1.4%. In Hungary, an improvement was observed especially in 2021–2022 (4.8% and 3.3%, respectively), while a decline occurred in 2023 (1.3%). In Poland, the indicator remained at a persistently low level between 2016–2021, increased to 3.7% in 2022, and then decreased again to 1.7% in 2023.

The difference between the two sets of results does not reflect a methodological inconsistency, but rather different structural dimensions of agricultural

performance. The FADN database contains a representative farm-level sample, in which individual and family farms are significantly represented, while the Crefoport analysis is based exclusively on companies operating in the form of partnerships. Consequently, the FADN results capture the farm efficiency of the agricultural sector as a whole, while the Crefoport data reflect the financial performance of a part of the sector.

Several structural factors can be assumed behind the difference. In Poland, the higher production flexibility, lower administrative cost level and stronger market integration of family farms may have resulted in more favorable farm-level returns. In Hungary, on the other hand, corporate enterprises are typically more capital-intensive, operate with greater economies of scale, and have a more advanced technological background, which may be reflected more favorably in the ROA indicator based on corporate reports [15].

Another explanatory factor may be the difference in asset valuation and accounting treatment. In agriculture, the valuation of land use, machinery, biological assets and inventories may differ by country and data source, which directly affects the denominator of ROA. In addition, the management of subsidies, the presentation of leased assets, and the tax environment can also modify the interpretation of the indicator.

Based on the results, it can be stated that Hungarian agricultural enterprises showed more favorable asset utilization in the corporate circle, while Poland performed better in terms of sectoral and farm-level efficiency. This indicates that the agricultural structure of the two countries follows a different development path: in Hungary, the more concentrated corporate model, and in Poland, the more competitive family economic structure, proved to be more effective.

From a methodological point of view, an important result of the dual approach is that ROA cannot be considered a universal indicator regardless of the data source. The interpretation of asset-based profitability is possible in each case by taking into account the specificities of the institutional environment, the company structure, and the database used. Therefore, the combined use of micro-level company data and representative farm-level data sources is justified for future comparative research.

4.3 Return on Sales (ROS)

Profitability relative to sales revenue shows how much profit the company is able to realize from sales.

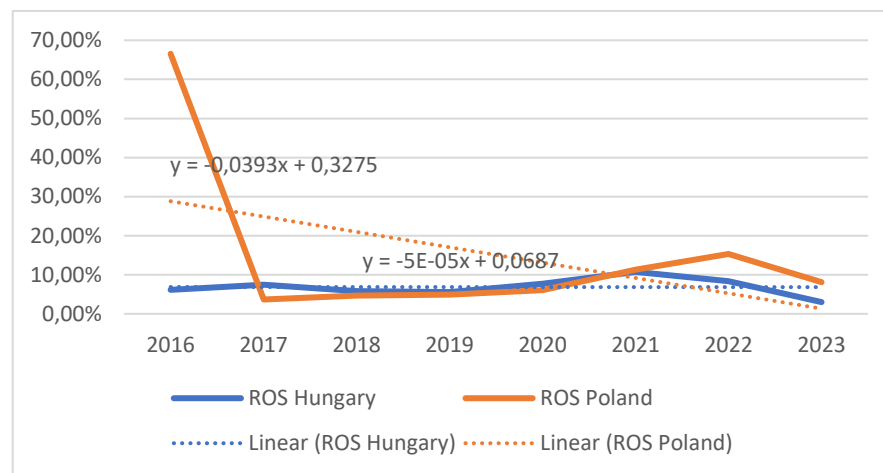


Figure 3

ROS-Return on Sales, 2016-2023

Source: Own editing, Crefoport Company Information Database (2025)

The profitability of Hungarian enterprises as a percentage of sales during the period under review was 6.9% on average, i.e. it was typically in the medium range associated with sustainable operations. At the same time, ROS decreased to 3.0% in 2023, which indicates a narrowing of the profit margin.

In the Polish sample, the median value of the indicator was 7.1%, but the time series showed significant fluctuations. After the extreme spike in 2016, a significant improvement was observed in 2021–2022 (11–15%), followed by a decline in 2023 (8.1%). The higher volatility of the Polish data suggests that profitability may have depended more strongly on market conditions, export demand or one-off profit effects.

4.4 Profit margin

The profit margin or profit ratio indicator reflects the company's operating efficiency and helps evaluate the profitability of the business model.

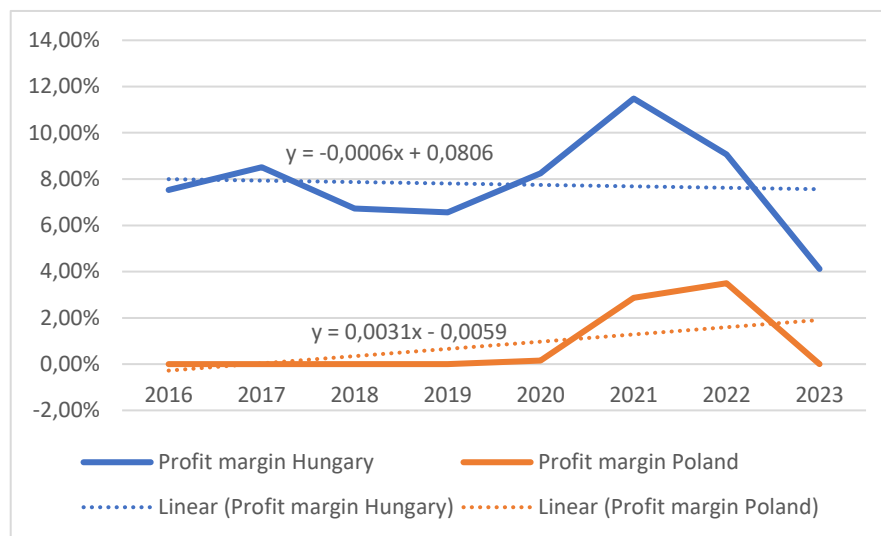


Figure 4

Profit margin, 2016-2023

Source: Own editing, Crefoport Company Information Database (2025)

Based on the profit margin, the operating efficiency of Hungarian agricultural enterprises showed a more favorable picture overall. The indicator was 7.8% on average and indicated a stable, positive operating margin in most years, although it decreased to 4.1% in 2023.

In the case of Polish enterprises, the profit ratio remained at a permanently lower level (0.8% on average), although an improvement was observed in 2021–2022. This suggests that although Polish enterprises realized higher net income, they worked with lower margins at the operating level, which may have been partially compensated by financial or support factors.

4.5 Relationship between profitability indicators

According to the correlation analysis, the relationship between profitability indicators in the Hungarian sample was closer than in the case of Polish enterprises. In Hungary, the ROE–ROA relationship showed a strong positive correlation ($r = 0.866$), while a near-perfect correlation was observed between ROS and profit ratio

($r = 0.985$). This suggests that corporate performance primarily depended on the development of operating efficiency and cost structure. In Poland, the relationships were more moderate (ROE–ROA: $r = 0.573$; ROS–profit ratio: $r = 0.821$), which indicates more heterogeneous business models, stronger market diversification and different corporate strategies. The profitability of Polish enterprises was presumably influenced to a greater extent by external factors, especially changes in export markets, the financing environment and the support system.

4.6 Synthesis of the results

Overall, the results show that between 2016 and 2023, Polish agribusinesses achieved more dynamic income growth, while Hungarian cooperatives operated with more favorable operating margins and a more stable internal profitability structure. The Polish model reflects greater growth potential, but also higher volatility, while the performance of Hungarian enterprises indicates a more moderate growth trajectory. Farm size, asset structure and operational efficiency proved to be determining factors in both countries.

5 Conclusions and recommendations

The aim of the research was to conduct a comparative analysis of the financial, asset and profitability situation of Hungarian and Polish agricultural enterprises in the period 2016–2023. During the evaluation, we interpreted the descriptive statistical, correlation and hypothesis testing results in an integrated manner, taking into account the effects of the COVID–19 pandemic, the Common Agricultural Policy (CAP) reforms and climatic shocks.

5.1 Main conclusions

Based on the results, the examined Hungarian enterprises showed a more favorable performance in terms of return on assets (ROA) and return on sales (ROS), which indicates more efficient asset utilization and stronger operating margins. In contrast, there was no clear Hungarian superiority in terms of return on equity (ROE) and profit ratio. This suggests that Hungarian corporate enterprises are more competitive at the operational level, but the efficiency of return on equity and capital structure remained limited.

The correlation between profitability indicators was stronger in the Hungarian sample, which indicates more homogeneous business models and greater internal consistency of corporate performance. In the case of Polish enterprises, weaker

correlations were observed, which indicates a more diversified operating structure, different financing models and stronger market differentiation.

However, the profitability indicators of Polish social agribusinesses showed greater volatility, with negative or extreme values in several years. This suggests that the growth potential may be higher, but corporate performance is more sensitive to market, regulatory and macroeconomic shocks. The performance of Hungarian enterprises, on the other hand, proved to be more balanced, but was accompanied by lower growth dynamics.

The decline of Hungarian ROA from 4.8% in 2021 to 1.3% in 2023 illustrates the sensitivity of export-oriented agricultural enterprises to macroeconomic and climatic shocks.

During the period under review, the COVID-19 pandemic resulted in significant adjustment pressures for agricultural enterprises in both countries. As a result of the uncertain market environment, enterprises adopted a more cautious borrowing behavior, increased their liquid reserves, and in several cases postponed their investments. This was particularly noticeable in Hungary, where the restraint in external financing was more pronounced.

The transitional period related to the new cycle of the CAP and the changes in support rules also influenced investment and financing decisions. The periodic narrowing of support sources restrained long-term developments, while new, sustainability-focused regulations caused cost increases in the short term. This was particularly evident in the development of profitability and liquidity indicators.

Among the climatic factors, the drought of 2022 should be highlighted, which significantly worsened production conditions in Hungary, reduced output and increased costs. As a result, investment activity deteriorated, the role of financial reserves increased, and the liquidity exposure of enterprises increased. In Poland, the production environment was more stable, which allowed for more favorable operational adaptation.

Macroeconomic developments also played a measurable role in the evolution of profitability indicators. Between 2021 and 2023, agricultural enterprises in both countries faced substantial increases in input costs, especially in energy, fertilizers and feed prices, partly driven by inflationary pressures and disruptions in international commodity markets. According to Eurostat data, agricultural input prices in the European Union increased sharply during 2022, with fertilizer and energy costs rising by more than 20% in several Central European countries, significantly reducing operating margins despite rising agricultural output prices [8].

The effects of these shocks appeared differently in the two countries. Hungarian enterprises experienced a sharper decline in profitability indicators after 2022, particularly in ROA and profit margin values, which may be associated with the severe drought conditions and stronger export exposure of Hungarian agriculture.

In contrast, Polish enterprises demonstrated relatively more stable income dynamics, supported by a larger domestic market and more diversified farm structures.

These findings suggest that macroeconomic resilience in agriculture depends not only on subsidy intensity, but also on the flexibility of production structures, financing conditions and market integration.

5.2 Policy and corporate governance proposals

Based on the results, it can be concluded that, under the current support and financing system, the long-term income-generating capacity of social agricultural enterprises is limited, especially without subsidies. Therefore, it is justified to design support systems in a more differentiated and targeted manner, which takes into account the different size, production structure and risk profile of individual company groups. Instead of sector-level, homogeneous regulation, it is more appropriate to apply a segment-specific approach.

In the case of Hungary, the primary objectives are:

- encouraging investments in technology and digitalization;
- improving cost efficiency and increasing the proportion of higher value-added products;
- strengthening liquidity reserves;
- expanding insurance and irrigation programs to manage climate risks.
- In the case of Poland, it may be justified to:
 - mitigating financing risks;
 - optimizing the debt structure;
 - improving the efficiency of inventory management;
 - Stabilizing highly volatile profitability through more conservative financial management.

A relevant goal for both countries is to strengthen the investment-incentive role of subsidies and to encourage the use of resources for productivity-enhancing and innovation purposes.

5.3 Scientific contribution and future research directions

The research contributes to the comparative assessment of the financial performance of Central European agribusinesses, especially in a period

characterized by a pandemic, regulatory transition, inflationary pressures and climate shocks. The results suggest that the resilience of the agricultural sector depends not only on the intensity of support, but also on firm efficiency, financing structure and adaptability.

From a methodological perspective, the research also highlights the applicability of panel-data approaches in comparative agricultural financial analysis. The integration of longitudinal enterprise-level data enables the future estimation of fixed-effects and random-effects models, which may provide more precise evidence on the causal relationships between profitability, subsidies and macroeconomic shocks.

The structure of the dataset also enables the future application of panel-data models, regional breakdown, and studies by firm size and sub-sector specialization. In addition, it would be useful to analyze in more depth the causal relationships between support, climate risks and financial performance.

Another promising research direction could be the application of the behavioral economics approach [13], especially the examination of the impact of behavioral and financial sunk costs [12]. Aspects related to the sustainability of production appeared among corporate operating goals as early as the 1970s, which are becoming an increasingly important issue with climate change [14]. In agriculture, the aspects of organic farming are also becoming increasingly decisive, which affect profitability [18].

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