DETERMINATIONS OF PROFITABILITY IN THE AGRICULUTRAL SECTOR IN SERBIA

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ABSTRACT

This research paper considers performance determinants at firm and industry level from the perspective of agricultural industry since this industry is recognized as one of key drivers of Serbian national economy. Sample is consisted of 115 large and medium-sized firms as they participate around 50% in total sector turnover, during years 2017 - 2021. The Generalized Method of Moments was used to analyze how firm factors (lagged profitability, leverage, labor cost, size, liquidity, sales growth) and industry factors (market share and capital intensity) affect profitability. Research results showed that profitability is strongly positively affected by its past values and stronlgy negatively affected by leverage, labours costs and industry factor capital intensity. The results suggest that internal factors are key determinants of the performance of agricultural firms rather than external factors and that leverage is the most significant determinant of profitability therefore managers should pay more attention to debt policy.

Introduction

The agricultural sector is a specific sector as it highly depends on natural factors from one side and state subsidies and agricultural policies from another. Agriculture is one of the most important sectors in Serbian national economy. Production of food for domestic market reduces demand for import and benefits to national economy by developing rural areas and employment (Dašić et al, 2022).

According to the national accounts published on Statistical Office of the Republic of Serbia [hereinafter SORS] in 2022 agricultural sector in Serbia contributes with 6.3% in total Gross Domestic Product (GDP), while agricultural sector in EU contributes with 1.3% (Eurostat, 2022) in total EU GDP. This sector plays essential role in Serbian economy as total output value was 394,576 million RSD in 2021 which places the agricultural on fourth place, behind manufacture sector, trade, and real estate sector. Agriculture employs 15.2% of total employees in 2021 in Serbia and is on third place

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behind service and manufacture industries. Participation of agricultural sector in GDP and employment is decreasing (SORS, 2023) but still has a very important role in domestic economy. Agriculture dominates rural areas and secures minimum levels of food and social and economic stability (Volk et al, 2014).

Determination of factors which influence the performance of agricultural firms can be crucial for management and policy makers. There are two opposites theories on what factors are decisive for firm performance. The theory of the Industrial organization was developed in 1950s. It studies the economic process, how markets and companies are organized and what strategies are applied (Uzunidis, 2016). Structure – conduct – performance model (S-C-P) represents the school of point that industry characteristics like barriers to entry, product differentiation, industrial concentration are determinants of firm performance (Bain, 1956). This model accepts industry characteristics as decisive elements of firm performance.

Resource- advantage theory was developed during the 1990s as a reaction to industry structure theory. Firm strategic resources are not homogeneous and can create competitive advantages by using and developing superior resources (Barney, 1991). This theory focuses on firm specific, internal resources and factors. Barney (1991) suggested VRIN criteria (valuable, rare, imperfectly imitable, and not replaceable) for creating competitive advantage which can lead to high performance. The main company advantage is management's ability to combine individual technologies and skills and build competence to create opportunities (Prahalad & Hamel, 1990).

Most studies confirm the influence of both firm specific and industry factors as determinants of profitability; however, results are not consistent. The main goal of this research was to determine driving factors of profitability in Serbian large and mid-sized agriculture firms. The results were studied in relation to Theory of the Industrial organization (Bain, 1956) and Resource- advantage theory (Barney, 1991; Prahalad & Hamel, 1990) though five-year period (2017-2021).

Many papers and scholars are focused on investigating determinants of firm profitability as profitability is the ultimate measure of every firm's success. The focus of this research are internal and external determinants of financial performance of firms operating in agricultural industry since this industry is recognizes as one of key drivers of national economy (share in GDP, share in total employment, etc.).

Literature review

When analyzing factors which determine a firm's profitability, empirical studies recognize two different types of factors: internal and external (industry and macroeconomic level indicators). Some research papers are only focused on **external determinants** of firm's profitability like Callado & Soares (2014) or McGahan & Porter (1997, p29) showing that industry have impact on profitability and are more persistent over time and "…

Some papers are focused only on **internal** determinants. Mijić & Jakšić (2017) investigated internal factors that influence profitability of agricultural companies in SEE region. Lagged profitability, leverage, liquidity, and growth showed positive, and size and capitalization showed negative impact on profitability of examined companies in Hungary and Romania. Lagged profitability, growth and liquidity showed positive impact on profitability of examined companies in Serbia and Bosnia and Herzegovina. Nguyen & Nguyen (2020) showed that firm size, financial leverage, and liquidity have positive impact on ROA in study from Vietnamese listed enterprises. Kryszak et al. (2021) examined if farm size has an impact on farm profitability in EU region. In the study it is highlighted that high level of equity turnover is important and that leverage is a negative determinant in almost all group sizes. Dahmash et al. (2021) also analyzed only firm specific factors for listed companies in Jordan, showing that size and assets growth have positive and tangibility negative effect on its profitability, while leverage doe does not have significant effect. Martinho (2022) showed that current assets and current liabilities have positive and leverage negative impact on financial performance of farms from the former 28 EU countries.

Most papers focus on **both types of factors**. Analyzing listed companies in China from agricultural sector, Liu et al. (2021) showed that size, long term leverage and growth are positively while leverage, capital and export intensity are negatively related to profitability. Authors argued that internal factors have more significant impact on firm performance, same as Yazdanfar (2013). On the other hand, Korneta (2019) stated that although external determinants are not controllable should also be considered during the business process. Pervan at al. (2019) designed three categories to determine what influence on profitability in the manufacturing industry in Croatia. Results showed firm-specific determinants: lagged profitability and firms age have positive and labor cost negative impact, sector-specific: HHI index has negative impact and macroeconomic determinants inflation and growth of GDP have positive impact. Stierwald (2010, p2) showed that profitability is mostly determined by firm characteristics on example of large firm in Australia. And that industry effects are significant but to considerably lower extent. Blažková & Dvouletý (2018) studied food processing companies in Czech. The paper determined that both industry determinants and firm level determinants have significant influence on profitability. Market concentration (CR4) and market share (MS) have a positive impact implying that higher profitability can be achieved in a more concentrated sector. And age, leverage and short risk have negative impact as young firms can quickly react to any change in examined food processing sector (Blažková & Dvouletý, 2018, p40). Fernández et al. (2019) showed that performance of large and small Spanish firms is predominately explained by firm factors, but medium firm's performance is predominately explained with industry effects.

Materials and methods

For this research paper data were obtained from Serbian Business Registers Agency [hereinafter SBRA]. Selection of sample was based on following criteria: active

firms classified in Sector A (Agriculture, Forestry and Fishing) according to Serbian Regulation of Classification of Economic Activities (Official gazette of the Republic of Serbia, 2010) with submitted financial statements for observed period. Having in mind that there are almost 4,000 agricultural companies in Serbia, and large and medium-sized agricultural companies have market share of 52% in total sector (SBRA, 2021) large and medium companies are selected. Criteria for determine large and medium companies was based on Accounting Law in Serbia, article 6 (Official gazette of the Republic of Serbia, 2021). The final sample is consisted of 115 companies (N=115) which are observed during period 2017-2021 (T=5). The model has 575 observations, there are no missing data, so we are dealing with a strongly balanced panel.

Selection of variables

Based on data availability and literature review Liu et al. (2021), Pervan at al. (2019), Stierwald (2010), Blažková & Dvouletý (2018) Fernández et al. (2019) selected are two types of variables. Variables specific for each large and middle-sized agricultural firm in Serbia – internal and specific for the whole agricultural sector – external. The dependent variable is an indicator of performance calculated as return on total asset – ROA.

Table 1. Calculation of selected variables

Determinants of profitability - Variables		Calculation	References
Dependent variable	Profitability: Return on Asset (ROA)	Ration of firm's net profit and total asset	Blažková & Dvouletý (2017), Nguyen & Nguyen (2020), Pervan et al. (2019), Liu et al. (2021), Mijić & Jakšić (2017)
Firm specific variable	Lagged Profitability: Return on Asset (ROAl)	Lagged ROA	Yazdanfar (2013), Pervan & Mlikota (2013), Stojcic & Vojvodic (2012), Mijić & Jakšić (2017), Pervan et al. (2019)
	Debt Indicator (DR)	Ratio of firm's total long- term and short-term debt and total assets	Blažková & Dvouletý (2017), Nguyen & Nguyen (2020), Liu et al. (2021), Mijić & Jakšić (2017), Dahmash et al. (2021)
	Current ratio (Liq)	Ratio of firm's current assets and total assets	Andrašić et al (2018), Nguyen & Nguyen (2020), Pervan et al. (2019), Liu et al. (2021), Milošev (2021)
	Labor cost (Labcost)	Ratio of firm's labor costs and total sales	Williams et al. (1989) Pervan et al. (2019), Korneta (2019)
	Size (Size)	Natural logarithm of firm's assets book value	Yazdanfar (2013), Andrašić et al. (2018), Nguyen & Nguyen (2020), Pervan et al. (2019), Liu et al. (2021), Dahmash et al. (2021), Singh & Bagga (2019), Milošev (2021)

Firm specific variable	Sales growth (Salesgr)	(Current year firm's sales - previous year firm's sales) / previous year firm's sales	Andrašić et al (2018), Mijić & Jakšić (2017) Liu et al. (2021), Singh & Bagga (2019)
Industry specific variable	Market Share (CRn)	Ratio of firm's sales and total industry sales	Pervan & Mlikota (2013), Feeny & Rogers (2000), Blažková & Dvouletý (2017). Andrašić et al. (2018), Stojcic & Vojvodic (2012)
	Capital intensity (Cap)	Ratio of firm's fixed assets and total sales	Liu et al. (2021), Mijić & Jakšić (2017), Singh & Bagga (2019)

Source: Author illustration based on Pervan et al., 2019

Lagged profitability, leverage, liquidity, size, cost of labor and potential of sales growth are used as *firm specific variables*. Bearing in mind that firm performance depends on its past values, a **lagged profitability** variable is used in this model as an independent variable. It is proved that profitability from previous year has positive impact on current profitability (Mijić & Jakšić, 2017; Yazdanfar, 2013).

Debt indicator is widely used variable in research papers which are determining profitability of companies. Findings are consistent in some papers, authors (Yazdanfar, 2013; Kryszak et al., 2021; Korneta, 2019, Liu et al., 2020; Andrašič et al.; 2018, Marinho, 2022; Milošev, 2021) find negative relationship. Some papers claim (Mijić & Jakšić, 2017) that performance of agriculture companies in Romania, Hungary and Bosnia and Herzegovina is positively affected by leverage or is statistically insignificant (agricultural companies in Serbia). Nguyen & Nguyen (2020) confirmed negative impact on debt indicator to ROE and ROS, but positively to ROA indicator.

Results in many studies find that relationship between **firm size** and profitability (Liu et al., 2020; Nguyen & Nguyen, 2019; Dahmash et al., 2021), and relationship between ratio of current to total assets and profitability (Andrašič et al., 2018; Nguyen & Nguyen, 2019; Mijić & Jakšić, 2017; Martinho, 2022) is positive, however some papers show negative relationship regarding size (Andrašič et al., 2018; Stojcic & Vojvodic, 2012, Milošev, 2021).

Williams et al. (1989, p281) showed that **labor costs** in British manufacture industry determine profitability when profit is relatively small. According to Pervan et al. (2018, p.977) labor cost has significant impact on determining profitability of manufacturing companies in Croatia. Higher costs decrease profitability, so cost strategy is very important in the traditional manufacturing industry. Korneta (2019) show significant and negative influence of salaries to profitability of Polish agricultural distributors.

Sales growth potential is used to represent the size of agricultural market in Serbia and if demand is growing. Andrašić et al. (2018), Mijić & Jakšić (2017), Liu et al. (2021), Blažková & Dvouletý (2017) show that performance is positively affected by growth.

Industry specific variables market share and capital intensity are included in the model to

analyze if industry specific effects contribute to firm profitability. Relationship between industry and specific effects are complex (McGahan & Porter,1997, p15) as they are not consistent in each industry sector. **Market share (CRn)** is one of the most relevant ratios to measure market concentration beside the Herfindahl-Hirschman Index - HHI. In this model is used CRn and not HHI as market share data for all agricultural company in Serbia were not available. Market share represents company share in relevant industry. Low value of CR represents high level of competition in particular industry (Naldi & Flamini, 2014, p5). Positive effect is confirmed in papers Pervan & Mlikota (2013), Hirsch et al. (2014), Blažková & Dvouletý (2017), and Andrašić et al. (2018). On the example of large firms in Australia Feeny & Rogers (2000) showed U-shaped relationship of profitability and market share, highlighting that profitability is declining at the beginning and rising when market share is above 30%. In agricultural companies in China (Liu et al., (2021), agro cooperatives in U.S. (Singh & Bagga, 2019) agricultural companies in Hungary and Romania (Mijić & Jakšić, 2017) profitability is negatively affected by **capital intensity.** In agricultural companies in Bosnia and Herzegovina and Serbia (Mijić & Jakšić, 2017) impact is not significant.

Estimation method

Examination of profitability determinants in the agricultural sector in Serbia is research goal and next hypothesis is defined:

H1: Firm specific variables (lagged profitability, leverage. liquidity, labor costs, size, and sales growth potential) and industry specific variables (market share and capital intensity) determine profitability of large and medium agricultural companies in Serbia.

Many relationships in the economy have dynamic aspects. It is already mentioned in this paper that financial performance of agricultural companies in Serbia depends on its past values. Therefore, dynamic element as a lagged profitability variable is used in this model:

$$ROA_{i,t} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 DR_{i,t} + \beta_3 Liq_{i,t} + \beta_4 Labcost_{i,t} + \beta_5 Size_{i,t} + \beta_6 Salesgr_{i,t} + \beta_7 Cap_{i,t} + \beta_8 MS_{i,t} + \sum_{n=1}^{5} \beta_n \, dum\, t_n + n_i + \varepsilon_{i,t} \quad \beta_6 \qquad (1)$$

Where: ROA represents *profitability* as dependent variable, *i* stands for *number of observed agricultural companies* (i=1, 2, …115), *t* represents *observed period of five years*, firm specific variables are *leverage, liquidity, labor cost, growth potential and size, capital intensity and market concentration* presents industry specific variables. Dependent variable from previous years, *lagged profitability*, is included in model as independent variable to control of bias and inconsistency. To consider specific year effect *time dummies* variable is also included in the model (y*). The *regression coefficients* of independent variables are β, ε represents a *random error*.

Results and discussion

Descriptive statistics of Serbian agricultural sector for 5-year period (2017-2021) is presented in the *Table 2*, the model had 575 observations. The agricultural sector had low profitability as an average profitability was 3.03% and most theories believe reference value should be above 10% (Mijić & Jakšić, 2017, p162). The mean ROA was partly reduced by the effect of limiting the minimum ROA value at -0.259108 and maximum ROA value at 0.218391 after adjusting the outliers in the 99th and 1st percentile. The debt ratio had a mean of 45,36% implying that agricultural companies relied on debt as a way of financing business. The average liquidity of the observed companies was 2.29, and size was 14.39. Labor cost participated in average 10,94% in total sales. Market share in average was 0.4%, with minimum values of 0.01% and maximum 0.3% showing that agricultural market in Serbia was very competitive. Variables profitability and lagged profitability were adjusted for outliers using Winsorize method in STATA. In Appendix 1 are presented values before adjustment.

Table 2. Descriptive statistics of Serbian agricultural sector

Variable	Obs	Mean	Std. Dev.	Min	Max
roa_w	575	.0303965	.058048	-.259108	.218391
roal_w	460	0.797795	.0898612	-.159218	.218391
dr	575	.4536188	.3101597	.011839	2.10453
liq	575	2.299656	3.711358	.077906	60.2663
size	575	14.39828	.9444567	12.3576	18.7377
labcost	575	.1094107	.1102613	.000214	.773606
cr	575	.0041159	.0042187	.0001034	.0302241
cap	575	1.243425	1.465071	0	9.74136
salesgr	575	.4750551	1.51065	-.98526	19.3812

Source: STATA, Authors' elaboration

To test if there was multicollinearity problem in the model the correlation among the variables was analyzed through Pearson correlation matrix (*Table 3*). Performance had low, positive, and significant correlation with its lagged variable, liquidity, and market share; low, negative, and significant correlation with leverage and capitalization and low, negative but not significant with company size and sales growth. Moderate, negative, and significant correlation was shown between performance and labor cost and moderate, positive, and significant correlation between capitalization and size, capitalization and labor cost and market share and size.

Table 3. Pearson correlation analysis of profitability and its determinants

	roa_w	roal_w	dr	liq	size	labcost	cr	cap	salesgr
roa_w	1.0000								
roal_w	0.2412* 0.0000	1.0000							
dr	-0.2455* 0.0000	0.0242 0.6040	1.0000						
liq	0.1376* 0.0009	0.0414 0.3759	-0.3598* 0.0000	1.0000					
size	-0.0736 0.0777	-0.1042* 0.0255	-0.3287* 0.0000	0.0400 0.3380	1.0000				
labcost	-0.4469* 0.000	-0.1565* 0.0008	-0.1353* 0.0011	0.0884* 0.0340	0.2142* 0.0000	1.0000			
cr	0.1179* 0.0046	0.0487 0.2969	-0.0118 0.7778	-0.0561 0.1791	0.5375* 0.0000	-0.1646* 0.0001	1.0000		
cap	-0.2992* 0.0000	-0.1411* 0.0024	-0.2627* 0.0000	0.0349 0.4041	0.4005* 0.0000	0.4954* 0.0000	-0.2092* 0.0000	1.0000	
salesgr	-0.0687 0.1001	-0.0984* 0.0349	0.1072* 0.0101	-0.087* 0.0362	0.0062 0.8818	0.0384 0.3577	-0.0545 0.1915	0.0327 0.4335	1.0000

* Statistical significance at 5% level.

Source: STATA, Authors' elaboration

Variance Inflation Factor (VIF) was used as superior test. There was no multicollinearity problem (*Table 4*) in the model as results are below 10.

Table 4. VIF multicollinearity test for profitability and its determinants

Variable	VIF	1 / VIF
size	2.71	0.368353
cr	2.25	0.443816
cap	2.09	0.477867
labcost	1.38	0.724535
dr	1.36	0.732730
liq	1.16	0859089
roal_w	1.05	0.951670
salesgr	1.01	0.966651
Mean VIF	1.63	

Source: STATA, Authors' elaboration

Model was facing heteroskedasticity (BP (8, 451) = 4.81 Prob > F= 0.0000) and the endogeneity problems (DW (9,460) = 0.9348137). Generalized Method of Moments was used to work around autocorrelation within panels of groups, heteroskedasticity and endogeneity. Roodman (2009, p.102) introduced G.M.M. in Stata and suggested to use lagged dependent variable as independent i.e., to instrument variable to work around endogeneity problem. The model, internal and external determinants of profitability,

(*Table 5*) showed that instruments are valid. The model had 5 instruments for one endogenous variable. The null hypothesis that instruments are valid cannot be rejected as the Hansen (1982) J statistic was not significant and model was correctly specified. The second order of autocorrelation was excluded as Arellano-Bond test AR (2) was not statistically significant. In our model a time dummy variable (Sarafidis, et al., 2009) was added to prevent cross section dependence and to consider the specific year effect.

Table 5. Internal and external determinants of profitability

Dedendent variable: Profitability – roa_w	**Model two step system GMM**		
	Coefficient	**Corrected Std. Err.**	**P> | t |**
roal_w	**.4942642**	**.1362104**	**0.000*****
dr	**-.657133**	**.01884623**	**0.001****
liq	-.0000272	.0004381	0.951
labcost	**-.1239455**	**.0503485**	**0.015***
size	-.002203	.00458	0.631
cap	**-.0065121**	**.0014385**	**0.000*****
cr	.3773895	.9423669	0.690
salesgr	.0031164	.0036197	0.391
year	**.0250224**	**.0092353**	**0.008****
yr3	**.0607405**	**.0143853**	**0.000*****
yr4	**.0399579**	**.0081282**	**0.000*****
_cons	**-50.48934**	**18.65055**	**0.008*****
No of observations	460	F (11, 114)	30.02
No of groups	115	Prob > F	0.000
No of instruments	17	AR (2)	0.051
Year Dummies	Yes	Hansen test chi2(5) = 7.04	0.218
Obs per group	4		

Note * significance at the level of 5%, ** at the level of 1% and *** at the level of 0.1%.

Source: Authors' calculation, Software used: STATA

The gained results demonstrate that regarding firm specific factors, the previous year's performance has a significant and positive effect on performance. Labor cost and leverage have significantly and negative effect on performance of large and medium agricultural firms in Serbia. Gained results demonstrate that firms achieve higher performance if their liquidity is higher, but the relation is not statistically significant. Positive but not significant result is obtained between size and performance.

The capital intensity indicator, as industry factor, is confirmed to be determinant of performance for agricultural firms in Serbia. This variable also has a significant negative effect but with lower coefficient than firm specific factors. Capital intensity may affect performance as an entry barrier (Pervan et al., 2019, p977). Market share has a negative but not significant impact on the performance of observed companies.

Conclusions

The results suggest that internal factors are key determinants of the performance of agricultural firms rather than external factors. The results show that profitability is strongly positively affected by its past values and strongly negatively affected by leverage, labor costs and industry factor capital intensity. The empirical results suggest that leverage is the most significant determinant of profitability and that managers should pay more attention to debt policy. When level of leverage and the level of labor costs to sales are increasing profitability (measured as Return on Asset – ROA) of agricultural firms in Serbia is decreasing. Liquidity, size, growth potential, and market share do not have impact on profitability according to the results of this study.

Selected sample can be the limitation of this study. Further research might take into consideration small and micro sized firms from the agricultural sector or other sectors which have more impact on GPD – for example manufacture industry or longer time periods.

Conflict of interests

The authors declare no conflict of interest.

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Appendix no 1. Minimum and maximum values before Winsorized adjustment of Agricultural industry in Serbia

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	575	.0328676	.1077702	-.716254	1.99956
roal	460	0.0354547	.1123166	-.716254	1.99956
dr	575	.4536188	.3101597	.011839	2.10453
liq	575	2.299656	3.711358	.077906	60.2663
size	575	14.39828	.9444567	12.3576	18.7377
labcost	575	.1094107	.1102613	.000214	.773606
cr	575	.0041159	.0042187	.0001034	.0302241
cap	575	1.243425	1.465071	0	9.74136
salesgr	575	.4750551	1.51065	-.98526	19.3812

Source: STATA, Authors' elaboration