

DETERMINANTS OF PROFITABILITY: EVIDENCE FROM RUSSIAN AGRICULTURAL FIRMS

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Abstract: *The analysis of profitability and the factors that can influence it is of vital importance in business decision making. Thus, the purpose of this study is to examine the relationship between profitability and working capital, leverage, and net trade credit. The study is developed based on a sample of Russian firms, which operate in the agricultural sector, for the period from 2013 to 2017. The result denoted that firms were both, profitable and liquid ones, and bought more than sold on credit. Among other results, the study showed that more profitable firms operated with higher liquidity. Onward, the study suggested that firms should decrease the financial leverage ratio in order to increase profitability.*

Keywords: *profitability, liquidity, determinants.*

1. Introduction

Managers and many other decision makers such as: shareholders, investors, creditors, etc. are interested in having their business generating and operating with profitability within a steady and continuous growth. Business decision makers would like to know if there are factors or determinants that can explain profitability. Achieving this objective is not easy due to interactions of many factors which can influence profitability, as profitability can affect them. Therefore, business decision making is not easy and it is not based on accounting information that is derived only from financial statements. For example, from balance sheets or income statements, but relies on other data sources, and even intertwines information inside and outside the firm.

The profitability analysis, in addition to traditional measurements in form of financial ratios and techniques (vertical, horizontal, trends, etc.), requires a deeper extension by investigating it with other categories such as: liquidity, solvency, debt financing, etc. Here comes the thorny question: *how much profitability and liquidity should a firm have?* Some researchers have tried to answer this question. For example, Bolek and Wolski (2012, from Gajdka, J., Walińska, E., 1998) illustrate the relationship between

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liquidity and profitability, and hence three main related strategies can be presented as: aggressive strategy, neutral strategy and conservative strategy.

The relationship between liquidity and profitability is complex due to their interference with each other. However, let us try to simplify theoretically this relationship by further explanations. Let's say hypothetically that the firm has to deal with mainly two situations:

- (a) To invest all amount of liquidity – getting a maximal *profit*; and
- (b) Not invest at all – holding a maximal *liquidity*.

But, in practice perhaps firms would rely somewhere between these two blocks rather on one of them. Firms are investing liquidity with the purpose to maximize investment's returns (profitability) and at the same time they carry on to keep a sufficient level of liquidity. Hence, the line slope (*Alfa*, α) between these two determinants typically could capture values such as:

- equal one ($\alpha = 1$): *neutral approach-strategy*,
- higher than one ($\alpha > 1$): *aggressive approach-strategy* and
- lower than one ($\alpha < 1$): *conservative approach-strategy*.

Furthermore, the *trade-off* should converge to an *optimal* combination between profitability and liquidity. Of course, the firm will be satisfied to have maximum profitability from investments on the one hand and on the other hand to have sufficient liquidity which is necessary for a regular run (i.e. paying on time invoices or liabilities in general).

However, achieving this situation is not easy in practice because both profitability and liquidity are dynamic categories and they change over time. The change of these two categories (versus targets) comes from several factors, depending on the circumstances inside and especially outside the business. Thus, the firm needs to manage both by giving each of them more or less importance.

The present study claims to follow this pattern, thus providing empirical evidence with all possible limitations in terms of explaining profitability and factors in the analysis.

This study is an extension of previous works of Deari and Lakshina (2019) and tries to contribute not only in the theoretical and pedagogical-methodological aspect, but also in the managerial decision making.

The rest of this paper is organized in the following sections: Literature review, Data and methodology, Empirical results and discussion, Conclusions, and finally, References.

2. Literature Review

Profitability has attracted the interest of several authors which have applied various methodologies to analyse different business entities. For example, the relationship between profitability and liquidity, and many other factors is examined by several authors. Even authors have examined this relationship not just from the general measurement, for example, using short-term liquidity as it is working capital (for example, see: Knauer and Wöhrmann (2013), Juan García-Teruel and Martínez-Solano (2007), Pestonji and Wichitsathian (2019)), but have extended the analysis further by testing some working capital derivatives, such as: net trade cycle, trade credit, etc. Thus,

for instance, Madaleno, Bărbuță-Mișu and Deari (2019) in their study by analysing eight European countries among other findings revealed that net trade credit to sales is positively influenced by the profit margin.

Alarussi and Alhaderi (2018), analysing a sample of 120 firms listed on Bursa Malaysia found, among others, a strong positive relationship between working capital and profitability.

Afrifa and Padachi (2016) revealed that there is an optimal working capital level at which firms' profitability is maximized.

Deloof (2003) found that managers can increase firm profitability by reducing the number of days accounts receivable and inventories.

Also, Yazdanfar and Öhman (2014) in their study found that cash conversion cycle significantly affects profitability and suggested at the same time that firm profitability could be increased by improving working capital management.

Moreover, it is motivating to investigate the relationship between profitability and firm financing. Profitability can be affected and it can affect the way how the business is financed. The historical debate on how to finance the firm is still active and there is no final answer to *how much debt the firm must use?*

Thus, in this context it is very important to know how much debt the firm should use to increase profitability and at the same time to be liquid. On the other hand, debt ratios can be affected by the level of profitability. Researchers have tried to solve the issue by examining different historical data and testing different variables. For example, Abel (2018) examined optimal debt and profitability in the trade-off theory by developing a dynamic model of leverage and revealed that increases in current or future profitability reduce the optimal leverage ratio.

Muscettola and Naccarato (2016) examined the causal relationship between debt and profitability for the case of Italy.

Yazdanfar and Öhman (2015) analysed the relationship between debt level and performance among 15,897 Swedish SMEs and revealed that debt ratios, in terms of trade credit, negatively affect firm performance in terms of profitability.

However, the capital structure itself and the relationship between profitability may be affected by the macroeconomic environment. For example, Danso and Adomako (2014) found that capital structures of firms in South Africa were affected of 2007/08 financial crisis.

Goddard, Tavakoli and Wilson (2005) among others discovered that the relationship between a company's gearing and its profitability is negative, but companies with higher liquidity tend to be more profitable.

In their study, Asimakopoulos, Samitas and Papadogonas (2009) examined the determinants of profitability, the case of Greek non-financial firms listed in the Athens Stock Exchange for the period 1995-2003 and among findings revealed that company's profitability was positively affected by size, sales growth and investment and negatively by leverage and current assets.

Stierwald (2010) examined a panel of large Australian firms for the period 1995 to 2005 and revealed that company's profitability is mainly determined by company-level characteristics, and that sector effects are relevant, but to a much smaller extent.

3. Data and Methodology

The study is developed based on a sample of Russian firms, which operate in the agricultural sector, for the period from 2013 to 2017. Totally 13,871 observations are examined and the selected variables are checked for non-logical accounting values (for example, debtors or creditors can be higher than total assets).

Selected firms on average have 808,000,000 rubles debtors and 694,000,000 rubles creditors. The average ratio of debtors to total current assets is 42%, whereas of creditors to total current liabilities is 77%. On the other hand, on average, firms have 59% ratio of total current assets to total assets and 36% total current liabilities to total assets.

The average financial debt financing is 2,360,000,000 rubles. Firms have generated sales on average 2,910,000,000 rubles, whereas net income is 410,000,000 rubles. Thus, on average, firms were profitable and operated with positive working capital.

In addition, the observed variables and related calculations are given as follows (Table 1). Profitability is calculated as net income (loss) divided by sales. This ratio denotes that how many net income rubles the firm is able to generate for each sales ruble.

Working capital is calculated with the traditional formula, as the difference between total current assets and total current liabilities. As it was presented above, there are discrepancies not only as a total of current assets, respectively current liabilities to total assets, but also in their structure.

Leverage in this is calculated as proportion of financial debt to total assets, i.e. financial debt financing.

Finally, net trade credit is calculated as the difference by debtors and creditors and then divided by total assets.

Table 1

Calculation of variables

Abbreviation	Calculation
PROF	Net income / Sales
WC	Current assets – Current liabilities
LEV	Financial debt / Total assets
NTC	(Debtors – Creditors) / Total assets

Source: own selection

Table 2 presents means by years for the selected variables. As it can be noticed each 100 ruble sale generated 15.79 ruble net income. Firms on average have positive working capital and negative net trade credit. Thus, total current assets were higher than total current liabilities, but firms bought more than sold on credit. It seems that firms have tried to use this policy as a form of business financing.

Finally, firms' total assets on average were financed with 44.83 percent by financial debt, which in turn means that the rest of 55.17 percent is either other form of liabilities or equity financing.

Variables means by years

Table 2

Year	PROF	WC	LEV	NTC
2013	0.0721	479,000,000	0.4602	-0.0368
2014	0.0463	694,000,000	0.4553	-0.0264
2015	0.1538	816,000,000	0.4495	-0.0243
2016	0.7553	677,000,000	0.4404	-0.0247
2017	-0.2492	647,000,000	0.4365	-0.0202
Total	0.1579	663,000,000	0.4483	-0.0265

Source: own processing

Moreover, Spearman's rank correlation is performed and significant relationships are found between profitability and examined factors (see Table 3).

Finally, firms that sold more than bought on credit (with positive net trade credit) used less financial debt financing.

Spearman's rank correlation

Table 3

	Prof	WC	Lev	NTC
Prof	1			
WC	0.3017*	1		
Lev	-0.2807*	-0.2920*	1	
NTC	0.1742*	0.4175*	-0.4079*	1

Source: own processing. * 0.05 significance level

Furthermore, to examine the effect of financial debt financing on profitability, variable of leverage is de-composited as following ratio: till 20%, from 20% to 40%, from 40% to 60%, from 60% and higher and results are given on Table 4.

Mean by leverage category

Table 4

LEV ratios	PROF
<=20%	0.4337
>20 and <=40%	0.1032
>40 and <=60%	0.2206
>60%	-0.0604

Source: own processing

Finally, net trade credit and working capital are categorized as positive and negative in order to examine mean of profitability (see Table 5). Obviously, firms with positive net trade credit and working capital were in a much better position compared to counterparties.

Profitability mean based on trade credit and working capital

Table 5

NTC	PROF	WC	PROF
Negative	0.0224	Negative	-0.0508
Positive	0.3078	Positive	0.2130

Source: own processing.

3.1. Logistic regression

This study features an application of the logistic regression with binary response. In our case, the objective is to examine if and how examined variables-determinants (WC, LEV and NTC) affected the dependent variable (PROF).

Hence, are selected data from the year 2017, i.e. 2,765 observations (sample size) and variables are coded/defined based on the following methodology. The separate regression analysis for the year 2017 is done due to negative mean of profitability, i.e. firms have operated in this year with losses (see results on Table 2). Thus, the logistic regression analysis tries to provide evidence from the perspective of improving financial performance. Discussions and possible suggestions will be based on odds ratio (OR).

Dependent (endogen) variable *Y* (PROF, profitability) is a binary response variable, which is coded as 0 or 1, referred to as negative or positive, respectively: firms which operated with losses are coded with 0 and firms which operated with profits are coded with 1. In addition, independent variables (exogenous) are defined as:

WC (working capital) is coded as 0 if the firm's working capital is equal or lower, respectively 1 than the overall mean of working capital.

LEV (leverage) is coded as 0 if the firm's leverage is equal or lower, respectively 1 than the overall mean of leverage.

Finally, *NTC* (net trade credit) is coded as 0 if the firm's net trade credit is negative, respectively 1 if it is positive, i.e. firms that bought more than sold on credit are coded with 0 and 1.

Results denoted that in our study there are 652 or 23.58% cases with $Y = 0$ and 2113 or 76.42% cases with $Y = 1$. Thus, the model predicts that 76.42% of cases are correctly classified, which presents an overall good estimation.

Logistic regression results

Table 6

Overall Model Fit	
Null model -2 Log Likelihood	3020.462
Full model -2 Log Likelihood	2961.466
Chi-square	58.996
DF	3
Significance level	$P < 0.0001$
ROC curve analysis	
Area under the ROC curve (AUC)	0.582
Standard Error	0.0123
95% Confidence Interval	0.563 to 0.600

Variable	Coefficient	Std. Error	P
WC	1.0513	0.2210	0.00000197
LEV	0.0290	0.09363	0.7567
NTC	0.4374	0.0955	0.000004655
Constant	0.8992		

Odds Ratios and 95% Confidence Intervals		
Variable	Odds Ratio	95% CI
WC	2.8613	1.8554 to 4.4125
LEV	1.0294	0.8568 to 1.2368
NTC	1.5487	1.2843 to 1.8674

Source: own processing

Based on the above results, the logit model can be rewritten:

$$\text{logit}(p) = \ln \frac{p}{1-p} = 0.899 + 1.051WC + 0.029LEV + 0.437NTC$$

To interpret the situation is important to know odds-ratios as are presented above. Thus, if the variable will be changed by one unit and the others remain unchanged, the chance will be changed with the factor of type e^{β_i} which is known as odds-ratios (OR).

Hence, as the above table shows, in the case of WC, OR is 2.86 which is higher than 1. In turn, the result indicates that firms which operate with higher than the average value of working capital (if WC moves from 0 to 1), will be moved from losses to profits by 2.9 times.

In the case of LEV, OR is 1.029 and is higher than 1. The result denotes that for firms which use more than the average level of leverage (if LEV moves from 0 to 1), the financial result will move from loss to profit by 1.03 times.

Finally, in the case of NTC, OR is 1.55 and is higher than 1. The result denotes that for firms which move from negative (i.e. creditors higher than debtors) to positive (i.e. debtors higher than creditors), the financial result will move from loss to profit by 1.55 times.

4. Empirical Results and Discussion

Profitability and related determinants are examined by different authors using different samples and periods, and methodologies. This sometimes makes it difficult to compare obtained results with previous studies. For example, the comparison of profitability ratios would not be adequate between a bank and a non-financial firm due to many specifics.

However, it is important to note that previous studies have analysed and brought to light important relationships between profitability and many other factors. In this context, this study also tries to provide evidence, perhaps limited, in order to explain profitability and selected variables.

The study from the performed analyses derives some results as follows.

Results showed that, on average, observed firms are profitable and liquid ones. This finding coincides with the previous discussion that however firms in practice will not choose the maximum one by sacrificing the other component (profitability versus liquidity).

Thus, firms have generated profits and operated with higher current assets than current liabilities. This means that firms have operated with positive working capital and this is so every year, and not just as a total.

View as trend line, there is a positive trend for profitability and working capital. Net trade credit shows positive, whereas financial leverage shows a negative trend, but in both cases changes are quite weak.

Moreover, firms have bought more than sold on credit and this is a form of financing without interest implications. Also, the negative trade credit in this case shows the ability of the observed firms to buy more than sell on credit, probably due to the positive trend of profitability.

In addition, total assets were financed roughly 45% by financing debt, which is slightly a high financial leverage ratio. Another possible explanation that firms operated with negative trade credit is that they may have approached the allowed financial leverage limit. In this context and line is the negative correlation between profitability and leverage by suggesting that firms that used less financial financing were more profitable than counterparties. The cross-tabulation analysis denoted that by increasing leverage financing, the firms' profitability decreased.

Firms that were financed with up to 20% financial debt have higher profitability and by increasing the leverage financing, profitability on average was decreased. In turn, this suggests that firms should keep lower leverage ratios and financing should be done probably by non-interest bearing liabilities (such as: accounts payables, etc.) or even by equity. As financial debt is increasing, the associated risk is increasing too as well as bankruptcy probabilities. For example, firms with leverage ratio of 60% or higher were not able to cover costs (including interest as fixed expenses) and thus resulted in losses (on average -6.04%).

Furthermore, more profitable firms operated with higher working capital (higher liquidity). In turn, this denotes that the observed firms implemented aggressive strategies which lead to the combination *high profit-high liquidity*. Also, the cross-tabulation analysis denoted that firms with higher net trade credit and working capital (positive ones) generated much more profitability than counterparties.

Also, on the other side results denoted that firms with higher working capital were more profitable ones (coefficient = 0.3017). This shows that more liquid firms generated higher profitability too.

In addition, firms that were less leveraged were more profitable (coefficient = -0.2807) and firms with positive net trade credit were more profitable compared to counterparties (coefficient = 0.1742). Also, the result between working capital and financial leverage which is -0.2920 in turns suggests that higher working capital is associated with lower financial debt financing. Thus, investments in working capital are financed more by other sources rather than debt.

Finally, the logistic regression shows that odd-ratios for working capital and net trade credit were higher than leverage one. In other words, there are possibilities firms to move from loss to profit by 2.9 times (WC), 1.03 times (LEV) and 1.55 times (NTC).

5. Conclusions

The purpose of this paper was to study profitability and some determinants which are supposed to affect it. The study shows that between profitability and observed determinants there are significant relationships as it was empirically tested. Results denoted that firms in general were positioned for taking higher risk in trade-off to profitability.

The behaviour of firms in the context of how much liquidity they will hold and how much profitability will generate is difficult to be predicted. This difficulty is also related to the preference of firms for profitability-liquidity combinations, but still depends on other factors, not even addressed in this study. Nowadays, it would be understandable and rational for firms to keep or increase liquidity at the expense of profitability due to the COVID-19 crisis effects.

However, as this study showed between profitability and liquidity, it is the financing factor that should be kept in mind by managers of firms. Financing and especially the financial debt has the accompanying risk, which can even lead not just to loss, but to bankruptcy too.

As the present study has its own limitations, the next study could further focus on:

- Increasing the number of firms and adding the business industry effect,
- Analysing other firm's characteristics, and
- Including macroeconomic factors.

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