

## **Estimating trade-off between liquidity and profitability of agriculture companies**

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### **Jelena Andrašić**

PhD in Finance

Institution: University of Novi Sad, Faculty of Economics in Subotica

Address: Segedinski put 9-11, Subotica, Republic of Serbia

E-mail: [jelena.andrasic@ef.uns.ac.rs](mailto:jelena.andrasic@ef.uns.ac.rs)

### **Vera Mirović**

PhD in Finance

Institution: University of Novi Sad, Faculty of Economics

Address: Subotica, Republic of Serbia

E-mail: [vera.mirovic@ef.uns.ac.rs](mailto:vera.mirovic@ef.uns.ac.rs)

### **Miloš Pjanić (corresponding author)**

PhD in Finance

Institution: University of Novi Sad, Faculty of Economics

Address: Subotica, Republic of Serbia

E-mail: [milos.pjanic@ef.uns.ac.rs](mailto:milos.pjanic@ef.uns.ac.rs)

### **Branimir Kalaš**

PhD in Finance

Institution: University of Novi Sad, Faculty of Economics

Address: Subotica, Republic of Serbia

E-mail: [branimir.kalas@ef.uns.ac.rs](mailto:branimir.kalas@ef.uns.ac.rs)

### **Nada Milenković**

PhD in Finance

Institution: University of Novi Sad, Faculty of Economics

Address: Subotica, Republic of Serbia

E-mail: [nada.milenkovic@ef.uns.ac.rs](mailto:nada.milenkovic@ef.uns.ac.rs)

### **Dragana Milić**

PhD in Finance

Institution: Higher School of Professional Business Studies

Address: Novi Sad, Republic of Serbia

E-mail: [draganaim84@gmail.com](mailto:draganaim84@gmail.com)

## **Abstract**

The subject of the research is to estimate trade-off between liquidity and profitability of agriculture companies in the Republic of Serbia for the period 2006-2019. The analysis includes multivariate analysis of variance and structural equation modeling in order to provide the potential relationship between liquidity and profitability as two most important principles in the company's business. The empirical findings confirms the presence of a statistically significant difference in liquidity and profitability, as well as, trade-off between liquidity and

profitability of the agriculture companies. The results of regression model show that liquidity has a negative effect on profitability which implies that higher level of liquidity leads to smaller profitability levels of these companies. Precisely, 1% increase of liquidity measured by current ratio and quick ratio declines return on assets for 0.13% and return on equity for 0.06%.

**Keywords:** Liquidity. Profitability. Agriculture companies. The Republic of Serbia.

## 1. Introduction

There has always been a great interest, both from the theoretical and from the practical point of view, in the phenomena of the liquidity and profitability trade of (Smith 1980). Liquidity and profitability stand out as fundamental measures of sustainability and operational flexibility and manifest the focus of the management orientation of modern business (Čavlin et al. 2021). From the point of view of companies' survival strategies, liquidity plays a more important role than profitability in the short-term. In the case when the companies are not profitable in the short-term, but has good liquid level, they have the potential for the further development and for upgrading their performance (Goldman, 2017). Therefore, the success of a business cannot be measured individually on profitability (Kumar et al. 2020). However, profitability is more essential from the long-term perspective, because without it, companies will face with lack of cash and liquid sources and have problem with covering their liabilities. Substantial financial resources are conditions that help firms to assume better investment opportunities. Financial managers pursue maximizing company's value (Zhao et al. 2022) and they have to take account to necessary financial resources that are preconditions for companies to achieve investment goals. Likewise, the managers of companies with low liquidity have to invest a lot of time and effort in order to convert receivables into cash or to negotiate additional short-term financing (Pervan et al. 2019). Therefore, companies has to balance between the liquidity levels and profitability levels, either they prefer to be more liquid or to perform more profitable. In order to fulfil their daily liquidity needs, for companies it is necessary to keep a certain amount of funds in liquid form, which entails that the funds are not engaged and do not make profit. Certainly, these liquid assets may enhance the future profitability of the company, but at some point it can negatively affect the firms profitability (Li et al. 2020). There is no consensus in the literature on the positive or negative relationship between liquidity and profitability. This relationship depends on various internal and external determinants. One of the most important goals of every company is profitability.

In order to reach this goal it is essential for every financial manager to balance between the daily needs of liquid assets and the maximization of the profitability (Brahmah et al. 2021).

The aim of this research is to identify trade-off between liquidity and profitability of agriculture companies in the Republic of Serbia in the pre-pandemic era, for the period 2006-2019. The paper is structured in four segments as following. After the introduction segment, a literature review of relationship between liquidity and profitability is performed in order to manifest our research with focus on agriculture sector. The segment methodological framework includes the sample and represents the developed hypotheses and model construction. The last segment implies final conclusions and recommendations for managers of agriculture companies, as well as, further empirical researches.

## 2. Literature review

Company management pay a lot of attention to estimating and handling company liquidity and profitability and tend to realize the optimal relationship between these two fundamental business concepts (Stevanović et al. 2019). Accordingly, Kontuš and Mihanović (2019) highlight that management of liquidity and liquid assets focuses on cash inflows and outflows together with a trade-off among liquidity and investment of surplus cash in order to upgrade profitability. On the other hand, liquidity is an essential indicator of company's performance and their ability to cover short-term liabilities within maturity. It is necessary to maintain an optimal ratio between liquidity and profitability because only in this way it is a possibility to record a positive effect of liquidity on profitability level of the company (Andrašić et al. 2018). For example, Deloof (2003) investigated a sample of 1,009 large Belgian companies for the period of 1992-1996. Using regression analyses his findings suggest that a better working capital management can increase the firm's profitability.

The attitude of the academic community regarding the relationship between liquidity and profitability is divided. There are researches proofing both, negative and positive relationships between liquidity and profitability. Mohanty and Mehrota (2018) investigated the trade-off between liquidity and profitability in twenty-eight small and medium-sized companies listed and traded at Bombay Stock Exchange for the period 2011-2016. Their findings of applied pooled regression model showed a negative relationship between liquidity (current ratio, quick ratio) and cash ratio and profitability (net profit margin, return on assets and return on capital employed). Eljelly (2004) has investigated the relationship between profitability and liquidity measured by current ratio and cash gap on a sample of Saudi Arabian joint stock

companies in the period from 1996 to 2000. The sample included companies from the agriculture, industrial and service sector. The author has found that the current ratio had been proven as the most important measure that affects profitability.

Also the study shows that there is a negative relation between liquidity indicators and profitability. Another study that has been undertaken by Alarussi and Gao (2021) on the sample of 100 companies listed to the Shanghai stock exchange showed that there is a strong negative relationship between liquidity and profitability.

Contributing to the findings that liquidity has a negative effect on the companies success Calcagnini et al. (2022) have shown that too much liquidity has a negative effect on profitability while by holding liquidity on higher levels the companies could miss investment opportunities and that leads later to lower profitability levels. The same dilemma of investing or holding liquid asset has been investigated by Kim, Mauer, and Sherman (1998). Baños-Caballero, García-Teruel, and Martínez-Solano (2012) have investigated the optimal level of working capital in order to achieve a positive effect on profitability. Their sample relayed on 1008 Spanish SMEs in various sectors in the period from 2002-2007. The results of this study have shown that there is a non-linear relationship between the considered variables. Furthermore they show that as the firms move away from the optimal levels of working capital that results with a decrease of their profitability.

Zorn et al. (2018) have analyzed thirteen ratios of liquidity, profitability, efficiency, stability, solvency and repayment capacity on the sample of 14,000 dairy farms from the Swiss Farm Accountancy Data Network. Most relevant for our research was the relationship between the liquidity and profitability ratios. They have shown a positive correlation between liquidity and profitability. Dsouza and Habibniya (2021) have had examined the impact of liquidity on the profitability of Nifty Pharma Index listed on the National Stock Exchange India. Using a multiple regression model on the sample of companies included in the index for the period of 2012 to 2016, they have shown a positive impact of the current ratio on the return on capital employed ratio, as well as a positive impact of the quick ratio on the return on total assets ratio. Nanda and Panda (2018) investigated several determinants affecting profitability like size, liquidity and depreciation of exchange rate on the sample of Indian manufacturing companies from 2000 to 2015. Among the tested hypotheses, they proved a positive effect of liquidity on the firms' profitability. Goddard et al. (2005) used a sample of 12508 firms from Belgium, France, Italy, Spain and the UK for the period from 1993 to 2001 and analysed the profitability determinants using a dynamic panel model. Their findings show that there is a positive relationship between liquidity and profitability. A study that analyses differences

between several branches (Czerwinska-Kayzer et al. 2021) has shown that a positive or negative relationship between liquidity and profitability depends on the branch in which the companies are operating.

A canonical variate analysis based on transformation by linear combination and singular value decomposition was implied in this study in order to identify the relationship between liquidity and profitability. The results have shown a negative relationship between liquidity measured by current ratio, quick ratio and profitability measured by shareholder equity ratio, return on assets and return on equity in the dairy cooperative and meat enterprises. On the other side a positive relationship between the same measured ratios was shown by feed companies.

Based on the review of the literature it is evident that there are two different standing points regarding the relationship between liquidity and profitability. Some authors have proven a negative and some have proven a positive relationship between the considered variables. Differences may acquire because sectors have their own specifics that affect this relationship. Mirović et al. (2022) have proven that in the Serbian tourism industry is this relationship negative. Our aim in this paper is to investigate the relationship between liquidity and profitability indicators in the agriculture sector in Serbia. More precisely to determine whether there is a positive or negative relationship between the considered most common liquidity and profitability ratios.

### **3. Data and Methodological Framework**

For the empirical research, we use data from the agriculture sector in the Republic of Serbia. The study includes 1128 companies operating in the agriculture sector for the period 2006-2019, where the structure is: 770 small companies, 271 medium-sized companies and 87 large companies. The data for the analyses was retrieved from the financial statements of the observed companies in the agriculture sector using Serbian Business Registers Agency. Based on previous empirical studies, the following objectives of the research are defined:

- to identify potential difference at liquidity level of the agriculture companies in the Republic of Serbia.
- to identify potential difference at profitability level of the agriculture companies in the Republic of Serbia.
- to identify potential trade-off between liquidity and profitability of agriculture companies in the Republic of Serbia.

- to identify various effect of liquidity on profitability of agriculture companies the Republic of Serbia.

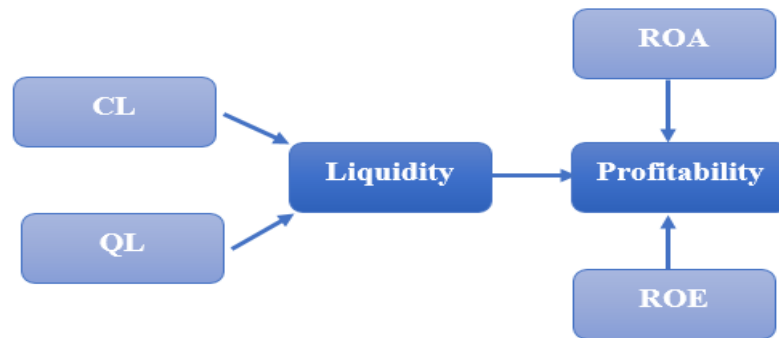
After defined the objectives of the research, hypotheses are developed as:

$H_1$ : There is a statistically significant difference in liquidity level between agriculture companies in the Republic of Serbia.

$H_2$ : There is a statistically significant difference in profitability level between agriculture companies in the Republic of Serbia.

$H_3$ : There is a trade-off between liquidity and profitability of agriculture companies in the Republic of Serbia.

$H_4$ : The inverse relationship between liquidity and profitability is most sensitive at large companies in the Republic of Serbia.



**Figure 1: Model construction**

Source: Author's illustration

where:

GL – general liquidity ratio, CL – current liquidity ratio, ROA – return on assets

ROE – return on equity.

To determine is there a significant difference in the level of indicator, the analysis implies four tests:

$$\text{Pillai's trace} = \text{trace} [H(H + E)^{-1}] = \sum_{i=1}^q \frac{\lambda_i}{1 + \lambda_i} \quad (1)$$

$$\text{Hotelling-Lawley's trace} = \text{trace} (A) = \text{trace} (HE^{-1}) = \sum_{i=1}^q \lambda_i \quad (2)$$

$$\text{Wilk's lambda} = A = \frac{|E|}{|H+E|} = \prod_{i=1}^q \frac{1}{1 + \lambda_i} \quad (3)$$

Roy's largest root =  $\max (\lambda_i)$

where:

$A$  – Wilks lambda used to identify significant difference between the means of groups on a combination of dependent variables

$\lambda_I$  – an eigenvalue

$E$  – within group sum squares and cross products matrix

$H$  – between group sum of squares and cross product matrix

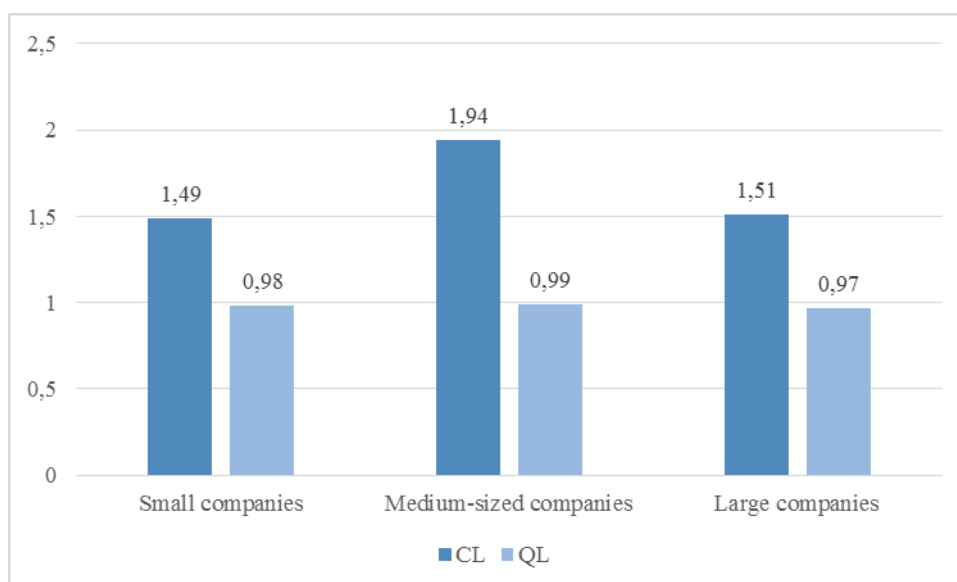
$\prod$  - product, it is an operator

*trace* – the sum of value along the diagonal of the matrix

These tests usually generate identical F statistics and probabilities whereby when they differ, Pillai's trace is most used because it is the most powerful and robust.

#### 4. Results and Discussion

This segment includes trend analysis of liquidity and profitability of agriculture companies in the Republic of Serbia for the period 2006-2019, as well as, empirical analysis that implies descriptive statistics, correlation matrix, multivariate analysis and structural equation models for profitability of selected companies in agriculture sector of the Republic of Serbia.

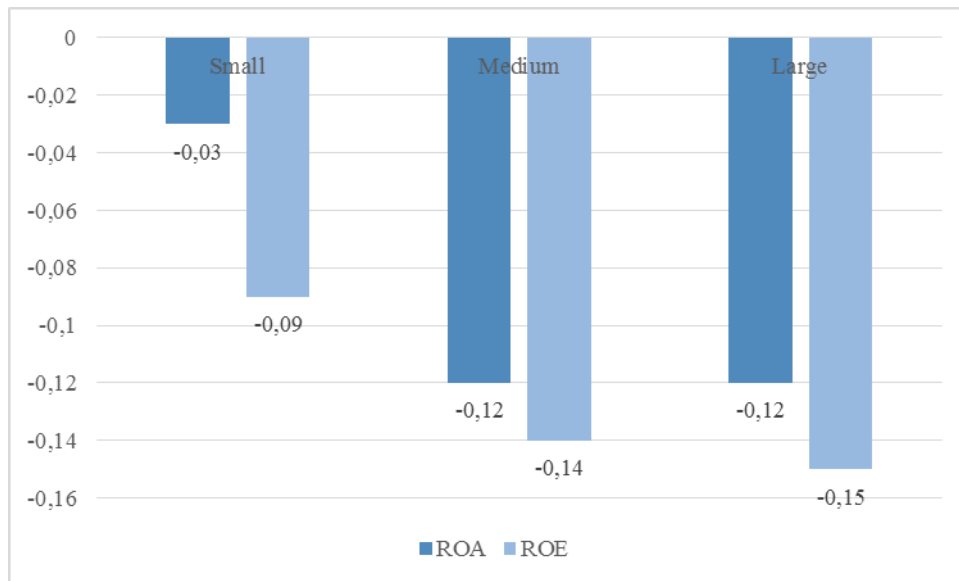


**Figure 2: Liquidity level of agriculture companies in Serbia**

Source: Authors' calculation

Analyzing liquidity of agriculture companies from 2006 to 2019, we can see that agriculture companies had problem with liquidity in the observed period. It can see that average values of selected indicators are less than 2 (current ratio) and 1 (quick ratio).

Likewise, we can conclude that medium-sized companies recorded the highest liquidity level at average level compared to small and large companies. The results showed that liquidity differences between medium-sized companies and small companies are 0.45 at GL and 0.01 at CL. Further, the liquidity differences among medium-sized companies and large companies are 0.44 at GL and 0.05 at CL for the observed period.



**Figure 3: Profitability level of agriculture companies in Serbia**  
 Source: Authors' calculation

After presenting liquidity level of agriculture companies, we introduce their profitability measured by return on assets (ROA) and return on equity (ROE) for the same period. Beside problem of liquidity, the agriculture companies recorded negative profitability at average level. Precisely, large companies had the highest negative trend of selected indicators, where ROA and ROE were -0.12% and -0.15%. at average level. There is a similar trend of profitability of the medium-sized and small companies that recorded negative mean values of ROA and ROE for the observed period. For example, medium-sized companies recorded negative value of ROA (-0.12%) and ROE (-0.14%). Finally, small companies had the smallest negative ROA (-0.03%) and ROE (-0.09%) compared to large and medium-sized companies in the agriculture sector.

**Table 1: Descriptive statistics**

Variable	GL	CL	ROA	ROE
Small companies				
Mean	1.49	0.98	-0.03	-0.09
Std. Dev.	1.29	1.01	0.29	3.87
Min.	0.01	0.01	-0.57	-85.53
Max.	10.41	6.84	0.41	64.75
Medium-sized companies				
Mean	1.94	0.99	-0.12	-0.14
Std. Dev.	1.81	0.91	0.08	0.62
Min.	0.05	0.01	-19.1	-4.22
Max.	10.36	6.82	16.42	0.35
Large companies				
Mean	1.24	0.62	-0.12	-0.15
Std. Dev.	0.78	0.46	0.07	0.62
Min.	0.3	0.04	-0.49	-4.22
Max.	4.05	2.11	0.17	0.35
Total companies				
Mean	1.51	0.97	-0.03	-0.15
Std. Dev.	1.32	0.99	0.29	3.87
Min.	0.01	0.01	-19.1	-85.53
Max.	10.41	6.84	16.42	64.75

Source: Authors' calculation

Table 1 shows mean value, standard deviation, minimum and maximum value of small, medium-sized and large companies of the agriculture sector in the Republic of Serbia. Based on 1128 observations, results manifested that medium-sized companies recorded the highest liquidity level measured by GL and CL. Namely, the mean values of GL and CL were 1.94 and 0.99 which is more than small and large companies for the observed period. It implies that these results determine the better liquidity position of medium-sized companies compared to small and large companies. When it comes to profitability, agriculture companies recorded negative mean profitability during the observed period, where mean values of ROA and ROE were -0.02% and -0.09%. Precisely, the profitability of large and medium-sized companies are almost identical, while small companies recorded the lowest ROA and ROE at average level.

**Table 2: Test difference at liquidity level**

GL	W = Wilks' lambda		L = Lawley-Hotelling trace		
	Statistic	F(df1)	F(df2)	F	Prob>F
Source					
W	0.996	1.0	1127.0	3.61	0.000
P	0.005	1.0	1127.0	3.61	0.000
L	0.005	1.0	1127.0	3.61	0.000
R	0.005	1.0	1127.0	3.61	0.000
Residual	1126				
Total	1127				
Number of	1128				

obs.					
CL	W = Wilks' lambda		L = Lawley-Hotelling trace		
	P = Pillai's trace		R = Roy's largest root		
Source	Statistic	F(df1)	F(df2)	F	Prob>F
W	0.998	1.0	1127.0	4.84	0.000
P	0.001	1.0	1127.0	4.84	0.000
L	0.001	1.0	1127.0	4.84	0.000
R	0.001	1.0	1127.0	4.84	0.000
Residual	1126				
Total	1127				
Number of obs.	1128				

Source: Authors' calculation

Based on results from Table 2 we can conclude there are significant differences in the liquidity level of small, medium-sized and large companies in agriculture sector in the Republic of Serbia from 2006-2019. The values of multivariate analysis of variance test are less than 0.05 which indicate the presence of a statistically significant difference in observed indicators of liquidity (GL and CL).

**Table 3: Test difference at profitability level**

ROA	W = Wilks' lambda		L = Lawley-Hotelling trace		
	P = Pillai's trace		R = Roy's largest root		
Source	Statistic	F(df1)	F(df2)	F	Prob>F
W	0.689	1.0	1127.0	2.82	0.000
P	0.311	1.0	1127.0	2.82	0.000
L	0.451	1.0	1127.0	2.82	0.000
R	0.451	1.0	1127.0	2.82	0.000
Residual	1126				
Total	1127				
Number of obs.	1128				
ROE	W = Wilks' lambda		L = Lawley-Hotelling trace		
	P = Pillai's trace		R = Roy's largest root		
Source	Statistic	F(df1)	F(df2)	F	Prob>F
W	0.631	1.0	1127.0	3.65	0.000
P	0.369	1.0	1127.0	3.65	0.000
L	0.584	1.0	1127.0	3.65	0.000
R	0.584	1.0	1127.0	3.65	0.000
Residual	1126				
Total	1127				
Number of obs.	1128				

Source: Authors' calculation

After identifying significant difference in profitability level of agriculture sector, the empirical findings confirmed the same situation at their liquidity. The values of multivariate analysis of variance test are less showed the presence of a statistically significant difference in

observed indicators of liquidity (GL and CL) between the small, medium-sized and large companies for the period 2006-2019.

**Table 4: Structural equating modeling**

Explanatory variable	GL	CL
ROA – dependent variable		
Small companies	-0.145*** (0.001)	-0.032** (0.021)
Medium-sized companies	-0.179** (0.028)	-0.041* (0.077)
Large companies	-0.259* (0.075)	-0.081* (0.093)
Total companies	-0.143*** (0.000)	-0.054** (0.027)
Prob > F	0.000	
R-squared	0.664	
Explanatory variable	GL	CL
ROE – dependent variable		
Small companies	-0.114*** (0.000)	-0.036** (0.011)
Medium-sized companies	-0.127*** (0.005)	-0.049*** (0.003)
Large companies	-0.139* (0.070)	-0.078** (0.035)
Total companies	-0.126*** (0.000)	-0.059** (0.013)
Prob > F	0.000	
R-squared	0.598	

Note: \*\*\* significance at level of 1%, \*\*significance at level of 5% and \* significance at 10%  
 Source: Authors' calculation

The results of structural equation modeling showed that liquidity has significant effect on profitability of agriculture companies for the observed period. Precisely, GL and CL negatively affect the profitability measured by ROA and ROE of selected companies. It implies that growth of these indicators by 1% decrease ROA for 0.143% and 0.054%, as well as, ROE for 0.126% and 0.059%. The reliability of these findings can be confirmed in high value of R-squared 0.664 at I model (ROA) and 0.598 at II model (ROE). Analyzing by company's type, there are several findings that determine the effect of liquidity on profitability:

- ↑ GL of 1% leads to ↓ ROA by 0.145% at small agriculture companies, ↓ ROA by 0.179% at medium-sized agriculture companies and ↓ ROA by 0.259% at large agriculture companies.

- ↑ CL of 1% leads to ↓ ROA by 0.032% at small agriculture companies, ↓ ROA by 0.081% at medium-sized agriculture companies and ↓ ROA by 0.05% at large agriculture companies.
- ↑ GL of 1% leads to ↓ ROE by 0.114% at small agriculture companies, ↓ ROE by 0.127% at medium-sized agriculture companies and ↓ ROE by 0.139% at large agriculture companies.
- ↑ CL of 1% leads to ↓ ROA by 0.036% at small agriculture companies, ↓ ROA by 0.049% at medium-sized agriculture companies and ↓ ROA by 0.078% at large agriculture companies.

## 5. Conclusion

The agriculture sector is one of the most important segment of economic structure of the Republic Serbia. The business of agriculture companies is an essential issue for policymakers, but also for the managers who manage these companies. Liquidity and profitability are two fundamental principles in the business of each entity. Accordingly, adequate management and careful balancing between these two components implies precondition for improved business performance. The paper has estimated the relationship between liquidity and profitability of agriculture companies in the Republic of Serbia for the period 2006-2019. Empirical study has identified liquidity level measured by general liquidity ratio (GL) and current liquidity ration (CL), as well as, profitability level measured by return on assets (ROA) and return on equity (ROE) for the selected companies. The analysis reflected that agriculture companies had average values of liquidity below reference values, while their mean profitability was negative. Medium-sized companies recorded the highest liquidity values at average values compared to small and large companies, while small companies reported the lowest values of mean profitability during the observed period. Furthermore, the profitability of medium-sized and large companies are practically equivalent and their values of ROA and ROE were - 0.12% and -0.15%. The values of multivariate analysis of variance test indicates the presence of a statistically significant difference in liquidity and profitability level which refers that hypotheses H1 and H2 can be accepted. Empirical findings showed that liquidity significantly affects the profitability of the agriculture companies, where higher liquidity level implies lower profitability level for the observed period. These results confirmed trade-off between these variables which implies that hypothesis H3 can be accepted.

Finally, results of regression model showed that trade-off between liquidity and profitability is the most reflected at large companies. It implies that hypothesis H4 can be accepted due the change of liquidity leads to greater change of ROA and ROE of these companies.

The limitations of this study are that it considers one specific sector, the agriculture sector of Serbia. The recommendations for further research are to involve more sectors for the analysis and to extend the sample on more countries. In such case there would be more industry-specific and also country-specific determinants involved in the study.

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