

The Determinants of Trade Credit for Firms Listed on the Zagreb Stock Exchange: An Empirical Analysis

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Abstract. The paper examines the firm's trade credit and its determinants, before and after financial crisis, for a sample of 26 non-financial firms listed on Zagreb Stock Exchange. Trade credit provided and trade credit obtained are the quantitative dependent variables. Profitability, cash to total assets ratio, long-term financing, short-term financing, converting sales into cash, and inventories to total assets ratio are the quantitative independent variables. Industry and time are used as qualitative independent variables. Some of the obtained results are: firms have hold on average a balance between trade credit provided and obtained; profitability, cash ratio and converting sales into cash were found to be statistically significant determinants of trade credit provided; cash ratio and short-term financing were found to be statistically significant determinants of trade credit obtained; more profitable firms and with higher level of cash have provided more trade credit then counterparties.

Keywords: trade credit, accounts receivable, accounts payable, crisis, regression

1 Introduction

View from the historical perspective and nowadays quite often happens that firms have difficulties in accessing financial markets. This happens for many reasons. But, one of the possibilities to meet the financial gap is buying on credit. This can be associated with selling on credit. Trade credit has intrinsic connections with supply chain coordination and inventory management, so trade credit enhances supply chain efficiency by allowing the retailer to partially share the demand risk with the supplier [1]. But, when a buyer depends too much on its main supplier, the supplier does not provide more credit as its relationship with the buyer matures [2]. So both trade credits can occur simultaneously, thereby generating, on one side, accounts payable and, on the other side, accounts receivable.

Trade credit management represents an important strategic opportunity for firms to enhance performance, liquidity and profitability [3]. The level of accounts receivable and payable can be affected by many factors. There is no a fixed level of accounts receivable and payable that firm should has. The concept of trade credit explains the relationship between the firm, its customers and suppliers.

On the other hand, in financial literature the expression *cash is king* is commonly used. The firm may be profitable but not liquid. Hence, the level of profitability and liquidity that a firm should choose is not a simple task. Finding the optimal level of profitability and liquidity is a complex calculation. Complexity comes from different factors. Normally, firms do not realize all sales in cash, as they do not pay all invoices (bills) with cash on transaction date. The crucial problem starts from point of selling and buying on credit. Moreover, the longer the net trade cycle, the larger is a firm's working capital requirement [4].

Doubtless trade credit cannot be analyzed separate from others financial indicators. Thus, the aim of this paper is to take into account some factors that may explain the relationship between the credit offered to clients and credit obtained from suppliers.

The rest of paper is organized as follows: Section 2 presents a literature review in the field, Section 3 develops the methodology, Section 4 presents empirical data and analysis, followed by Section 5 with results and discussions and conclusions in the Section 6.

2 Literature Review

Literature related to the firm's trade credit and its determinants is growing as trade credit importance is growing as well. A large number of papers are written and evidence is found from micro and macro perspectives. Testing the existence of a trade credit channel of transmission of monetary policy Guariglia and Mateut [5] found that both the credit and the trade credit channels operate in the UK, and that the latter channel tends to weaken the former. Also, during tight monetary periods, trade credit operates mainly as a substitute for bank borrowing while during looser monetary episodes even when the economy is weak, trade credit and bank loans are dominated by a complementary effect [6]. On the other hand, Fisman and Love [7] proved that firms in countries with less developed financial markets appear to substitute informal credit provided by their suppliers to finance growth.

There is no a fixed level of accounts receivable and payable that firm should has, this level being affected by many factors that also determine the contract terms: suppliers' willingness to price discriminate, information asymmetry between suppliers and customers, market structure, stages of business cycles, and customers' creditworthiness [8]. Delannay and Weill [9] examining the determinants of trade credit of about 9,300 firms from nine transition countries (Central and Eastern European Countries) found that both financial and commercial motives explain the credit behaviour of firms and suppliers act as financial intermediaries in favour of companies with a limited access to bank credit.

Firms with better access to credit offer more trade credit [10]. Garcia-Teruel and Martinez-Solano [11] analyzing 3,589 small and medium sized firms in the UK have found evidence that larger firms, with better access to alternative internal and external financing and with a lower cost, use less credit from suppliers. Furthermore, Frank and Maksimovic [12] found that not all trade can be on credit because the investor cannot observe the quality of the buyer. When lending becomes less severe, the allo-

cation of lending became more efficient, and the amount of trade credit extended by private firms declined [13]. Nilsen [14] found that: small firms increase trade credit, a substitute credit, indicating a strong loan demand; trade credit is widely used by the small firms suffering the loan decline; the reasons large firms use trade credit are financial in nature. Also, firms with more inventories, market share and that are financially distressed invest less in trade credit, while higher operating cash flow, annual sales growth, export propensity, access to bank credit and larger firms lead to higher investment in trade credit [15].

In the countries with poorly developed financial institutions, compared to state owned firms, non-state owned firms use more trade credit, and this higher usage is primarily for financing their prosperous growth opportunities rather than transactional purposes [16]. Poorly performing state-owned enterprises are more likely to redistribute credit to firms with less privileged access to loans via trade credit [13]. Also, state-controlled listed firms in China receive preferential treatment when borrowing from commercial banks and, in contrast, private controlled firms rely on informal finance and on trade credit [17]. They found evidence that private firms located in higher social trust regions use more trade credit from suppliers, extend more trade credit to customers, and collect receivables and pay payables more quickly.

Fisman and Love [7] show that, industries with higher dependence on trade credit financing exhibit higher rates of growth in countries with weaker financial institutions, and that most of the effect reported comes from growth of the size of pre-existing firms, consistent with barriers to trade credit access among young firms. Suppliers with smaller market share are associated with more trade credit, confirming that suppliers with weak market power use trade credit as a competitive tool and buyers with larger market share are associated with more trade credit, whereas suppliers selling to a concentrated buyer base are associated with less trade credit [18].

Kohler *et al.* [19] found that firms with direct access to capital markets, quoted on the UK stock exchange, both extend more and receive less trade credit during a recession. They therefore unambiguously provide unquoted firms with more net trade credit. Studying the behaviour of trade credit around the time of financial crises, Love *et al.* [20] found an increase in trade credit at the peak of financial crises, followed by a subsequent collapse of trade credit right after crisis events.

The effect of financial deepening on the relationship between trade credit and cash holdings shows that firms in regions with higher levels of financial deepening hold less cash for payables while substituting more receivables for cash and a more highly developed financial sector helps firms to better use trade credit as a short-term financing instrument [21]. Casey and O'Toole [22] found that credit-rationed firms are more likely to use, and apply for, trade credit; this increases with firm size and age and firms that denied credit for working capital tend to turn to trade credit, while informal and inter-company lending tends to act as a substitute for bank investment loans.

Regarding to the relationship between profitability and trade credit use, the profitable private firms are more likely to extend trade credit than unprofitable ones [13]. When suppliers offer trade credit at their industry-average level, this action facilitates trade and, thus, is positively associated with both parties' performance; conversely, when suppliers are more aggressive in their trade credit strategy than the industry

average, then the excess trade credit is negatively associated with buyer performance [23].

Using a supplier-client matched sample, Garcia-Appendini and Montoriol-Garriga [24] studied the effect of the 2007–2008 financial crisis on between-firm liquidity provision and they found that firms with high pre-crisis liquidity levels increased the trade credit extended to other corporations and subsequently experienced better performance as compared with ex ante cash-poor firms and also, trade credit taken by constrained firms increased during this period.

Starting from these findings we proposed to examine the determinants factors that may explain the conjunction between the credit offered to clients and credit obtained from suppliers for a sample of 26 non-financial firms listed on the Zagreb Stock Exchange, for the period 2007-2013. Thus, trade credit provided and trade credit obtained are the quantitative dependent variables and determinants factors analysed are: profitability, cash to total assets ratio, long-term financing, short-term financing, converting sales into cash, inventories to total assets ratio and industry and time.

3 Methodology

In this study are used quantitative methods and a deductive approach. Principally, the case study as a research method is used because the study is limited on two aspects. Firstly, the sample comprised just non-financial firms which are listed on the Zagreb Stock Exchange. Secondly, the analyzed period that covers 2007-2013.

Selected firms are non-financial entities that belong to two branches of industry as agriculture, forestry and fishing; and manufacture of food products, beverages and tobacco products. Moreover, selected firms are divided for further analyze based on establishment year. Hence, two groups of firms are examined, established before and after 1990. Data are derived from firms' annual reports published on the Zagreb Stock Exchange web page (<http://zse.hr/>) and used as accounting data, i.e. *kn* (Croatian Kuna, hereafter *kn*).

In this study are used six independent quantitative variables. Industry and time period are used as qualitative variables. Firm's age is used also as category (not as a part of regression analysis) and firms are divided into two groups. Profitability, cash to assets ratio, long-term financing, short-term financing, inventories to assets ratio and converting sales into cash are independent quantitative variables. Two depended variables are used, i.e. trade credit provided and trade credit obtained. Both types of quantitative variables, dependent and independent are expressed on their book values.

Table 1 describes the methodology of measuring and defining quantitative and qualitative variables used in this study. By using those independent variables in the regression model, it is attempted to analyze the dependence of the trade credit on these proxies.

Table 1. The methodology of quantitative and qualitative variables calculation.

Description	Abbreviation	Calculation/ Definition
Quantitative variables		

Dependent variables:		
Trade credit provided	tr	Accounts receivables / Total assets
Trade credit obtained	tp	Accounts payables / Total assets
Independent variables:		
Profitability	prof	Net income / Sales
Cash to assets ratio	cash	Cash / Total assets
Long-term financing	longtfin	Long-term liabilities / Total assets
Short-term financing	shorttfin	Short-term liabilities / Total assets
Converting sales into cash	inventratio	Net cash flows from operating activities / Sales
Inventories to assets ratio	convsale	Inventories / Total assets
Qualitative variables		
Industry:		Dummy
Agriculture, forestry and fishing		1
Manufacture of food products, beverages and tobacco products		2
Age:		
Established after 1990		0
Established before 1990		1
None-crisis period		0
Crisis period		1

Source: Selected from Grave (2011), Garcia-Teruel and Martinez-Solano (2010), Petersen and Rajan (1997), and authors' calculations.

Other analysis performed in this study is to examine whether financial crisis has affected trade credit for selected firms. Different authors have used different measurements or indicators to identify financial crisis. For example, Grave [25] used the GDP growth rate and the acceptance criteria of the banking sector to identify financial crisis years. In this study we use percentage change on previous year of the real GDP growth rate as a measure of the financial crisis. According to the data from Eurostat (for more see: <http://ec.europa.eu/eurostat/data/database>) [26] the real Croatian GDP growth rate (percentage change on previous year) was: 5.2 (2007), 2.1 (2008), -7.4 (2009), -1.4 (2010), -0.3 (2011), -2.2 (2012) and -0.6 (2013). Thus, we consider that crisis occurred in 2009 and continued in next coming years. Therefore, the period 2007-2013 is divided into two sub-periods, i.e. none and crisis period. For this reason, a dummy variable is generated that will present financial crisis. Its value is 0 for years 2007 and 2008 (none-before crisis), respectively 1 for years 2009, 2010, 2011, 2012 and 2013 (crisis period).

The initial generalized regression model used in this study is:

$$Y_{it} = \alpha + \sum_{k=1}^6 X_{kit} \beta_{kit} + \varepsilon_{it} \quad (1)$$

where, $i = 1, 2, 3, \dots, 26$, $t = 1, 2, 3, \dots, 7$, and $k = 1, 2, 3, \dots, 6$.

Since the trade credit is a function of variables of interest then the regression model (1) can be expanded adding dummy variables as follow (2) and (3).

Trade credit provided:

$$\left(\frac{\text{Accounts receivable}}{\text{Total assets}}\right)_{it} = \alpha + \beta_1\left(\frac{\text{Net income}}{\text{Sales}}\right)_{it} + \beta_2\left(\frac{\text{Cash}}{\text{Total assets}}\right)_{it} + \beta_3\left(\frac{\text{Long-term liabilities}}{\text{Total assets}}\right)_{it} + \beta_4\left(\frac{\text{Short-term liabilities}}{\text{Total assets}}\right)_{it} + \beta_5\left(\frac{\text{Net cash flows from operating activities}}{\text{Sales}}\right)_{it} + \beta_6\left(\frac{\text{Inventories}}{\text{Total assets}}\right)_{it} + \text{Industry dummy} + \text{Year dummy} + \varepsilon_{it} \quad (2)$$

Trade credit obtained:

$$\left(\frac{\text{Accounts payable}}{\text{Total assets}}\right)_{it} = \alpha + \beta_1\left(\frac{\text{Net income}}{\text{Sales}}\right)_{it} + \beta_2\left(\frac{\text{Cash}}{\text{Total assets}}\right)_{it} + \beta_3\left(\frac{\text{Long-term liabilities}}{\text{Total assets}}\right)_{it} + \beta_4\left(\frac{\text{Short-term liabilities}}{\text{Total assets}}\right)_{it} + \beta_5\left(\frac{\text{Net cash flows from operating activities}}{\text{Sales}}\right)_{it} + \beta_6\left(\frac{\text{Inventories}}{\text{Total assets}}\right)_{it} + \text{Industry dummy} + \text{Year dummy} + \varepsilon_{it} \quad (3)$$

In this study OLS regressions without and with dummy variables are used. Regressions are performed separately based on two dependent variables using cluster-robust standards errors (vce). According to Wiggins [27] ... “regress ..., vce(cluster) estimates the model by OLS but uses the linearization/Huber/White/sandwich (robust) estimates of variance (and thus standard errors)”.

Trade credit as dependent variable is differently defined by different authors. Some authors examined separately trade receivables and payables with others determinants, while some others authors separately and jointly. For example, Alatalo [28] uses trade credit provided (trade receivables per sales), trade credit obtained (trade credit payables per cost of goods sold) and net trade credit (difference between trade receivables and payables scaled by sales). Grave [25] has examined trade receivables divided by total assets; trade payables divided by total assets; and trade receivables minus trade payables divided by total assets. On the other hand, Ge and Qiu [16] as dependent variable uses accounts payable/total assets, accounts payable/sales, (accounts payable - accounts receivable)/total assets, (accounts payable - accounts receivable)/sales. In this study two dependent variables are used for trade credit: trade credit provided and trade credit obtained calculated according to Table 1. Using these two dependent variables, we tried to analyze factors that may have determined selling and buying on credit for selected firms and for selected period: profitability, cash assets ratio, long-term and short-term financing, converting sales into cash and inventories to assets ratio.

Profitability – there are many indicators for calculating the profitability of an entity. For example, profitability often is measured by gross margin, operating margin, contribution margin, profit margin, return on assets (ROA), return on equity (ROE), return on total capital (ROTC), etc. In this study is used a measure that takes into consideration sales. Hence, profitability is measured using profit margin calculated as net income / sales. This ratio denotes how much profit generates every sale.

Cash to total assets ratio – this ratio is calculated based on the methodology of balance sheet vertical analysis. So, cash is divided by total assets. In this study this ratio measures and denotes the firm’s liquidity, in the sense of share of cash in total assets.

Long-term financing and short-term financing – those two ratios explain how assets are financed. With other words, these ratios show the percentage of long-term financing, respectively short-term financing on total assets. Thus, long-term financing

is calculated as long-term liabilities divided by total assets, whereas short-term financing is defined as short-term liabilities divided by total assets.

Converting sales into cash – normally, every sale is not done on cash. For this reason cash flow statement is prepared (accruals versus cash accounting base). In this study this ratio is calculated as net cash flows from operating activities divided by sales.

Inventories to assets ratio – this is a regular ratio which is calculated in order to analyze the inventory level. Knowing the inventories level is important to the financial decision making process. Inventories level may be different to different firms. Even, this ratio can change for own firm view from different periods. However, many explanations can be found why a firm has lower or higher inventories level.

4 Empirical Data and Analysis

This section includes descriptive and empirical analysis. Descriptive statistics present an overall picture of the sample composition. Observations are also divided by industry and age criteria. Summary statistics for examined variables are given. Mean is presented for examined variables based on year, industry and age category.

Empirical analysis includes Spearman and regression analysis. Regression results are presented separately for four models: model TR1 where dependent variable is trade credit provided; model TP1 where dependent variable is trade credit obtained; models TR2 and TP2 are regression models which take into consideration dummy variables for year and industry. Regression models are controlled and tested for necessary tests such as VIF for multicollinearity, Breusch-Pagan / Cook-Weisberg test for heteroskedasticity and model specification link test. Results of performed tests are added to each model. At the end of this part the financial crisis effect is analyzed for trade credit.

4.1 Descriptive Analysis

Initially 182 observations were examined and 26 firms were selected for the period 2007-2013. Data were checked for outliers, leverage and influential observations. Hence, after adjustments the number of observations was reduced to 165. But, still for further analysis 26 firms remained. On agriculture, forestry and fishing industry are 8 firms and 18 firms belong to manufacture of food products, beverages and tobacco products industry.

Table 2 shows how observations are distributed according to industry and age. There are 72 percent (119 / 165) observations of firms that belong to food products, beverages and tobacco products industry; and rests 28 percent (46 / 165) observations of firms that belong to agriculture, forestry and fishing industry. Hence, majority of selected firms belong on food products, beverages and tobacco products industry. On the other hand, 86 percent (142 / 165) are firms established after 1990 and rests 14 percent (23 / 165) are firms established before 1990. Hence, majority of selected firms are younger. Overall, mainly observations (65 percent) come from younger firms

which belong to manufacture of food products, beverages and tobacco products industry.

Table 2. Frequencies for 26 firms

Industry	Age		Total
	0	1	
1	35	11	46
2	107	12	119
Total	142	23	165

Descriptive statistics presented in this section include the number of observations, mean, standard deviation, minimum and maximum. As table 3 presents, there are 165 observations per each variable. From observed data there are cases where firms have negative net cash flow from operating activities, i.e. inflows are less than outflows of operating activities section. On the other hand, some firms have generated losses for the analyzed period. This is why on the min column for these two variables there are negative values. Even to, on average analyzed firms for the period 2007-2013 have generated losses.

On average term based on obtained results from descriptive statistics, following interpretation can be drawn for selected firms and analyzed period: trade credit provided and obtained are similar; for each 100 kn sale 2 kn losses is generated; the level of cash to total assets is 1 percent; firms have financed their assets 14 percent with long-term liabilities and 34 percent with short-term liabilities; for each 100 kn sale, 4 kn net cash flow from operating activities is received; inventories to total assets participate with 15%.

Table 3. Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Tr	165	0.14	0.09	0.00	0.38
Tp	165	0.14	0.07	0.01	0.38
prof	165	-0.02	0.18	-1.53	0.47
cash	165	0.01	0.02	0.00	0.07
longtfin	165	0.14	0.09	0.00	0.42
shorttfin	165	0.34	0.15	0.09	0.92
convsale	165	0.04	0.14	-0.39	0.76
inventratio	165	0.15	0.09	0.01	0.41

Source: own calculations.

Analyzing from the perspective of time horizon on average accounts receivable and payable we found a decreased trend (table 4). But, on the total they are balanced.

Table 4. Summary statistics: mean by category of year

Year	tr	tp	prof	cash	longtfin	shortt~n	convsale	invent~o
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2007	0.17	0.15	0.03	0.02	0.13	0.31	0.06	0.16
2008	0.17	0.15	-0.05	0.01	0.13	0.34	0.07	0.15
2009	0.13	0.12	-0.07	0.01	0.13	0.35	0.05	0.15
2010	0.14	0.13	-0.03	0.01	0.14	0.34	0.05	0.14
2011	0.13	0.15	0.00	0.01	0.17	0.32	0.04	0.15
2012	0.12	0.13	-0.02	0.01	0.16	0.34	0.00	0.16
2013	0.12	0.13	-0.01	0.01	0.14	0.37	0.02	0.17
Total	0.14	0.14	-0.02	0.01	0.14	0.34	0.04	0.15

Source: own calculations.

The level of profitability is very low, even in most cases and in total loss is generated. The level of cash that firms hold is same per each year, except for 2007. Firms have financed assets more with short-term liabilities rather than long-term liabilities, and this is evident for each year. The ability of firms to convert sales into cash, on general year after yeas have become lower. The trend of inventories to total assets ratio has a slight increase.

Relate to firms that belong to agriculture, forestry and fishing industry we found that (table 5): have provided less trade credit than firms belong to manufacture of food products, beverages and tobacco products industry; have obtained less trade credit than counterparties; have obtained more than have provided trade credit; are less profitable than counterparties; have less cash stock than counterparties; have financed assets slightly more with long-term liabilities and slightly less with short-term liabilities than counterparties; have less ability to convert sales into cash and hold higher inventory level than counterparties.

On the other hand, firms that belong on manufacture of food products, beverages and tobacco products industry have provided more than have obtained trade credit. Hence on term of the net trade credit (accounts payable – accounts receivable), firms those belong on agriculture, forestry and fishing industry have a positive trade credit comparing with counterparties which have a negative trade credit.

Table 5. Summary statistics: mean by category of industry

Industry	tr	tp	prof	cash	longtfin	shortt~n	convsale	invent~o
1	0.08	0.10	-0.08	0.01	0.15	0.33	0.01	0.19
2	0.17	0.15	0.00	0.02	0.14	0.34	0.05	0.14
Total	0.14	0.14	-0.02	0.01	0.14	0.34	0.04	0.15

Younger firms have higher level of trade credit provided and obtained comparing with older firms (table 6). But, on term of the net trade credit older firms have a positive net trade credit comparing with younger firms which have a negative trade credit. Older firms are likely to be slightly more profitable than younger ones (0.06 percent versus -2.51 percent). Both, younger and older firms have same level of cash stock. Younger firms have financed assets less with long-term liabilities and more with short-term liabilities than counterparties. Younger firms are less capable to convert sales into cash and hold slightly lower inventory levels than counterparties.

Table 6. Summary statistics: mean by category of age

Age	tr	tp	prof	cash	longtfin	shortt~n	convsale	invent~o
0	0.15	0.14	-0.03	0.01	0.13	0.34	0.04	0.15
1	0.10	0.13	0.00	0.01	0.18	0.31	0.07	0.16
Total	0.14	0.14	-0.02	0.01	0.14	0.34	0.04	0.15

Selected firms for the period 2007-2013 on average have capital-to-asset ratio (defined as total capital and reserves divided by total assets) of 50%. This ratio has a decreased trend line and this implies that leverage ratio has an increased trend line.

Empirical Analysis

Spearman analysis is performed and results are presented on table 7. Spearman analysis has generated relevant evidence for analyzed trade credit and related variables. Hence, a summarizing can be as follows.

Significant positive relationship is found between trade credit provided and obtained. Significant positive relationships are found between trade credit provided, profitability and cash. This means that firms which are more profitable and hold more cash stock have provided more trade credit than counterparties. Firms with higher cash stock and which are more able to convert sales into cash are more profitable than counterparties. Perhaps profitable firms generate internal funds and are more able to extend the collection period.

Significant positive relationships are found between trade credit obtained, cash, short-term financing and converting sales into cash. This means that firms which have higher level of cash stock, that use more short-term financing and are more able to convert sales into cash obtained more trade credit than counterparties. Significant negative relationships are found between profitability, long-term financing and short-term financing. This means that firms with higher liabilities are less profitable than counterparties. Significant positive relationship is found between inventory ratio and short-term financing. This means that firms with higher ratio of inventory use more short-term financing than counterparties.

Table 7. Spearman analysis

	tr	tp	prof	cash	longtfin	shortt~n	convsale	invent~o
tr	1							
tp	0.396*	1						
prof	0.176*	-0.024	1					
cash	0.544*	0.478*	0.293*	1				
longtfin	0.051	-0.014	-0.269*	-0.076	1			
shorttfin	0.124	0.378*	-0.230*	0.008	0.012	1		
convsale	0.047	0.207*	0.306*	0.206*	-0.048	-0.045	1	
inventratio	-0.056	0.053	-0.109	0.036	0.135	0.393*	-0.006	1

* 0.05 Significance level.

On the other hand, four regression models are performed. Regression and performed tests results are presented on table 8. In model TR1 profitability, cash, short-term financing and inventory ratio are found statistically significant determinants which have affected trade credit provided. In model TP1, cash and short-term financing are found statistically significant determinants which have affected trade credit obtained. In model TR2 profitability, cash and converting sales into cash are found statistically significant determinants which have affected trade credit provided. In model TP2, cash and short-term financing are found statistically significant determinants which have affected trade credit obtained.

Industry 2 as dummy is found significant determinant for trade credit provided and not for trade credit obtained. Time as dummy is found significant determinant for trade credit provided just for 2008, respectively at 2009 for trade credit obtained. Constant is found significant at all four models.

Table 8. Regressions results and tests

Variable	TR1	TP1	TR2	TP2
prof	0.09	0.03	0.07	0.01
	3.82*	1.17	3.96*	0.28
cash	2.64	1.21	2.01	0.79
	3.83*	3.23*	2.51*	1.99*
longtfin	0.04	-0.02	0.06	-0.03
	0.5	-0.31	0.72	-0.42
shorttfin	0.08	0.16	0.05	0.14
	2.1*	2.88*	0.99	2.37*
convsale	-0.05	0.08	-0.08	0.06
	-0.99	1.68	-2.28*	1.46
inventratio	-0.21	-0.09	-0.08	-0.01
	-2.15	-0.91	-0.7	-0.12
_industry_2			0.06	0.04
			3.05*	1.27
_Iyear_2008			0.02	0
			2.18*	-0.22
_Iyear_2009			-0.01	-0.04
			-0.75	-3.01*
_Iyear_2010			-0.02	-0.02
			-0.83	-1.81
_Iyear_2011			-0.02	0
			-0.98	-0.15
_Iyear_2012			-0.02	-0.01
			-0.91	-1
_Iyear_2013			-0.03	-0.03
			-1.19	-1.46
_cons	0.11	0.08	0.08	0.07

	3.95*	4.24*	2.98*	2.87*
N	165	165	165	165
r ²	0.28	0.22	0.38	0.31
legend: b/t; * 0.05 Significance level				
Mean VIF	1.15	1.15	1.56	1.56
Lower VIF	1.04	1.04	1.08	1.08
Upper VIF	1.34	1.34	1.92	1.92
hettest (Prob > chi ²)	0.51	0.00	0.09	0.11
linktest (_hatsq, t)	-0.13	-1.82	-0.61	0.41

Controlling for multicollinearity, is used Variance Inflation Factor (VIF) as measure, results of which are presented on table 8. Results indicate that for all variables mean of VIF is lower than 10 per each model. Therefore, it means that multicollinearity is not a problem for used models. Controlling for heteroskedasticity, is used Breusch-Pagan / Cook-Weisberg test. Breusch-Pagan / Cook-Weisberg test for heteroskedasticity (hettest) is done after performing regression without cluster. At this test the null hypothesis says that the variance is homogeneous (constant variance), and alternative hypothesis says that the variance is not homogenous. Results of tests are given on table 8 according to models. In all cases, except for TP1, results of the test show that p-values are higher than 0.05. Therefore, indicating that the variance of the residuals is homogenous.

Controlling whether regression models are correctly specified is used a model specification link test for single-equation models (linktest). Results of this test presented on table 8 denote that _hatsq is not significant in any model ($t = -0.13 < 1.96$, $t = -1.82 < 1.96$, $t = -0.61 < 1.96$, $t = 0.41 < 1.96$). In case of TP2 specification is slightly concerning even $t = -1.82$ is still lower than 1.96, i.e. not significant. Hence, generally it looks like that there is no specification error for models used in this study. Moreover, comparing mean of trade credit provided and obtained before and after crisis has generated following results as presented on table 9 and table 10. Two-tailed p-value is 0.01. This value is lower than 0.05. Hence, coming to conclusion that the mean difference of trade credit provided before and after crisis is different from zero. With other words, on average trade credit provided by analyzed firms statistically significantly is different view from the perspective of before and after crisis (see table 9).

Table 9. Mean of trade credit provided, before and after crisis

Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	47	0.17	0.01	0.09	0.14	0.19
1	118	0.13	0.01	0.09	0.11	0.15
combined	165	0.14	0.01	0.09	0.13	0.15
diff		0.04	0.01		0.01	0.07
diff = mean(0) - mean(1)				t = 2.56		
Ho: diff = 0				degrees of freedom = 163		

Ha: diff < 0	Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 0.99	Pr(T > t) = 0.01	Pr(T > t) = 0.01

Two-tailed p-value is 0.06. This value is higher than 0.05. Hence, coming to conclusion that the mean difference of trade credit obtained before and after crisis is not different from zero. With other words, on average trade credit obtained by analyzed firms is not significantly different view from the perspective of before and after crisis (see table 10).

Table 10. Mean of trade credit obtained, before and after crisis

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	47	0.15	0.01	0.08	0.13	0.17
1	118	0.13	0.01	0.06	0.12	0.14
combined	165	0.14	0.01	0.07	0.13	0.15
diff		0.02	0.01		-0.00	0.04
diff = mean(0) - mean(1)				t = 1.92		
Ho: diff = 0				degrees of freedom = 163		
Ha: diff < 0		Ha: diff != 0		Ha: diff > 0		
Pr(T < t) = 0.97		Pr(T > t) = 0.06		Pr(T > t) = 0.03		

Table 11 presents mean of independent variables before and after financial crisis. As this table present, a decrease is evidenced for profitability, cash and conversation sales into cash. Long-term and short-term financing have increased. Inventories level remains unchanged.

Table 11. Mean of independent variables, before and after crisis

Crisis	prof	cash	longtfin	shortt-n	convsale	invent~o
0	-0.01	0.02	0.13	0.32	0.06	0.15
1	-0.03	0.01	0.14	0.34	0.03	0.15
Total	-0.02	0.01	0.14	0.34	0.04	0.15

5 Results and Discussions

Results obtained in this paper are related explicitly with selected firms and period. The paper shows that divergences exist on trade credit according to industry and age. Profitability, cash and converting sales into cash have determined the trade credit provided. Cash and short-term financing has determined trade credit obtained. Profitability and cash as statistically significant determinants have affected positively, whereas converting sales into cash negatively to trade credit provided. Cash ratio is a liquidity measure. Hence, firms that are more liquid and profitable have provided more trade credit to their customers than counterparties firms. On the other hand, as

firms get less able to convert their sales into cash, trade credit provided to customers gets higher.

Cash and short-term financing as statistically significant determinants have affected positively trade credit obtained. Accounts payable belong to short-term liabilities section. Thus, as accounts payable are increased, trade credit obtained is increased too. Liquidity again is an important determinant. Perhaps, creditors allow these firms to buy on credit because of liquidity. Thus, as liquidity is increased, trade credit obtained is increased too.

The correlation analysis among other results denotes also that a positive significant relationship exists between trade credit provided and obtained. Hence, firms have bought and sell on credit their goods and services.

Mean of trade credit provided and obtained after financial crisis has started becomes lower. Even to, in case of trade credit obtained the relationship is not significant, still a decrease is evidenced. The difference is more pronounced at trade credit provided than obtained. The expression mentioned earlier that *cash is king* seems that better explains this result. Under financial crisis conditions firms may have tried to decrease accounts receivable because cash was needed. Profitability and cash level are decreased after crisis. But, the decrease is more pronounced at converting sales into cash (from 6.5% to 3.4%). This implies that firms' ability to convert sales into cash is almost halved due to crisis. Thus, one way to compensate this drop maybe was shorting the collection period and lowering accounts receivable. Love and Zaidi [29] analysing a sample of SME-s in four East Asian countries before and after the financial crisis between November 1998 and February 1999 offered evidence which proves that on average the use of trade credit declines and the cost of trade credit increases following the crisis. On the other hand, Carbó-Valverde *et al.* [30] analyzing a sample of Spanish SMEs during the recent crisis found evidence that trade creditors play a role in the SME sector as lenders of last resort and this role becomes more important during a credit crisis. Moreover, after crisis an increase is evidenced on debt financing. Accounts payable after crisis are decreased on average by 2%, whereas short-term liabilities are increased by 2%. This clarifies that another type of short-term liabilities is increased, probably borrowing, to finance worsen profitability and liquidity.

6 Conclusions

The purpose of this paper was to analyze trade credit and its determinants for 26 non-financial firms listed on the Zagreb Stock Exchange. The paper among other findings revealed that: trade credit provided is positively significantly associated with profitability and cash ratio, whereas negatively significantly associated with converting sales into cash; trade credit obtained is positively significantly associated with cash ratio and short-term financing; significant positive relationship is found between trade credit provided and obtained; firms which are more profitable and hold more cash stock have provided more trade credit then counterparties; firms which have higher

level of cash stock, that use more short-term financing and are more able to convert sales into cash obtained more trade credit than counterparties.

The paper has own limitations as number of firms and the analyzed period. For future studies it might be interesting to focus on the increase number of firms on sample, and adding new independent and dependent variables.

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