
Working Capital Management vs Profitability in Agricultural Holdings (in the Context of Integration for “Old” and “New” EU Members)

Submitted 02/02/21, 1st revision 26/02/21, 2nd revision 07/03/21, accepted 30/03/21

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Abstract:

Purpose: The aim of this article is the analysis of the relation among the net working capital and the profitability (ROA, ROS) of agricultural holdings in the European Union (EU) taking into consideration the difference between “old” and “new” EU members.

Approach/Methodology: The source of data on the production and economic situation of approximately 8400 agricultural holdings is Farm Accountancy Data Network (FADN). Analysed objects are divided into four classes considering the length of the net working capital (NWC) cycle (less than a year, more than a year) and of the date of accession to the European Union. The centres of gravity in each class are estimated with the use of the Gretl program. The relationship between the NWC to assets and profitability is also estimated.

Findings: A statistically significant and positive relationship between these categories is revealed in all four analysed classes. Therefore, the relation of the NWC to assets affects the profitability of agricultural holding. The factor differentiating the strength of this impact is the length of the NWC cycle. It allows formulating concluding remark that most holdings maintain it up to 1 year, therefore the situation of agricultural holdings in this respect is safe.

Practical Implications: The study examines the current situation of agricultural holdings in the EU. The research may serve as a unique source of information on the financial situation of European agricultural holdings. Achieved results may be useful to agriculture managers, politicians and managers of companies cooperating with agricultural holdings.

Originality/Value: The capital management framework is similar in both groups of countries – “old” 15 EU countries and “new” 13 EU countries. It appears that agricultural holdings of working capital period up to achieve more favourable results concerning the NWC 1 year, production factors and profitability. The longer the cycle, the less favourable the conditions. However, the working capital practices appear to be relatively stable over the analysed period.

Keywords: Agricultural holding, assets, European integration, FADN, net working capital, profitability.

JEL: C21, F15, G50, Q14.

Paper Type: Research article.

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1. Introduction

Proper working capital management is one among crucial financial problems and tasks (Lind *et al.*, 2012; Motlíček and Polák, 2015). It is constrained by time-limited decision-making process and constant profit pressure (Bei and Wijewardana, 2012). Working capital position of entity is closely related to its liquidity. *Ceteris paribus*, a higher working capital position implies a more liquid position (Shapiro, 1990). This is because the firm's current assets are the easiest to convert into cash, making them the main item to meet liabilities of short maturity (Kontuš and Mihanović, 2019). If an economic unit has a permanent need for working capital, it must search for long-term sources of refinancing. On the contrary, seasonal demand is satisfied within short-term financial projects such as trade commitments, loans, etc., (Bodie and Merton, 2013).

These issues are particularly important in agriculture. The demand for working capital is increasingly important (Browstone, 1953). In agriculture possibilities to create equity capital are limited. According to FAO (2008) savings may be accumulated over more or less extensive areas and they may be channelled into investments which are more or less diversified both in terms of geography and in terms of asset categories. Micro finance institutions and branchless banks have been among the fastest to development in this domain. However, micro financial institutions are highly risky reflecting the high-risk nature of farming activities and farm assets. The longer-term development of financial institutions seems to be toward larger and more densely networked enterprises, toward ones which are broadly diversified both in terms of sources and uses of financing. Endemic high risk/return factors and increased competition seems to be driving rural finance in this direction.

The economic situation of agricultural holdings is determined by high level of stocks, spatial concentration, and highly seasonal production. This situation is compounded by the need to maintain high stocks of agricultural holdings, because a high level of stocks may protect against the risk of changing of prices. However, the alternative costs resulting from excessive non-interest-bearing cash holdings also deteriorate the economic situation of holding. The profitability is lower. The managers of agricultural holdings prefer the conservative approach to net working capital management. They are focused on maintaining surplus of the working capital. Therefore, the issue of determining the proper level of net working capital in agricultural holdings in relation with their profitability seems to be one of the most important issues.

Taking this into consideration the purpose of the article is to analyse the net working capital in relation to agricultural holding, length of cycle in days, and its share in assets within the framework of profitability of the EU agricultural holdings, reporting to FADN database in 2004-2018.

2. Literature Review

2.1 Working Capital Management

Working capital management plays an imperative role in corporate financial sustainability as it can directly affect firm liquidity, profitability, and solvency (Wang *et al.*, 2020). There is little evidence that excess cash has a large, short-run impact on capital expenditures, acquisition spending, and pay-outs to shareholders. A relatively high proportion of small firms claimed to use quantitative capital budgeting and working capital techniques and to review various aspects of their companies' working capital.

In addition, the firms which claimed to use the more sophisticated discounted cash flow capital budgeting techniques, or which had been active in terms of reducing stock levels or the debtors' credit period, on average tended to be more active in respect of working capital management practices (Peel and Wilson, 1996). In the case of agricultural holdings, the approach may be different, because in many countries there is no obligation to keep accounting.

The main reason that firms experience large changes in excess cash is the occurrence of operating losses (Opler *et al.*, 1999). The optimal management of the components of working capital is considered to have an influence on liquidity (Smith, 1980; Nuhiu and Dërmaku, 2017), performance (Baños-Caballero *et al.*, 2016; Vural *et al.*, 2012; Zariyawati *et al.*, 2009), risk (Al-Shubiri, 2011; Carpenter and Johnson, 1983; Van Horne, 2007), solvency (Huda, 2015; De Souza Guimarães and Nossa, 2010) and value of a firm (Sabri, 2012; Sianipar and Prijadi 2019). This seems particularly important in the agricultural sector, where over-liquidity of agricultural holdings and operational losses in production is observed.

Many contemporary studies confirm impact of working capital on profitability of firm (Akoto *et al.*, 2013; Bhunia and Das, 2012; Charitou *et al.*, 2010; Korent and Orsag, 2018; Lazaridis and Tryfonidis, 2006; Makori and Jagongo, 2013; Napompech, 2012; Nobanee, 2009; Raheman and Nasr, 2007; Rezaei and Pourali, 2015). Managing a firm's working capital (current assets and liabilities) is highly relevant to the success. The analysis provides evidence of positive effects of accounts receivable management and inventory management on profitability (Knauer and Wöhrmann, 2013).

Many studies suggest that an aggressive working capital strategy is more suitable to enhance firm profitability (Afaza and Nazir, 2009; Deloof, 2003; Nwude, 2016; Pais and Gama, 2015; Rasyid *et al.*, 2018). Therefore, the question is how working capital managing affects agricultural holding profitability, so it may be assumed that:

Hypothesis 1: The working capital cycle has a positive impact on the profitability of agricultural holding.

2.2 Aspect of EU Integration in Agriculture

Undoubtedly, the creation of the European Union and its subsequent enlargements represent one of the deeper examples of voluntary institutional change involving a large number of countries during the post-war period. Policy makers in EU-15 countries expressed expectations of significant growth effects from enlargement, assuming that integration and trade liberalization is about to importantly affect investment and accumulation. It was expected, therefore, that the investment channel was about to shape the overall effects of enlargement on “old” member countries (Kohler, 2014). The importance of such institutional integration has recently been brought to the centre of political debates in relation to Brexit, the first example of a country exiting the EU (Campos *et al.*, 2019). The literature on the growth effects of European integration remains inconclusive. The main problem is heterogeneity of country experiences before and after their accession to the EU and some methodological difficulties (Crafts, 2015; Eichengreen, 2007).

Previously, the important and huge challenge was the process of the EU expansion to include the Central Eastern European Countries (Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Latvia, Estonia, and Lithuania), together with Cyprus and Malta to join in 2004 (Baimbridge *et al.*, 2004). The agriculture of these eight countries has been the big loser of the transformation process. Loss of markets, overly hasty liberalization, the collapse of domestic demand due to declining real incomes in the first years of the changes and, to a large extent, ideology-driven and mistaken agricultural policies can be listed as the major factors of an unprecedented crisis (Tang (ed.), 2000).

Common Agricultural Policy (CAP) is one of the pillars of the European Union policy. In 2018, CAP was responsible for 38% of the EU budget. The structure of the CAP has fundamentally changed since its beginnings, with a large part of former price support spending now going towards fixed, per-hectare payments to EU farmers (Berend, 2020). It is worth recalling that the attempt to keep up agricultural incomes by boosting price levels has led to a large overproduction. Surpluses could only be disposed of at very considerable cost. These created enormous welfare loss in the EU. The losers were consumers and taxpayers (Molle, 2006).

It should be emphasized that as agricultural problems are in many respects not comparable with problems in other sectors, and as the solutions to agricultural problems generally reflect considerations that have little to do with a free market economy. The common agricultural policy has frequently been analysed as isolated from other policies, with Weinstock (1967) as notable exception.

According to the CAP framework, support for agriculture, including for activities in the food and non-food sector and in forestry, objectives to be achieved are (Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013, article 4):

- a) fostering the competitiveness of agriculture;
- b) ensuring the sustainable management of natural resources, and climate action;
- c) achieving a balanced territorial development of rural economies and communities including the creation and maintenance of employment.

It has been considered that CAP is the most common EU policy because it is a complex policy that applies to all farmers. It also leaves little room for state or regional policy instruments (Wieliczko, 2019). During the integration progresses, differences are about to disappear, as:

Hypothesis 2: The agricultural holdings from “new” EU countries achieve the same results of working capital management and profitability such as holdings from “old” EU countries.

3. Source Materials and Methodological Aspects

The study is based on Farm Accountancy Data Network (FADN). FADN data provide a detailed presentation and analysis of the main factors affecting the economic, financial and production situation of the agricultural holdings in the European Union (FADN, 2021). It allows obtaining the information on about 8400 production and economic types in the EU in the years 2004-2018 (Table 1).

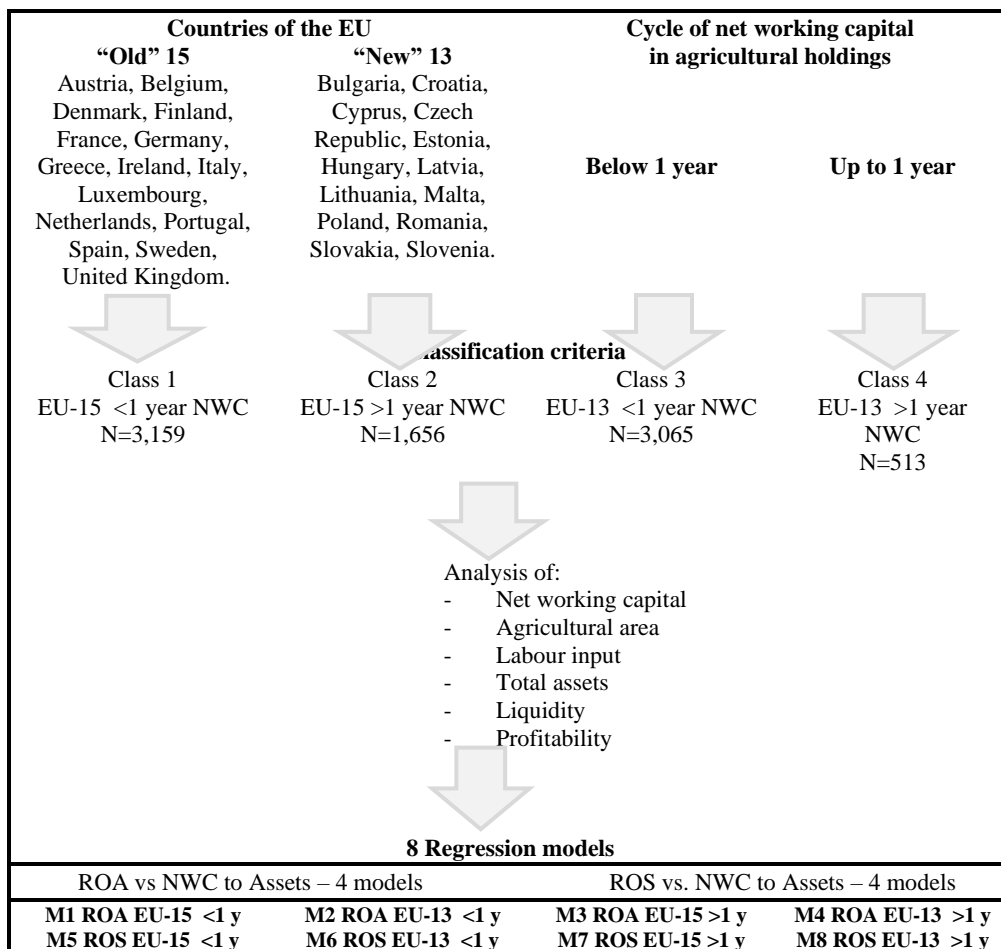
These 8400 observations have a character of panel data. The data contain aggregated average units. They represent the types in the corresponding stratificated sample (FADN, 2021). Information from FADN is adequate data relating to accountancy. This makes it possible to draw comparisons in all European Union.

Table 1. The characteristics of sample analysed from FADN in 2004-2018

Year	Number of observations				Year	Number of observations			
	EU-15		EU-13			EU-15		EU-13	
	<1 year of NWC cycle	>1 year of NWC cycle	<1 year of NWC cycle	>1 year of NWC cycle		<1 year of NWC cycle	>1 year of NWC cycle	<1 year of NWC cycle	>1 year of NWC cycle
2004	246	79	143	6	2013	210	112	223	54
2005	229	99	153	11	2014	201	122	218	55
2006	228	100	158	15	2015	191	117	221	42
2007	230	98	206	17	2016	189	121	226	50
2008	234	91	214	24	2017	193	120	229	41
2009	216	102	209	34	2018	186	125	225	46
2010	204	127	212	39	Σ	3159	1656	3065	513
2011	197	125	217	38		4815		3578	
2012	205	117	211	41		8393			

Source: Own calculations based on FADN (2021).

Figure 1. Research procedure



Source: Own work.

The following research procedure is used (Figure 1):

- Stage I: the analyzed sample of 8393 agricultural holdings is divided into two classes according to their year of accession to the European Union:
 - EU-15 – “old” members – 4815 agricultural holdings,
 - EU-13 – “new” members – 3578 holdings.

- Stage II: the analyzed 2 samples from EU-15 and EU-13 of 8,393 agricultural holdings is firstly divided into two classes according to the length of the NWCC period:
 - NWCC = 0-365 days,
 - NWCC over 365 days,
 allowing the division into:

- Class 1: <1 year of NWC cycle from EU-15 – 3,159 agricultural holdings,
 - Class 2: >1 year of NWC cycle from EU-15 – 1,656 agricultural holdings,
 - Class 3: <1 year of NWC cycle from EU-13 – 3,065 agricultural holdings,
 - Class 4: >1 year of NWC cycle from EU-15 – 513 agricultural holdings.
- Stage III: the centers of gravity in each class are presented in reference to the most important production, economic and financial information on agricultural holdings,
 - Stage IV: the relationship between the ratio of NWC to assets (dependent variable) and the ROA and ROS (independent variables) is estimated,
 - Stage V: verification of hypotheses, discussion, and conclusion.

The choice of the appropriate ratio of NWC depends on the context of the research (Brigham and Houston, 2005). All ratios are included in Table 2. NWC is represented by variables calculated, on 1 holding (NWC), in days (NWCC) and to assets (NWCtA). Profitability is expressed and return on assets (ROA) and return on sales (ROS).

Table 2. Measurement of variables and abbreviation

Variable	Measurement	Abbreviation
Net Working Capital	Total Assets – Current Liabilities [in EUR]	NWC
Net Working Capital Cycle	$NWC * 365 / \text{Income from Sales of the Family Farm}$ [in days]	NWCC
Net Working Capital to Assets	$NWC / \text{Total Assets}$	NWCtA
Return on Assets	$\text{Family Farm Income} / \text{Total Assets}$	ROA
Return on Sales	$\text{Family Farm Income} / \text{Total Output of Farm}$	ROS
Utilised agricultural area	Total Utilized Area [in hectares]	UA
Labour input	Labour Input [in Annual Work Unit]	LI
Total Assets	Fixed Assets + Current Assets [in EUR]	TA
Corrected Quick Liquidity	$(\text{Current Assets} - \text{Stocks} - \text{Non-breeding livestock}) / \text{Short-term Liabilities}$	cQL

Source: Own work.

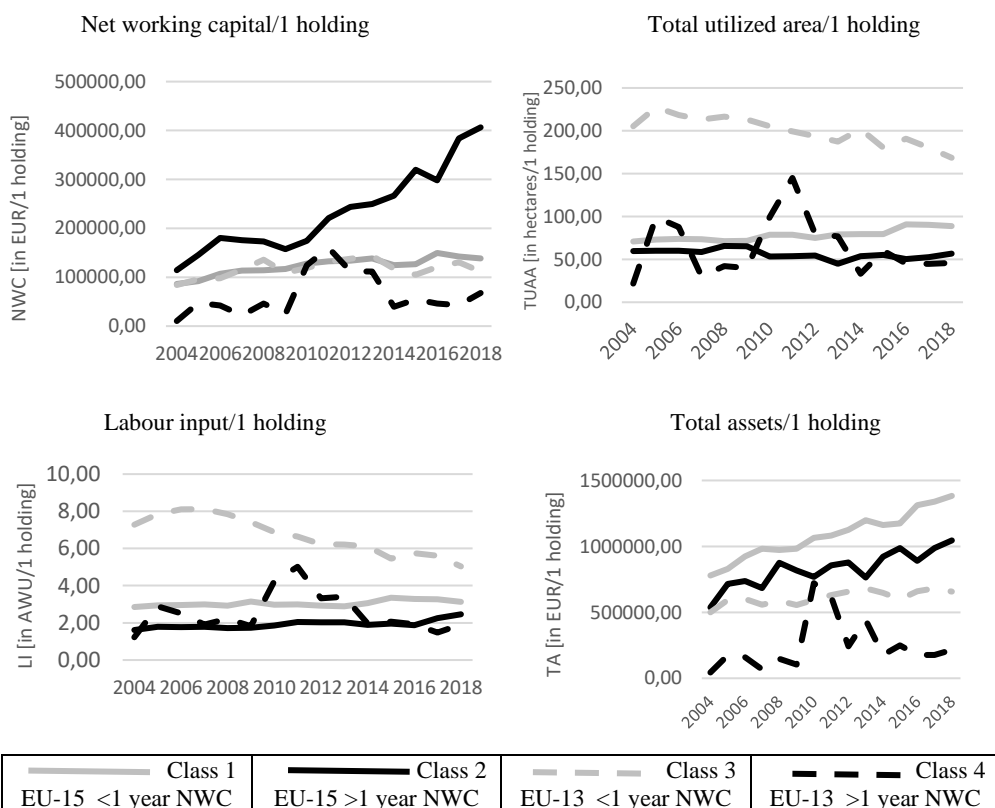
To show the conditions for agricultural production, the main production factors are presented, such as, total utilised area (UA), labour input (LI) and capital of holding (TA). The study of literature reveals a close relationship between a level of NWC and liquidity, so this one ratio is also presented as corrected quick liquidity (cQL).

This is because the over liquidity of agricultural holdings is a fact. The value of liquidity ratio is high, and the same situation occurs in case of quick liquidity ratio. Here, the value of quick liquidity was corrected by value of non-breeding livestock, and this value is considerable.

4. Results

Figure 2 presents the average values of the net working capital and selected factors of production in the four farm classes according to the length of the NWCC period in 2004-2018. The EU-15 agricultural holdings of NWCC period up to 1 year has NWC average equaling 120 thousand EUR (1 year, Class 1). This value increases from 86 thousand EUR to almost 140 thousand EUR in the analysed period. Agricultural holdings from this group have the average area approx. 80 ha and labour approx. 3 AWU. In this Class 1, the value of total assets increases from 780 thousand EUR to almost 1.4 million EUR. The average NWCC period equals 167 days. The shortest result was equal to 1 day, and it was made by Fine holding (FADN, 2021). Agricultural holdings in the Class 2 (holdings of NWCC period longer than 1 year) are different. Their net working capital is the highest, ranging between 114 thousand EUR and 406 thousand EUR (Figure 2).

Figure 2. Average NWC and production factors in the four classes of agricultural holdings (according to NWCC and membership in the EU) in 2004-2018



Source: Own compilation based on FADN (2021).

The averages values of production factors in the Class 2 are lower than in the Class 1. The average area equals approx. 56 ha, labour – about 2 AWU and assets – 843

thousand EUR. AWU range between 537 thousand EUR to 1.045 million EUR, remaining c.a., 30% lower than in the Class 1 (Figure 2). In the Class 2 the average NWCC period was equal to 682 days. The longest equals to 9,256 days in Italian holding (FADN, 2021).

The agricultural holdings in Class 3 (from EU-13 with NWCC period up to 1 year) have a similar level of NWC than holdings in Class 1. Average equals approximately 126 thousand EUR, increasing from 118 thousand EUR in 2004 to almost 112 thousand EUR in 2018. On the other hand, the supply of factors of production is different than in Class 1. The average area is the highest among all four Classes. It equals almost 190 ha, decreasing from 203 to 167 hectare per 1 holding during the period considered. The same situation occurs in the case of labour input. The average labour input is the highest among all distinguished Classes. It equals almost 5,8 AWU, falling from 6.2 to 5 AWU between 2004-2018. This is an evidence of over-employment in agriculture (i.e., the concealment of unemployment) in the Central and Eastern European Countries. In Class 3, the average equipment of assets is c.a. 600 thousand EUR (Figure 2) and the average NWCC period equals 196 days. Holdings from EU-13 and with NWCC period longer than 1 year (Class 4) show the most difficult situation. They have an average area of about 64 hectares, a labour input of about 2.6 AWU, 280 thousand EUR of assets and average NWC equalling to only 71.5 thousand EUR (Figure 2). In Class 4, the average NWCC period equals 504 days.

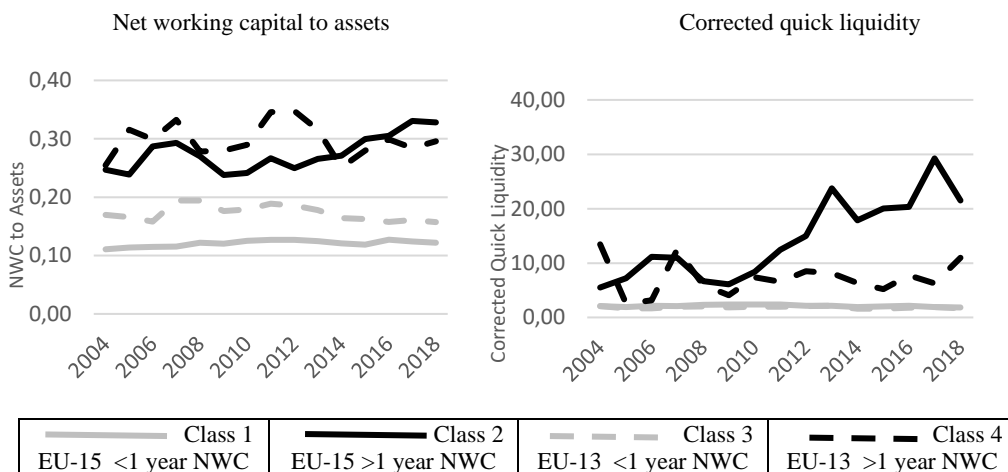
Quick liquidity ratio in holdings in Class 1 does not exceed 2.4, and the ratio of the NWC to assets equals on average 0.12 (Figure 3). A similar efficiency is demonstrated by holdings from Class 3. Quick liquidity does not exceed 2.1 with the average relation of NWC to assets equalling 0.17. In contrast, the results are higher – therefore less stable – in Classes 2 and 4. Holdings in Class 2 achieve average quick liquidity ratio of 14, with the average ratio of NWC to assets equalling 0.28. The quick liquidity ratio ranges from 5.5 in 2004 to 21.5 in 2018 and almost 30 in 2017 (FADN, 2021). At the same time, holdings in Class 4 are also excessively liquid (quick liquidity ratio ranging from 3.5 to even 11.0, 6.9 on average) and their coverage of assets with net working capital was averaged equaled to 0.3 (Figure 3). It can be concluded that the longer the NWCC period is, the higher the over-liquidity is achieved, and the geographical location is less relevant.

Over the period considered, the average ROA ratio in the analysed Classes is respectively, 0.08, 0.06, 0.11, and 0.09. The variation of ROA ranges from 65% to 82%. In 2006, Class 4 had a higher ROA occurred, but the overall coefficient of variation of this ratio was equalled to 75%. The average ROS equals, 0.29 in Class 1, 0.38 in Class 2, 0.32 in Class 3, and 0.40 in Class 4. In Classes 1-3 this ratio remains within the range of 55-67%, in Class 4, despite the 2006, it does not exceed 76% (Figure 4).

To analyze the relation between the NWC to assets ratio and profitability, regression models without intercept are estimated (Table 3). The program Gretl is used. Different

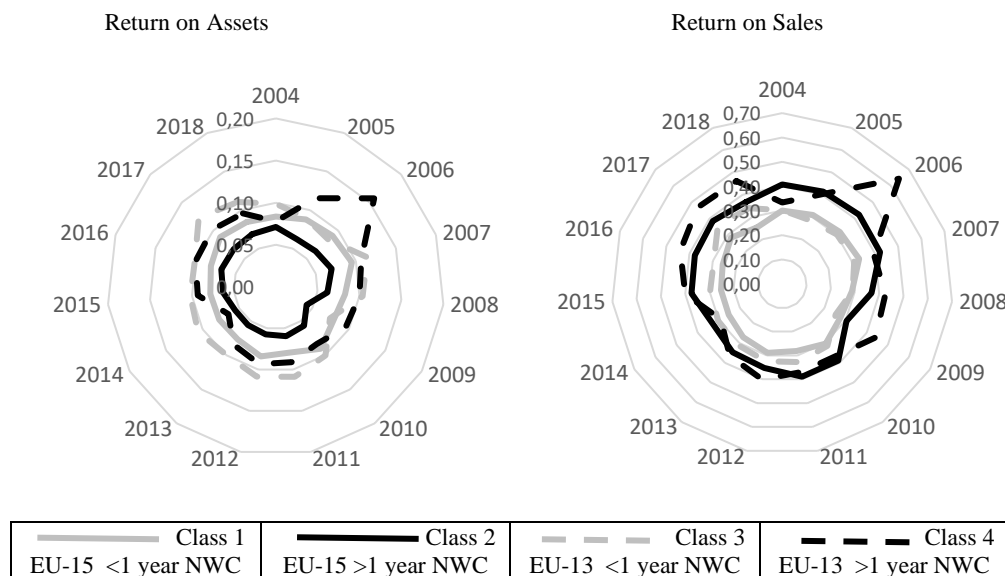
results are obtained in each class, confirming the Hypothesis 1 along with earlier remarks (Figures 2-4). Therefore, the working capital cycle has a positive impact on the profitability of agricultural holding.

Figure 3. Average NWCtA and corrected quick liquidity in four classes of agricultural holdings (according to NWCC and membership in the EU) in 2004-2018



Source: Own compilation based on FADN (2021).

Figure 4. Average ROA and ROS in four classes of agricultural holdings (according to NWCC and membership in the EU) in 2004-2018



Source: Own compilation based on FADN (2021).

Table 3. Regression models for net working capital to assets and profitability

Profitability	Classes				
	1 (N = 3,159)	2 (N = 1,656)	3 (N = 3,065)	4 (N = 513)	Total (N = 8,393)
Models with independent variable ROA					
Coefficient	0.9709	3.8411	1.2009	2.3583	1.4133
Standard Error	0.0157	0.0437	0.0160	0.0658	0.0143
Student t test	61.97	87.81	74.96	35.81	99.16
Level of Significance	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
Non-centred R2	0.5487	0.8234	0.6471	0.7147	0.5396
F test	3,840.04	7,710.26	5,619.11	1,282.57	9,833.22
p value for F test	0.0000	0.0000	0.0000	0.0000	0.0000
Models with independent variable ROS					
Coefficient	0.2791	0.6106	0.4073	0.4878	0.4273
Standard Error	0.0054	0.0096	0.0066	0.0181	0.0042
Student t test	51.40	63.53	61.46	26.99	102.60
Level of Significance	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***
non-centred R2	0.4555	0.7094	0.5521	0.5872	0.5564
F test	2,632.33	4,036.65	3,777.00	728.43	10,524.02
p value for F test	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Own calculations based on FADN (2021).

All models estimated confirm statistically significant linear relation between NWC to assets ratio, ROA, and ROS. The impact of ROA and ROS intensifies as the NWCC period increases, but the difference among EU-15 and EU-13 countries in this respect is not large (Table 3). This confirms Hypothesis 2. The agricultural holdings from “new” EU countries achieved the same results of working capital management and profitability such as holdings from “old” EU countries.

5. Discussion

The field of corporate finance has conventionally focused on the financial decisions in long term. These problems are investment decisions, capital structure, dividend payment decisions, and analysis of company’s valuation. Since short-term assets and liabilities (working capital) are important part of their financial statements, they should be analysed carefully (Shaikh *et al.*, 2018). This holds true also in the agricultural sector.

The approach to measurement of the working capital and profitability in agriculture is still evolving. The classic bookkeeping ratios and measures based on historical data are still commonly used, but they are designed for companies, not for agricultural holdings of high heterogeneity. The accounting data in principle are quite irrelevant to market valuation of farms, and indicators calculated on their basis express many weaknesses. Therefore, main advantage of approach presented in this paper is the simple construction of indicators and easy interpretation. The importance of this approach stems also from the fact that the keeping the accounts in agricultural holdings is still not obligatory in all European countries.

6. Conclusions

The conducted research reveals that there are differences among “old” EU-13 countries and “new” EU-15 countries referring to working capital management and profitability. Moreover, it proved also that the capital management frameworks are similar in both groups. It appears that agricultural holdings of working capital period up to achieve more favourable results concerning the NWC 1 year, production factors and profitability. The longer the cycle, the less favourable the conditions. However, the working capital practices appear to be relatively stable over the analysed period. This research confirms that there is a positive relationship between ratio of NWC to assets and profitability in agricultural holdings in the EU. The factor influencing this impact is the length of the NWCC period. Its increase may lead to the excessive liquidity of holding. Situation in this respect is safe, however. Most agricultural holdings maintains it within 1 year period. The most efficient are farms with an area of c.a. 80 hectares, a labour input of c.a. 3 AWU and assets above 1 million euro.

This study proves a positive relation between net working capital and profitability of agricultural holdings as well as provides suggestion how to improve the financial situation of holdings. The results and research in this study may be useful to agriculture managers, politicians and managers of companies cooperating with agricultural holdings. It may serve as a guidance in assessing and improving working capital management. It may be assumed that the risk resulting from maintaining high net working capital by farmers is to some extent compensated by an increasing profitability. Confirming this assumption requires further studies on agricultural holdings with higher debt levels and lower liquidity. This allows for a broader understanding of farm decision-making processes. It is well-known that farmers prefer accumulation of equity and avoiding indebtedness. The over-liquidity is an obvious consequence of this approach. As a result, they prefer a shorter liability cycle than the operational cycle.

It should be noted that the study is based on average representative data from the FADN database, as detailed information and agriculture accountancy is still not obligatory in the EU. Empirical research based on surveys of farms, allowing for detailed accountancy data analysis, would further extend the research.

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