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PROFITABILITY DETERMINANTS OF MILL COMPANIES FROM THE REPUBLIC OF SERBIA
DETERMINANTE PROFITABILNOSTI MLINSKIH PREDUZEĆA IZ REPUBLIKE SRBIJE

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ABSTRACT

In order to assess the profitability of mill companies and identify influencing factors, 30 companies operating in the Republic of Serbia from 2010 to 2019 were analyzed. The profitability of these companies was measured using the ROA indicator. Internal factors influencing profitability included liquidity, indebtedness, financial leverage, asset structure indicator, total asset turnover ratio, and Z-score, while external factors considered were the gross domestic product growth rate and inflation. The analysis of the collected financial data began with the application of descriptive statistics to gain a clearer understanding of their business performance and the economic environment in which they operate. Following the descriptive statistical analysis, a panel regression method was employed to determine the impact of the observed internal and external factors on the profitability of milling companies. Based on the estimated panel regression model, it was found that the statistically significant factors influencing the profitability of the observed companies include liquidity, financial leverage,tangibility, total asset turnover ratio, Z-score, and inflation. Among these significant factors, only the Z-score had a positive impact on profitability, while the other factors negatively affected the profitability of the observed companies.
***Keywords**: profitability, mill companies, panel regression analysis*

REZIME

U cilju sagledavanja uspešnosti poslovanja preduzeća koja se bave proizvodnjom mlinskim proizvoda, kao i faktora od uticaja na uspešnost ovih preduzeća, analizirano je 30 preduzeća koja su poslovala na teritoriji Republike Srbije u periodu od 2010. do 2019. godine. Profitabilnost preduzeća merena je prekoindikatora ROA, a kao interni faktori od uticaja na profitabilnost posmatrani su: likvidnost, zaduženost, finansijski leveridž, pokazatelj strukture imovine, racio obrta ukupne poslovne imovine i Z-skor, kao eksterni faktori od uticaja na profitabilnost posmatrani su stopa rasta bruto domaćeg proizvoda i inflacija. Analiza prikupljenih podataka iz finansijskih izveštaja posmatranih 30 preduzeća započeta je primenom deskriptivne statistike kako bi se stekla jasnija slika o poslovanju ovih privrednih subjekata, kao i o privrednom okruženju u kojem posluju. Nakon sprovedene deskriptivne statističke analize primenjen je metod panel regresione analize kako bi se utvrdilo koji od posmatranih internih i eksternih faktora imaju uticaj na profitabilnost mlinskih preduzeća. Na osnovu ocenjenog panel regresionog model utvrđeno je da se kao statistički značajni faktori od uticaja na profitabilnost posmatranih preduzeća izdvajaju: likvidnost, finansijski leveridž, struktura imovine, racio obrta ukupne poslovne imovine, Z-skor i inflacija. Od izdvojenih značajnih faktora pozitivan uticaj na profitabilnost imao je samo Z-skor, dok su ostali faktori negativno uticali na profitabilnost posmatranih preduzeća
***Ključne reči**: profitabilnost, mlinska preduzeća, panel regresiona analiza*

INTRODUCTION

Profitability of a company is not just an indicator of financial health and operational efficiency, but also a key factor that enables the survival and development of a company in a dynamic and competitive business environment (Al-Jafari and Al Samman, 2015). Profitability is not just the ultimate goal of every company, but also necessary for their sustainability and growth. Without adequate profitability, companies face numerous challenges, including limitations in investments, difficulties in maintaining competitiveness, and ultimately, the risk of business failure. On the other hand, high profitability allows companies to reinvest in their business, improve their products and services, increase market share, and contribute to the economic prosperity of the wider community.

Understanding the dynamics of a company's profitability requires a comprehensive view of various internal and external factors that influence its financial performance (Tekić et al., 2022a). Internal factors are those aspects that are within the company's control domain, such as management, operational efficiency, corporate culture, and internal resources. These factors are key in defining the company's strategy, its operational processes, and its overall approach to the market. On the other hand, external factors include economic, political, social, and technological conditions that are beyond the control of an individual company, but have a significant impact on its ability to generate profit. Based on the aforementioned, the primary objective of this research has been defined, which is to examine the impact of internal and external factors on the profitability of milling companies that operated in the territory of the Republic of Serbia in the period from 2010 to 2019.

Numerous authors in our country have examined the impact of various internal and external factors on the profitability of processing companies. Tekić et al. (2022b) analyzed the profitability factors of mill companies operating in the territory of Vojvodina in 2019. The authors conducted a regression analysis based on a sample of 23 small and medium-sized enterprises and examined how internal factors affect profitability measured by the return on assets and return on equity rates. Liquidity, indebtedness, leverage, and productivity were observed as independent variables.

Based on the research results, the authors determined that indebtedness stands out as a significant factor. Mutavdžić et al. (2021) analyzed the profitability factors of micro food enterprises that operated in the territory of Vojvodina in 2019. The results of this research found that the inventory turnover ratio has a statistically significant and positive impact on profitability measured by the return on assets and that indebtedness has a statistically significant and negative impact. The results also determined that only productivity has a statistically significant and positive impact on the return on equity rate, while other variables did not stand out as significant. Dakić and Mijić (2020) analyzed the internal factors of companies on their profitability. The analysis covered 24 companies engaged in meat processing in the Republic of Serbia in the period from 2007 to 2016. Using panel analysis, it was determined that the number of years a company has been in operation, the debt ratio, and the tangibility negatively affect the Return on Assets (ROA). Additionally, sales growth and liquidity were found to have a statistically significant positive impact on profitability. Tadić et al. (2019) analyzed the impact of critical success factors on the profitability of food companies in the Republic of Serbia. The analysis was conducted on a sample of 200 companies, with data collected through a survey. Critical success factors selected were quality, flexibility, employees, innovation, and efficiency. The authors determined that the biggest impact on the profitability of the companies comes from efficiency, innovation, quality, and flexibility, which positively affect the profitability of the observed food companies. Dakić et al. (2019) studied the profitability of the Serbian food sector, focusing on 657 companies in meat, fruit and vegetable, and milk processing from 2007 to 2015. The panel analysis showed that sales growth positively affects profitability across all industries. In meat processing, liquidity ratio also positively impacts profitability, while company size, indebtedness, and capital turnover negatively affect it. For fruit and vegetable processing companies, size and capital turnover have a negative impact. In milk processing, liquidity positively influences profitability, while indebtedness has a negative effect.

MATERIAL AND METHOD

To analyze the influence of internal and external factors (Table 1) on the profitability (ROA) of mill companies, panel regression model was established.

Table 1. List of variables

Variable	Measurement	Predicted sign
ROA	Net income/Average total assets	/
Liquidity	Current assets-Inventories/Short-term liabilities	+/-
Indebtedness	Total liabilities/Total assets	+/-
Leverage	Total liabilities/Total capital	+/-
Tangibility	Fixed assets/Total assets	+/-
Total assets turnover ratio	Sales revenue/Average total assets	+/-
Z-score	$Z' = 0.717X_1+0.847X_2+3.107X_3+0.420X_4+0.998X_5$ (Altman, 1968)	+
GDP	Growth rate of gross domestic product	+/-
CPI	CPI growth rate	+/-

The panel regression model is a sophisticated statistical tool that provides a rich framework for analyzing data that varies across both entities (in these cases, different companies) and over time. In this specific context, the model incorporates a two-dimensional dataset, where each entity 'i' (representing individual companies, numbered 1 to n) is observed across different time periods 't' (spanning years 1 to 10). This approach is particularly advantageous in capturing both the individual characteristics of each company and the temporal dynamics over the decade. The panel regression model allows for the exploration of various relationships between dependent variables (such as profitability indicators) and a set of independent variables, which could include a range of internal and external factors. The most commonly used models for panel data are linear models, which represent a combination of cross-sectional data and time series. In its general form, the panel data regression model can be represented using the following function:

$$y_{it} = \beta_{1it} + \sum_{k=2}^{K} \beta_{kit} x_{kit} + u_{it}, i = 1, \dots, N; t = 1, \dots, T; k = 1, \dots, K.$$

Where: y_{it}– is the value of the dependent variable for the ith observation unit in period t; x_{kit} – is the value of the kth independent variable for the ith observation unit in period t; β_{kit} are the regression parameters, which in the general form of the panel data model are variable across observation units and time periods; u_{it} is the random error, which has an arithmetic mean equal to one and a constant common variance for every i and t.

For the developed model, the fundamental assumptions for the application of panel data were first examined. This process involved testing for the presence of multicollinearity, heteroskedasticity (White, 1980), autocorrelation (Wooldridge, 2012), and the cross-sectional dependence of data (Pesaran, 2015), in order to select the final specification of the model.

The analysis was conducted based on data obtained from the financial statements of 30 companies operating under the activity code 10.61, in the territory of the Republic of Serbia, during the period from 2010 to 2019. The data used in this study were obtained from the website of the Business Registers Agency of the Republic of Serbia. For the statistical analysis of the data, the R software version 4.3.2 was used.

RESULTS AND DISCUSSION

In the following table, the results of the descriptive statistical analysis for the indicators of mill companies are presented (Table 2).

Table 2. Descriptive statistics for the indicators of mill companies from the Republic of Serbia (2010 to 2019)

Variable	1,3 Median	Minimum	Maximum	Standard deviation
ROA	3.759	-36.721	36.802	7.609
Liquidity	0.813	0.098	15.161	1.767
Indebtedness	0.454	0.034	1.000	0.209
Leverage	0.831	0.000	43.069	4.262
Tangibility	0.431	0.052	0.914	0.159
Total assets turnover ratio	1.300	0.180	4.750	0.660
Z-score	2.470	-0.100	15.420	1.719
GDP	2.068	-1.590	4.495	1.889
CPI	2.606	1.122	11.137	3.278

Considering the significant extremes observed in the collected data, as well as the high values of standard deviations, the median represents a better indicator of central tendency compared to the mean. The median value of the profitability indicator ROA is

3.8%, which is relatively low compared to the recommended value of 5% set as the threshold for profitable companies. A notable aspect of the ROA indicator is its wide variation range, indicating that the overall profitability in this sector is negatively affected by companies that achieved negative results in the observed years. The liquidity ratio of these companies is at a level of 0.81, indicating the observed companies' inability to meet their current liabilities through current assets. The indebtedness indicator has a median value of 0.45, i.e., 45% of the company's assets are financed through debts, while the remaining 55% is financed through equity. The median value of financial leverage is 0.83, indicating a dominant participation of capital in liabilities. The tangibility average was 0.43, showing that the fixed assets' participation in total assets is 43%. The median value of the total business assets turnover ratio was 1.3, suggesting that every dinar invested in total business assets generated 1.3 dinars in sales revenue. The average Z-score of the observed companies was 2.47, placing these companies in Altman's grey zone of moderate bankruptcy risk (Altman, 1968). The median value of the Gross Domestic Product (GDP) in the observed period was 2.07%, and the average inflation rate was 2.61%. The lowest GDP rate was recorded in 2014 at -1.59%, and the highest in 2018 at 4.49%. The lowest inflation rate was recorded in 2016 (1.12%), and the highest in 2011 (11.11%).

In the following section, the basic assumptions for applying the panel regression model were tested. Table 3 shows the results of testing multicollinearity among the observed independent variables.

Table 3. Multicollinearity testing

Variable	VIF	TOL
Z-score	9.21	0.11
Liquidity	7.27	0.14
Total assets turnover ratio	2.96	0.34
Indebtedness	2.60	0.38
Leverage	1.57	0.64
Tangibility	1.52	0,66
CPI	1.18	0,85
GDP	1.09	0,91

Considering that the tolerance level in the model for all independent variables is greater than 0.1 and the variance inflation factor (VIF) is less than 10, we can assume the absence of multicollinearity. In the following table (Table 4), the results of testing other assumptions are presented, which pertain to the testing of heteroskedasticity, autocorrelation, and the cross-sectional dependence of data.

Table 4. Tests of heteroskedasticity, autocorrelation, and cross-section dependence of data

Test	Test statistics	p-value
White's test	2,931.840	0.000
Wooldridge test	2.767	0.107
Pesaran's CD test	1.387	0.165

To test for the presence of heteroskedasticity, a White's test was applied. Based on the results of this test, the null hypothesis of homoskedasticity is rejected at the 1% significance level ($p<0.01$), and the alternative hypothesis of the existence of heteroskedasticity is accepted. The presence of autocorrelation was tested using the Wooldridge test, and no presence of autocorrelation was found in the formed model ($p>0.05$). The results of Pesaran's CD test indicate that there is no statistically significant dependence of cross-sectional data ($p>0.05$).

To select an appropriate model specification, the Hausman test was employed. Given the violation of basic assumptions, a modified version of the Hausman test was applied to the panel model. The Hausman statistic value of 12.511 with a p-value of 0.052 indicates that at the 5% significance level, the null hypothesis is accepted, i.e., a model with random effects is chosen. With the aim of overcoming the disruption of the basic model assumptions, an alternative specification of the random effects model with panel-corrected standard errors (PCSE - linear regression with panel-corrected standard errors) was applied. The results of this alternative specification are presented in the following table (Table 5).

Table 5. Estimated model of random effects for the profitability of mill companies from Republic of Serbia

Variable	Coefficients	Standard error	z-statistics	p-value
Constant	5.998	2.533	2.368*	0.017
Liquidity	-3.152	0.544	-5.793**	0.000
Indebtedness	1.892	3.596	0.526	0.598
Leverage	-0.353	0.087	-4.017**	0.000
Tangibility	-16.951	2.602	-6.515**	0.000
Total assets turnover ratio	-3.028	0.909	-3.330**	0.001
Z-score	4.520	0.691	6.534**	0.000
GDP	0.118	0.141	0.838	0.402
CPI	-0.471	0.091	-5.178**	0.000

Note: ** - level of significance 1%; * - level of significance 5% ;

The panel regression model for agricultural companies was formed based on data from 30 companies over a 10-year period, resulting in a total of 300 observations. Based on the results of the F-test, it can be concluded that the formed model is statistically significant ($p<0.01$). This is due to the fact that significant determinants of profitability, expressed by the return on assets rate, liquidity, financial leverage, tangibility, total business assets turnover ratio, Z-score, and inflation stand out. Liquidity has a significant and negative impact on the profitability of the observed milling companies, i.e., with a 1% increase in liquidity rate, a decrease in profitability of 3.15% can be expected. Financial leverage also had a significant and negative impact on profitability, with an increase in this indicator by 1% expected to decrease profitability by 0.35%. The results identified a significant negative impact of financial leverage on profitability, which contrasts with the findings of Tekić et al. (2022) who analyzed milling companies in Vojvodina. Differences in these results might be due to this study covering companies from the entire territory of the Republic of Serbia. The asset structure also had a statistically significant and negative impact on the profitability of the analyzed companies, in line with the findings of Dakić and Mijić (2020). The asset structure stands out with the highest regression coefficient, indicating an expected decrease in profitability by 16.95% if this indicator increases by 1. The total business assets turnover ratio had a statistically significant negative impact on profitability, with an increase in this indicator by 1 expected to decrease profitability by 3.03%. The Z-score also emerged as a significant factor influencing the profitability of the observed companies, having a positive impact, with an increase in the Z-score by 1 expected to increase profitability by 4.52%. Among macroeconomic factors, it was determined that only inflation has a statistically significant impact on profitability, negatively affecting the companies' profitability as expected.

CONCLUSION

Based on the analysis of the profitability of milling companies in the Republic of Serbia from 2010 to 2019, from a sample of 30 companies, the research results determined that the average profitability of these companies was at the level of 3.76%. Using panel regression analysis, the impact of internal and external factors on the profitability of the companies was examined, and it was noted that asset structure had the greatest influence on the profitability of the observed companies. Asset structure had a negative impact on profitability, which can be explained by the companies' excessive investment in fixed assets or inefficient use of these assets. Liquidity also emerged as a factor with a significant negative impact on profitability, as did financial leverage. The return rate on total business assets also negatively affected profitability, indicating potentially inadequate asset management. Among the observed internal factors, only the Z-score had a positive and statistically significant impact on the profitability of the observed companies, suggesting that with its increase, companies can move out of the grey zone and into the zone of profitable companies. External factors of profitability, GDP, and inflation were observed, however, the results determined that only inflation had a statistically significant impact on the profitability of the observed companies.

The research results could contribute to a quality understanding of the state and perspectives for further development of the milling industry in the Republic of Serbia. These results should primarily benefit the creators of agrarian policy, from the perspective of preserving the profitability of the observed companies, which are crucial for maintaining a country's food security.

It's important to consider certain limitations of this research; besides the analyzed internal and external factors, there are a variety of factors not considered in this study (reference interest rates, unemployment, ownership, management, etc.), and the time period of the study, which should be expanded in future research.

REFERENCES

Al-Jafari, M. K. & Al Samman, H. (2015). Determinants of profitability: evidence from industrial companies listed on Muscat Securities Market. Review of European Studies, 7(11), 303-311. doi:10.5539/res.v7n11p303

Altman, E.I. (1968)Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. Journal of Finance 23, 589–609.

Dakić, S., Mijić & K., Jakšić, D. (2019). Multiple Regression Approach to Modelling Determinants of Business Success Based on Financial Statements: Evidence from Food Processing Companies in the Republic of Serbia. Custos e agronegocio on line, 15 (4), 485- 501.

Dakić S. & Mijić K. (2020). Regression analysis of the impact of internal factors on return on assets: a case of meat processing enterprises in Serbia. Strategic Management, 5(1), 29-34.

Pesaran, M.H. (2015). Time Series and Panel Data Econometrics. Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, United Kingdom.

Tadić, J., Jevtić, J. & Jančev, N. (2019). Modeling of critical profitability factors: Empirical research from food industry in Serbia. Ekonomika poljoprivrede, 66 (2), 411-422. doi: 10.5937/ekoPolj1902411T

Tekić, D., Mutavdžić, B., Milić, D., Matkoviski, B., Đokić, D. & Novaković, T. (2022). Profitability determinants of small agricultural and food companies in the Republic of Serbia. Custos e@gronegócio on line, 18(3), 124-145.

Tekić, D., Mutavdžić, B., Milić, D., Novaković, T., Popov, M., & Mihajlov, Z. (2022). Estimation of profitability factors of mill companies in Vojvodina. Journal on Processing and Energy in Agriculture, 26(1), 8-10. https://doi.org/10.5937/jpea26-36418

Mutavdžić, B., Tekić, D., Novaković, T. (2021), Statistička analiza determinanti profitabilnosti mikro prehrambenih preduzeća u Vojvodini, Zbornik radova, Naučni skup sa međunarodnim učešćem „Selo i poljoprivreda“, Bijeljina 29-30. Septembar, 2021, 223-237.

Wooldridge, J.M. (2012). Introductory econometrics: A modern approach. Mason, USA: South-Western, Cengage Learning.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48 , 817-838.

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