The modelling factors of agricultural companies performances

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Abstract

The aim of paper is to investigate the impact of factors on the profitability of medium and large agricultural sector. The analysis includes three models of multiple regression where return on assets as the main performance determinant is defined as a dependent variable. Models examines the impact of company size, liquidity, debt, market share, sales revenue growth, insurance and export on profitability of agricultural sector. Further, current liquidity, market share, sales revenue growth, insurance and export have a positive impact on profitability in observed period. Also, these findings determine that all observed factors are crucial for the profitability of medium and large agricultural companies in region of Vojvodina in the Republic of Serbia.

Keywords: agriculture, modelling, factors, peformance, Serbia

1. Introduction

Agriculture is a very important sector for the growth and development of the Republic of Serbia. According to Jakšić et al. (2015), the transition processes have been present for

more than two decades and together with effects of the global economic crisis caused a decline in economic activity. As a consequence of that, the relative importance of agriculture is increased in the economy of the Republic of Serbia, because there is great potential in achieving high returns in this sector. Today, agriculture and food industry participate in the creation of domestic gross domestic product for about 11.9%; agriculture, forestry and fisheries 7.7% and food industry 3.3% (Chamber of commerce and industry of Serbia) In modern business conditions, the challenge is to develop and encourage new profitable agricultural business branches in rural areas (Weiss, 2015). The orientation of agriculture activity to a certain agricultural branches without seeking alternatives and new profitable branches presents the risk of failure of the agriculture companies.

Favourable climatic conditions and quality agricultural land in the Republic of Serbia are important factors for a successful business of agricultural companies. Agricultural land is the most productive and economically essential category of land as a natural resource and represents a practically irreplaceable and relatively restrictive condition for sustainable agricultural production. According to Carter and Mesbach (1993), export growth is correlated to the concentration of agricultural land which additionally contributes to its importance.

These preconditions for the development of agriculture are strongly represented in region of Vojvodina in the Republic of Serbia where this region includes 35% agricultural area of the Republic of Serbia. Considering the importance of agriculture sector in AP Vojvodina and specifics faced by agricultural companies in their business, the subject of study is investigation of factors and their impact on profitability. The analysis of factors of agricultural companies should manifest the importance and direction of effects of certain factors such as company’s size, liquidity, debt, market share, sales growth, insurance and exports on profitability as a basic indicator of the company's performance. Companies insufficiently use biological assets event through the state subsidizes the insurance of crops, fruits and animals or herds. Export of agricultural products from Serbia reached a record 3.2 billion dollars in 2016. The state provides guarantees and ensures export of agricultural products through state agency. A special contribution of the paper is an analysis of the insurance of biological assets and export share of agricultural companies on profitability since these factors are not represented in empirical studies.

2. Literature Review

There are many empirical studies that have researched internal factors of profitability of the company. The most used internal factors are size, sales growth, debt ratio, quick ratio, age, inventory level, fixed assets to total assets ratio, capital turnover. However, there is no consensus on the impact of these factors on company profitability. Return on assets (ROA) is most used dependent variable in measuring profitability (Hansen and Wernerfelt, 1989; Chhibber and Majumdar, 1999; Kuntluru et al. 2008; Mijić and Jakšić, 2017). Chhibber and Majumder (1999) confirmed that company size has positive impact on profitability whereby debt ratio negatively influences on profitability.

Grinyer and McKiernan (1991) researched profitability determinants of electrical engineering industry in UK and confirmed significant impact of market share on company profitability. Kuntluru et al. (2008) investigated financial performances of companies in India and their findings confirmed positive and significant impact of company's size and growth on profitability. Further, they found that debt ratio significantly and negatively influenced on profitability. Similarly, Chandrapala and Guneratne (2012) researched the impact of internal factors on profitability of 102 Sri Lankan companies. Their results showed significant and positive relationship between company's size and growth and profitability as well as negative impact of debt ratio on profitability trend. Bottazzi et al (2008) researched profitability of Italian manufacturing companies and results confirmed there is positive, but barely significant relationship between company's growth and profitability. This research is in line with Gschwandtner (2005) which analyzed the profitability of US companies. In this study, there is a positive and significant relationship between company's size and profitability, where results confirmed previous studies (Hardwick, 1997; Leng, 2004). Robson and Bennett (2000) found a positive relationship between company growth and profitability of small and medium-sized companies in UK. Chandrapala and Knapkova (2013) pointed out that company's size and growth have positive and significant on profitability of 974 companies in Czech Republic. Also, results showed debt ratio negatively affect on profitability which is same as empirical research (Thomsen and Pedersen, 2000). Zaid et al. (2014) investigated determinants of profitability for construction companies in Malaysia in the period 2000-2012. Their findings showed positive and significant impact of size and liquidity on company's profitability. Al-Jafari and Samman (2015) investigated profitability determinants of industrial companies listed on the Muscat securities market in Oman from 2006-2013. Results have confirmed a significant and positive relationship between size and profitability of company. Likewise,

company's growth and financial leverage are statistically significant for profitability whereby financial leverage has negative impact on profitability.

In empirical research of profitability determinants for fifty-five Sri Lankan manufacturing companies, Pratheepan (2014) has noticed a positive and significant relationship between company's size and profitability. On the other hand, results show that leverage and liquidity have a insignificant impact on profitability of the company. Goddard et al. (2005) investigated profitability determinants of manufacturing and service sector in Belgium, France, Italy and the UK. Their research found negative relationship between size and profitability of company as well as positive relationship between market share and company's profitability. Nuševa et al. (2017) concluded there is a negative correlation between market share and company profitability. Hall et al. (2014) researched debt and profitability of companies listed on Brazilian agribusiness BM & FBovespa. The results showed that agribusiness companies have greater influence on the cost of debt to the capital structure as well as higher returns than other companies. However, a higher debt ratio increases risk for both lender and owner of the company (Mailkova and Brabec, 2012). Callado and Soares (2014) investigated the structure and patterns of relationships between the performance indicators used within agribusiness companies by using cluster analysis, multidimensional scaling and factor analysis. The results showed relationships between indicators of profitability, after-sales service and employee satisfaction, and on the other side relationships between indicators of profitability and customer satisfaction.

Mijić and Jakšić (2017) analyzed profitability factors of agricultural companies in the countries of Southeast Europe. Results confirmed positive impact of indebtedness, liquidity and growth on profitability of agricultural companies in Hungary and Romania. On the other hand, company size has negative impact on profitability in these. Further, there is a significant impact of company liquidity and growth on profitability in agribusiness sectors of Serbia and Bosnia and Herzegovina. Likewise, leverage has only positive impact on profitability in Bosnia and Herzegovina.

3. Methodology

This section provides the methodology adopted for the study of the impact of factors on profitability of 420 medium and large agricultural companies in region of Vojvodina in the Republic of Serbia from 2006 to 2015. The aim of paper is find out relationship between

determinants of profitability, where return on assets, company size, liquidity, debt, market share, sales revenue growth, insurance and export are used in regression models. Based on the objective, the paper looks to test the following hypothesis:

H0: There is a significant impact of factors on performances of medium and large agricultural companies.

Bearing in mind defined subject of paper, authors created three models of multiple regression which analyze the profitability level of medium and large agricultural companies in region of Vojvodina in the Republic of Serbia for the in the period 2006-2015. Profitability measures company's ability to earn profit relative to invested funds, while it can be calculated by return on assets (ROA). Research focuses on return on total assets as dependent variable, while other internal factors such as company size, current liquidity, indebtedness, market share, revenue sales growth, insurance and export are used as independent variables. The data was collected form the financial statements of agricultural companies from the databases of Serbian Business Registers Agency (2017) and Scoring (2017). The next table shows calculation of selected variables.

Table 1: Explanatory variables

Variables	Notation	Calculation	Unit
Return on assets	ROA	Net income/Total assets	%
Company size	SIZE	Natural log of total assets	%
Current liquidity	CL	Current assets/Current liabilities	%
Debt	DBT	Total liabilites/Total capital	%
Market share	CR_n	$\sum X_i$ (i=1...n)	%
Sales revenue growth	SRgrowth	Sales growth y - Sales growth y-1/Sales growth y-1	%
Insurance	INS	Company does not insure biological assets = 0, Company insures biological assets = 1	dummy
Export	EXP	Company does not export = 0, Company exports = 1	dummy

Source: Authors illustration

Return on assets is an indicator of managerial efficiency that determines earning ability is related to investments in total assets. Accordingly, it is calculated as the ratio of net income and total assets of the company, where the net income shows how companies operated at the of the business year.

Company size manifests capability from the aspect of production volume, where a higher volume of production enables a higher sales revenue level and their intensive growth. Whited (1992) argues that higher level of sales revenue growth and improved performances of the company open the space for borrowing and using of other financial sources at lower costs.

Liquidity is an important indicator of company's performance and their ability to cover short-term liabilities within maturity. It can be measured in several ways, using the current liquidity ratio which analyzes current assets and short-term liabilities. Companies have to take into account the liquidity and profitability ratio, ie to the level of surplus of liquid funds, so as not to be exposed to opportunity costs. It is necessary to maintain an optimal ratio between these two principles because only in this way it is a possibility to achieve a positive impact of liquidity on profitability level of the company.

Company debt points to structure of assets source and safety from the aspect of enterprise financial independence. Borrowing of other financial sources can have positive implications on profitability level of the company. If a company uses borrowed funds for investment that will enable future economic inflows, so can be expected a positive impact of debt on profitability. On the other hand, the company have to take into account of borrowing costs level, so that would not be in a situation to gives a higher amount for servicing debts in relation to potential investments. Low debt ratio create possibililty to achieve high profitability (Vučković et al., 2017). On the other hand, the company's ability to generate profits is one of the key factors of financing and it affects the company's ability to attract additional capital investment (Mijić, Jakšić, 2017).

Market share reflects the percentage share of the company in a particular sector, as well as the market character. When analyzing the potential relationship between market share and profitability, companies with a higher market share often achieve a higher profitability level compared to companies with a significantly lower market share.

Sales growth shows the company able to achieve a higher level of revenue on an annual basis compared to the previous time period. Asimakopoulos et al. (2009) point out when a company provides a higher income level in the current period, it is expected that revenues growth will have a positive impact on company profitability.

Both insurance and export should be positively related to the business performance. Insurance of biological assets of agricultural companies provide a lower risk of loss in situation of natural disasters, diseases etc. Furthermore, export of agricultural product provide collection of revenue in higher amount than the selling goods in domestic market. On the

other hand, export oriented firms should be aware of business risks outside of domestic market. Firms that are global in scope and provide high complexity product and service portfolios to hundreds of multinational customers often struggle to understand with sufficient accuracy, the sheer number of products being developed and produced, are missing accurate and timely life-cycle plans, and in some cases have inconsistent or missing profitability targets for their business contracts (Schmidt, Farkas, 2016).

4. Data and Results

Research examines medium and large companies in the agricultural sector in region of Vojvodina in the Republic of Serbia and analysis includes trends of dependent variable, descriptive statistics of explanatory variables as well as multiple regression models in three step.

Table 2: Profitability of medium and large companies from the agricultural sector (ROA)

Year	ROA		
	Mean	**Minimum**	**Maximum**
2006	0.23%	-23.42%	19.06%
2007	1.13%	-24.89%	18.87%
2008	3.84%	-10.70%	23.85%
2009	2.53%	-17.90	25.17%
2010	4.14%	-13.52%	42.33%
2011	4.75%	-24.82%	79.13%
2012	6.47%	-11.32%	35.26%
2013	3.26%	-7.01%	19.74%
2014	1.67%	-28.70%	28.83%
2015	1.38%	-14.29%	15.33%
Average	**2.99%**	**-28.70%**	**42.33%**

Source: Authors calculation

Results from Table 2 show that return on assets (ROA) increased in the period 2006-2008 year, while in 2009 this indicator declined by 1.31%. Comparing minimum and maximum level of ROA, we can see the smallest value of -24.89 in 2007 as well as the

maximum level of 23.85% in 2008. In the period 2010-2012, analyzed companies recorded average value of 5.12% where the maximum level of 6.47% is reached in 2012. After that, there is a sharp decrease of ROA to 1.38% which is the last year of the observed period. It means this indicator declined for even 5.09%. It is necessary to point out that medium and large companies from the agricultural sector in AP Vojvodina, Republic of Serbia are profitable in analyzed period what can see in the average value of ROA which is 2.99%. After we show that analyzed companies are profitable it is necessary to determine which factors are contribute to the positive average value of ROA.

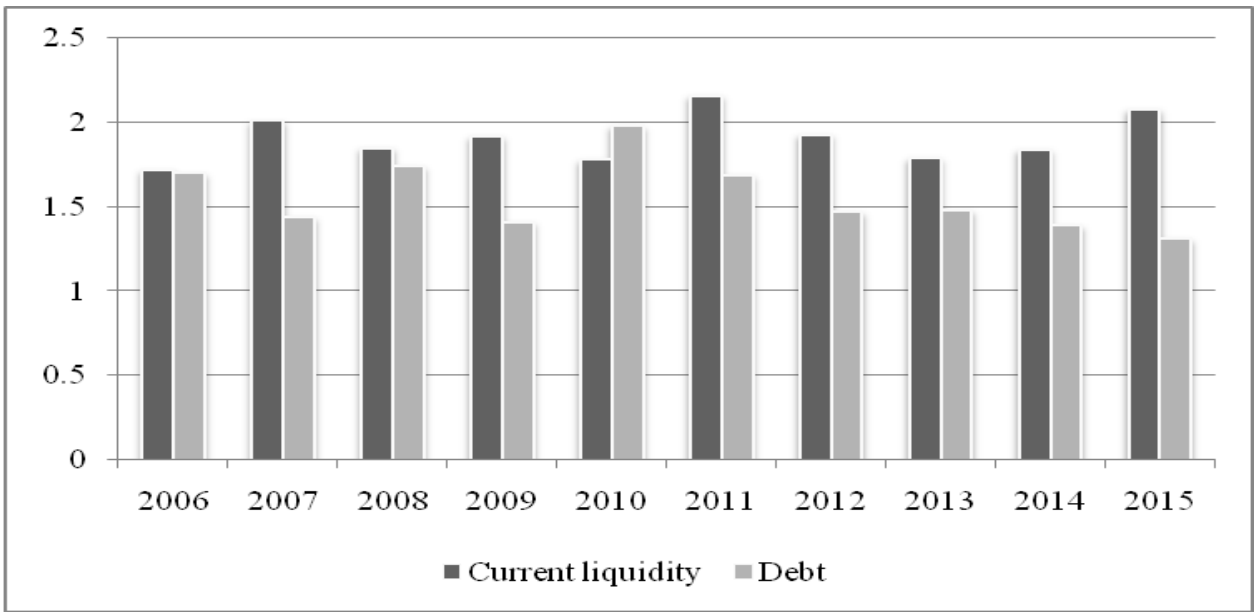

Figure 1: Liquidity and debt trend of medium and large companies from the agricultural sector
Source: Authors calculation

Figure 1 manifests values of liquidity and debt of the companies from the agricultural sector in region of Vojvodina in the Republic of Serbia from 2006 to 2015. Results indicate that medium and large agricultural companies are liquid in 2007, 2011 and 2015, while in the other year value of indicator was below the reference value of 2. The average value of this indicator is 1.91 from the whole period which means analyzed companies are not liquid. This is the logical result because higher profitability often implies lower liquidity. On the other hand, the average value of second indicator reflects that agricultural companies in region of Vojvodina in the Republic of Serbia are indebted. For example, the highest value of debt was 1.98 in 2010 when companies reached ROA above average as well as lower liquidity below

mean of the agricultural sector in region of Vojvodina in the Republic of Serbia. Likewise, the minimum value of debt indicator was 1.31 in 2015 when companies were simultaneously under average profitable and above the average liquid in this year. Table 3 shows the descriptive statistics for ROA and other factors.

Table 3: Descriptive statistics

	Obs	Mean	Min	Max
ROA	420	0.0299	-0.2870	0.4233
SIZE	420	6.05	4.82	7.65
CL	420	1.91	0.03	18.23
DBT	420	1.56	0	23.31
CR_n	420	0.02	0	0.19
SRgrowth	420	0.21	-1.00	11.27
INS	420	Dummy		
EXP	420	Dummy		

Note: variables are expressed in absolute values
Source: Authors calculation

In order to determine which factors have significant impact on profitability as a key measure of the business success of medium and large companies in the agricultural sector, authors created and evaluated three models of multiple regression. These models measure the impact of factors such as company size, current liquidity, indebtedness, market share, sales revenue growth as well as two dummy variables such as insurance and exports as independent variables on the dependent variable return on assets ROA.

Model validity and variable selection is checked by VIF test, which showed, that means values are below 10 and there is no problem of multicollinearity between independent variables in all three models.

Model I:

$$Yi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i$$

where is:

Yi– ROA,

X1 – size,

X2 – current liquidity,

X3–debt,

X4– market share,

X5 – sales revenue growth.

Table 4: Model I estimation

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig
		B	Std. Error	*β*		
1	Constant	0.301	0.070		4.332	0.000
	X1	-0.048	0.012	-0.234	-3.994	0.000
	X2	0.005	0.002	0.122	2.516	0.012
	X3	-0.008	0.002	-0.210	-4.278	0.000
	X4	0.682	0.185	0.217	3.685	0.001
	X5	0.018	0.006	0.149	3.186	0.002
						$R^2 = 32.9$

Source: Authors calculation

Based on results of multiple regression model, it can notice that company size and indebtedness have a negative impact on profitability, while current liquidity, market share and sales revenue growth positively affect on return on total assets of agricultural companies. Model results show statistically significant impact of all internal factors on ROA of agricultural enterprises (p-value less than 0.05), with explanation 32.9% of independent variables variations.

Model II:

$$Yi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_i$$

where is:

Yi– ROA,

X1 – size,

X2 – current liquidity,

X3–debt,

X4– market share,

X5 – sales revenue growth,

X6 - insurance.

Table 5: Model II estimation - dummy variable insurance

Model		Unstandardized Coefficients		Standardized Coefficients	*T*	Sig
		B	Std. Error	*β*		
2	Constant	0.201	0.067		3.001	0.003
	X1	-0.039	0.011	-0.191	-3.456	0.001
	X2	0.007	0.002	0.159	3.457	0.001
	X3	-0.007	0.002	-0.178	-3.850	0.000
	X4	0.672	0.174	0.214	3.864	0.000
	X5	0.015	0.005	0.122	2.771	0.006
	X6	0.066	0.009	0.333	7.419	0.000
						$R^2 = 46.3$

Source: Authors calculation

Table 5 shows model II that analyses the impact of factors on ROA of agricultural companies with one dummy variable such as insurance, which had 252 companies of total analyzed companies from agriculture sector in region of Vojvodina in the Republic of Serbia. Model explains 46.3% of independent variables variations and confirms statistical significance of all factors (p-value less 0.05). At the same time, there is a positive impact of current liquidity and market share as well as that enterprise size and indebtedness negatively affect on profitability of agricultural companies in observed period. Results show a positive and statistically significant impact of dummy variable on profitability, which points the importance of insurance in the business of agricultural companies.

Model III:

$$Yi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_i$$

where is:

Yi– ROA,

X1 – size,

X2 – current liquidity,

X3–debt,

X4– market share,

X5 – sales revenue growth,

X6 - export

Table 6: Model III estimation - dummy variable export

Model		Unstandardized Coefficients		Standardized Coefficients	*T*	Sig
		B	Std. Error	*β*		
3	Constant	0.298	0.069		4.304	0.000
	X1	-0.049	0.012	-0.241	-4.119	0.000
	X2	0.005	0.002	0.122	2.510	0.012
	X3	-0.008	0.002	-0.208	-4.260	0.000
	X4	0.643	0.185	0.205	3.476	0.001
	X5	0.017	0.006	0.141	3.007	0.003
	X6	0.019	0.009	0.101	2.137	0.033
						R^2= 34.4

Source: Authors calculation

Table 6 reflects model III which analyzes the impact of factors on ROA of agricultural enterprises with one dummy variable such as export, which had 269 companies of total analysed companies from agriculture sector in region of Vojvodina in the Republic of Serbia. Model explains 34.4% of independent variables variations and indicated statistically significance of all factors (p-value < 0.05). In addition, model 3 confirms results from previous model and indicates positive and statistical significant impact of dummy variables on profitability, which emphasis relevance of export component in agricultural business.

Table 7: Review of estimated models

Variables	Model I	ROA	Model II	ROA	Model III	ROA
	Direction	Change %	Direction	Change %	Direction	Change %
SIZE	↓	0.048	↓	0.039	↓	0.049
CL	↑	0.005	↑	0.007	↑	0.005
DEBT	↓	0.008	↓	0.007	↓	0.008
CR_n	↑	0.682	↑	0.672	↑	0.643
SRgrowth	↑	0.018	↑	0.015	↑	0.017
INS	-	-	↑	0.066	-	-
EXP	-	-	-	-	↑	0.019

Source: Authors calculation

Next table shows what happens with ROA due to change of independent variables in all models. Model I and model III show the similar impact of SIZE on return on assets, where 1% increase of size enhances return on assets for 0.05% which is more than result from model II. Also, model II reflects a higher change of ROA at impact of current liquidity (CL) and market share (CR_n). On the other hand, variable DBT has slightly impact on ROA in model II compared to other models. Results from model II and model III show the importance of insurance and export that positive contribute to ROA for 0.066% and 0.019%. As we can see, created models show a statistically significant impact of all selected variables on profitability of agricultural companies in observed period. This implies that research identify which internal factors are crucial for successful business of agricultural companies. Results confirm which factors have a positive or negative impact on profitability, which gives certain guidance to company management in business of agricultural sector. Because of their significant impact, insurance and exports are important components that can improve profitability level of agriculture companies. Especially, results show their positive influence, which implies that management, should focus on these variables in business.

5. Conclusion

The aim of paper is an analysis of the performance of agricultural companies in region of Vojvodina in the Republic of Serbia for the period 2006-2015. Data is collected from the financial reports of medium and large companies for observed ten period. Research is focused on medium and large companies becuase they employing 12.038 workers which means 59.46% of total number of employees in agricultural companies. The analysis of agricultural company's profitability showed that average return on assets was 2.99% as well as lower liquid and higher debt in observed period. It implies that analyzed companies had a few potential problems in covering current liabilities what can see from average value of current liquidity which was 1.91. Also, the position of agricultural companies in terms of analysis of relation between liabilities and capital is unfavorable since the average value of debt indicator was 1.56. Although medium and large agricultural companies reduced the level of indebtedness at the end of period, value of debt indicator was still above reference value of 1.

The empirical research examines the impact of factors on profitability of medium and large companies of agricultural sector in region of Vojvodina in the Republic of Serbia and shows statistically significant impact of company size, current liquidity, debt, market share,

sales revenue growth, insurance and export on return on assets as a main profitability determinant. Looking the character of factor's influence, models reflect negative impact of company size and debt on return on assets as well as positive impact of current liquidity, market share, sales revenue growth, insurance and export on return on assets of medium and large agricultural companies in region of Vojvodina in the Republic of Serbia.

In order to improve the performance of medium and large companies in the agricultural sector, and primarily profitability, companies should focus on payment cycles of short-term liabilities and collection of receivables. It is necessary to coordinate time for collecting receivables and paying liabilities so companies provide their liquidity and solvency. At the same time, companies should take into account the optimal level of liquidity because excess liquidity means the existence of free cash that is not invested and will not contribute to realization of future economic benefit. Sales revenue growth has positive impact on profitability, as it provides a higher revenue level over previous period. A positive trend in sales revenue is accompanied by higher market share. Companies should pay special attention to relationship between operating revenues and operating expenditures where an increase of operating revenues can be achieved by enhancing production volume or sales prices.

Insurance is not developed in agriculture in Serbia because owners of agricultural companies look insurance premium as the expense. Results show positive impact of insurance on profitability, which implies that companies that use insurance service, can significantly reduce potential damage on their performances. The development and improvement of the agricultural premium regression system is an indirect component in ensuring the sustainability of agricultural company's performance. The existence of a negative relationship between debt and return on assets indicates that agricultural companies with a higher level of indebtedness achieve a lower profitability. It means that companies use other sources of financing for servicing existing liabilities instead of investment in agricultural production. Agricultural companies should reduce the debt level to an optimal level, which primarily concerns the reduction of short-term liabilities and credit resources.

Medium and large companies have a greater potential for export and placement their final products on foreign markets. Export potential should be targeted at region countries and other countries in Europe. Results show a positive impact of export on profitability of agricultural companies as a fact that sale of products on foreign market provides a higher income level and more secure payment. Our recommendation for improving company's performance is the change of their production structure. Based on detailed analysis,

agricultural companies should direct production capacity into highly profitable activities. Likewise, medium and large companies have ability to achieve vertical connection where can provide secure placement and safety in realization of results in agricultural production. It is desirable to create an adequate institutional framework for credit resources for financing of medium and large agricultural companies. Providing favorable credit lines with a direct purpose in agricultural production will affect the improvement of agricultural companies business.

Contribution of the paper is manifested in fact that there is no similar research, which examines the impact of components as insurance and exports on profitability of agricultural companies. This paper provides both methodology and results of modeling factors of agricultural companies performances. The results should be consider by management in order to create a business policy for achieving a better business performances in agricultural sector.

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