

THE DETERMINANTS OF TRADE
CREDITS: CASE OF UKRAINE

by

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Abstract

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Firms have possibility to pay later for bills, in this way taking credit from the suppliers. There are quite a few studies for different countries and periods that look at the reasons for using trade credits. In this thesis, I investigate the determinants of usage of trade credits in Ukraine. In particular, I examine the following question: does cost of inventories determines prevalence of trade credit in Ukraine?

The thesis is structured as follows. First section is introduction. In the next section it is described existing theories and previous studies on trade credit. Next is discussed data and methodology applied. Section presenting empirical results is followed by concluding remarks.

The model identify responses of accounts payables and receivables as well as net trade credit to changes in cost of inventories, bank's credits, and credit worthiness parameters, using unbalanced panel data for Ukraine firms during 2000-2010 years. The results show negative influence of finished goods inventories on extended trade credits and on net trade credits and positive influence on received trade credits. This means that Ukrainian firms also used trade credits as an instrument for inventories management, in spite of risk not paying back. Also,

firms with higher access to financial resources are not intermediate between banks and their customers, which indicate lower price of trade credits than for bank's ones.

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GLOSSARY

Trade credit – An agreement where a customer can purchase goods on account (without paying cash), paying the supplier at a later date.

Accounts receivable (AR) – account in balance sheet, which shows how much customers owe to the firm, proxy for trade credits expended.

Accounts payables (AP) – account in balance sheet, which shows how much firm owes to its suppliers, proxy for trade credits received.

EBIT – Earnings before interest and taxes (Net income + interest expenses + corporate taxes)

Chapter 1

INTRODUCTION

Trade credit is important financial instrument, which gives opportunity to buy and use materials in production process without paying cash immediately, in other words to postpone payments to suppliers. In such a way trade credits connect product and money markets, giving opportunities to smooth payments over time. Some theories about reasons of using trade credit are outlined below.

Trade credit is recognised to be an additional source of capital, substituting or complementing financial resources like bank credits. Suppliers have some benefits over banks in controlling credit risk. Firstly, they communicate closely in everyday transactions, which give them better idea of clients business, their prospects and risks. Secondly, clients are more dependent on suppliers for maintaining flow of manufacturing process without shortage of inputs. Usually, it is hard to substitute for suitable supplier. Thirdly, in case of default, suppliers could easily resell goods event at higher prices, as they are working in the same market (Mian and Smith, 1992; Petersen and Rajan, 1997, Jain, 2001), or could make vertical acquisition of the client.

Moreover, trade credit could be used for stabilization and stimulation of demand. On the one hand, customers could try products before paying for them and receive inputs in case of temporal insolvency at the moment. And on the other hand, suppliers obtain sales, which are predicted to be paid for some time later. Additionally, it could be used as a substitution for legally forbidden price discrimination (Meltzer, 1960; Brennan, Maksimovic and Zechner, 1988; Mian and Smith, 1992). In this case the trade credit is a way of attract poorer customers:

by giving them trade credits suppliers price discriminate between new and old customers. Even though nominal price is fixed the real price is not and is going down with time of payment, due to time value of money. At the same time, suppliers do not extend trade credit to existing customers. So, firms get revenue from both classes of clients.

And finally, trade credits are used for inventory management and for reducing transaction costs. Firms may be able to make their payments once a month instead of paying for each delivery (Ferris, 1981). From inventories management point of view, on the one hand, firm can minimize costs of holding finished goods by selling them on credit. On the other hand, firms can postpone payments for materials used in production, in case of insolvency.

For Ukraine such instrument is especially essential, as Ukraine is a developing country with a poorly developed stock market, which in turn restricts firms' possibilities to raise funds externally. According to the Doing Business rating, Ukraine has high rating in the area of getting bank credits (23 out of 185, Ukraine is at the same level as Denmark, Canada, Germany and above Finland, Sweden, France, and Belgium), but despite this fact, credits are nearly unavailable for the majority of enterprises due to their high costs. The lending interest rate in Ukraine in 2011 was 15.9% (World Bank), which puts Ukraine on 101st place among 130 countries, for which information is available. This rate is one of the highest rates in Eastern Europe, it is higher than in Russian Federation, Belarus, Moldova. High costs of bank credits suggest that trade credit could be a cheaper substitute for bank credits in Ukraine, contrary to the situation in developed countries, where trade credits are usually more expensive. This indeed is confirmed empirically for Ukraine by Levchuk (2002), who finds that firms used more trade credits due to shortage of banks credits, but don't extend more trade credits, if they have more banks credits.

For United Kingdom and India it is found that trade credit is used as a part of inventory management (Guariglia, 2006; Bougheas, 2009; Vaidaya, 2011). To my knowledge, there are no studies for Ukraine which investigate relationship between inventories and trade credit. Ukrainian market conditions are different from the ones in the UK and India, so trade credit could mostly be driven by its lower price or it could be “forced”. Another question is: do Ukrainian firms tend to give more trade credits with the purpose of reducing inventories holding costs? It should be taken into consideration the risk of don’t getting cash for goods already sold, thus firms tending to minimize this risk will rather hold more inventories. So, this research is aimed to answer the following research question: does cost of inventories determine prevalence of trade credit in Ukraine?

To give answers to the above question I employ GMM regression using accounts payable and accounts receivables as well as their difference as dependent variable. A set of independent variables includes but is not limited to firm’s inventories and their deviation on finished goods and raw materials, firm credit worthiness (size, profits, liquid assets, collaterals) and available banks’ credits, as well as dummies for industries, form of organisation, and years.

In this analysis I use data coming from annual financial statements, such as “Balance” and “Financial results” provided by National Statistics committee of Ukraine and available from KSE data center containing information for over 90000 observations, and more than 3900 observations for manufacturing firms over 2000-2010 years.

The results show negative influence of finished goods inventories on extended trade credits and on net trade credits and positive influence on received trade credits. This means that Ukrainian firms also used trade credits as an instrument for inventories management, in spite of risk not paying back. Also, firms with

higher access to financial resources are not intermediate between banks and their customers, which is signal for lower price of trade credit rather than bank's ones.

The thesis is structured as follows. In the next section it is described existing theories and previous studies on trade credit. Next is discussed data and methodology applied. Section presenting empirical results is followed by concluding remarks.

Chapter 2

LITERATURE REVIEW

Many studies were made in order to explain reasons why firms take or extend trade credits. Different theories can be divided into two major groups: those that are formulated at macro level (e.g. concerning country market), and micro level which look at firms rather than industries and countries in aggregate.

At macroeconomic level, trade credits seem to be related to the monetary policy conducted by central bank: namely, in periods with loose monetary policy firms are likely to give trade credits and accumulate liquid assets, in contrast, in the time of tight monetary policy firms accept more trade credits, as price for money is higher (Metzler, 1960; Guariglia, 2006; Bougheas, 2006).

Another determinant of trade credit is market conditions. It is optimal to provide customers with trade credits, if demand price elasticity in credit market is lower and reservation price is higher than in cash market. Also, trade credit could create competitive advantage for firms, which give it (Brennan, 1988).

There are a number of studies concerning relationship between trade credit and other external sources of capital. Schwartz (1974) was the first one to find that firms with better access to bank credits become intermediates between banks and their clients, taking loans from banks and giving them in the form of trade credits to their customers. Further studies (e.g. Petersen and Rajan, 1997; Kohler, Britton and Yates, 2000; Nilsen, 2002; Deloof and Jegers, 1999; Cunningham, 2004; Burkart, 2004; Bougheas et.al, 2009) also confirm this result, making similar conclusions for different samples, that account payables are used as substitute for

bank credits and accounts receivables are complimentary to bank credits. In other words, firms taking bank credits are less likely to receive trade credits, but more likely to offer them. If economic agents are rational, they do this to get margin, so they, probably, get cheaper credits from bank, and trade credits for higher price to their customers. Price for trade credit is a loss of earlier payment discount. All these studies are made for developed countries, such as the USA, Canada, the UK with low borrowing interest rate, so probably lost opportunity of earlier payment discount is more costly than take bank credit.

At the micro level, studies concentrated on firms' characteristics as determinants of trade credit taking/extending. Size of the firm and its profitability is used as proxies for credit worthiness. Size is found to be positively related to both accounts payables and receivables, so big firms offer and accept more trade credits (Petersen and Rajan, 1997; Deloof and Jegers, 1999; Miwa and Ramseyer, 2005; Bougheas et al, 2009). Gross profitability is positively related to account receivables, implying that more profitable firms offer more trade credits. At the same time, profitability is negatively related to accounts payables, as more profitable firm pay for their bills/shipments earlier (Petersen and Rajan, 1997; Deloof and Jegers, 1999).

Two studies are made on inventory trade-off with trade credit. Bougheas et al (2009) investigate panel of UK manufacturing firms for 1993-2003 years and Vaidya (2011) analyse Indian firms. These studies use similar methodology but there are some differences in results, reason for that could be difference in economic environment of the UK and developing economy of India. They both use first-difference GMM approach in order to control for firm-specific effect and for possible endogeneity of regressors.

The effect of firm characteristics on trade credit preferences differs for developed and developing countries. In developed countries big firms and firms with better access to financial resources give more trade credits in contrast to developing countries where the situation is the opposite. Horen (2007) explains this phenomenon by differences in market concentration: as big firms usually have higher market power, this gives them opportunity to increase their customer surplus demanding to buy on credit. So, firms with high market concentration, take trade credit by “force”, simply not paying in time.

Both papers find negative and significant impact of inventories on accounts receivables, which mean that firms with higher inventories extend more trade credits to avoid holding costs. Bougheas et al (2009) don't find significant impact of inventories on accounts payables. On the contrary, Vaidaya (2011) finds significant positive relationship, which indicates that firms with higher inventories tend to postpone payments to their suppliers, as a result there is an increase in account payables. Vaidaya also divides inventories into finished goods and work-in-process: only inventories of finished goods decrease accounts receivable but both of them have positive significant influence on accounts payable.

There are a few studies about determinants of trade credit in Ukraine. Levchuk (2002) investigates trade credit determinants focusing primarily on the banks credits. She finds that in the early 2000 firms in Ukraine used more trade credit than bank credits. Moreover, she finds statistically significant negative relationship between two types of credit. This may imply that shortage of bank credits forced firms to use more trade credits. Firms with higher tax and wage arrears and declining sales gave more credits. Author draws from her results policy recommendations to develop financial sector, especially focusing on facilitating access to financial resources and expanding factoring service.

Over the last ten years, the situation with banking sector in Ukraine according to Doing Business ranking has improved: it is easier now to get bank credits; costs of credits have decreased (from 25% in 2002 to 15,5% in 2011). Also factoring services have developed, giving firms possibilities to sell their accounts payables, so firms could immediately get cash for a given trade credit, which makes trade credits even more attractive.

So, different studies were made about determinants of trade credits, most of which for developed countries. The most discussed determinants are firm access to bank credit, performance (profits), size. These studies find that trade credit is more expensive, and firms tend to minimize trade credits. The different situation is observed in emerging markets, where firms with high market power give trade credits by “force”.

This research studies determinants of trade credit usage by firms with stress on inventory management. It is made for Ukraine, country with high risk of not getting cash for already sold products, high borrowing interest rates but comparable easiness of taking bank credit (at least according to the WB ranking) as well as with markets often characterized by market power of customers.

Chapter 3

METHODOLOGY

To investigate the posed research question I use GMM approach to control for possible endogeneity of independent variables and firm-specific time-invariant effects (fixed effect), which may correlate with error terms.

I use the following **dependent variables**:

AP (Accounts payable)/sales – Proxy for trade credits received from suppliers

AR (Accounts receivable)/sales – Proxy for trade credits given to customers

AR-AP/sales – Proxy to net trade credit

Independent variables.

The **main variable of interests** for this research is inventories. Higher cost of inventories will stimulate firms to sell on credit, rather than hold inventories (Bougheas et al., 2009). Hence inventories are supposed to be negatively related to accounts receivable, and have negative indirect effect on accounts payables, with insignificant coefficient. Also interaction term of inventories and size is included, as for bigger firms the cost of holding inventories is supposed to be lower, and coefficient of interaction is expected to be positive, offsetting the negative effect. Thus bigger firms less likely avoid holding cost of inventories giving trade credits. Also, this conclusion is confirmed including dummies for size, as coefficient for large firms is less negative.

Inventories could be further divided into raw materials and finished goods, as it was done by Vaidaya (2011) who finds that the type of inventories matter. While

accumulation of finished goods is negatively correlated with accounts receivables, raw materials do not seem to have any effect on the latter. At the same both types have positive and significant effect on accounts payable, implying that firms with higher inventories tend to get more trade credits. The effect on net trade credit (AR-AP) should be similar to the effect on accounts receivables (negative).

Following previous research to control for the relationship between trade credits and bank credits, the book value of short term bank's credits is included as another dependent variable. The coefficient is expected to be negative with AP as bank credit is possible substitute for trade credit; and to be positive in AR and AR-AP regressions, as firm with access to other credit resources have possibility to give trade credits.

Other **control variables** include variables describing credit worthiness: size, profitability, liquid assets, and collaterals. Size of the firm could be measured in several ways:

- By logarithm of number of employees as in Levchuk (2002)
- By logarithm of book value of assets as in Vaidaya (2011)

In this work book value of assets is used to measure size as the number of employees is not available in the database. The coefficient on size variable is expected to be positive in each regression based on results from Bougheas (2008) and Petersen (1997).

Profits are measured by EBIT (earnings before interest and tax) instead of NI (net income) to reduce possibility of multicollinearity with bank credits variable. If bank credits increase interest payments also increases, which cause NI to decrease, so there is direct relationship between banks credits and NI. Profitability measures are expected to be positively associated with AR, as more

profitable firm could give more credits, stimulating sales and reducing inventories; and negatively related to AP, as profits are internal source of capital, which is a substitute to trade credits.

Liquid assets are included to measure available assets to be given as trade credit or by which it could be paid. So positive relation is predicted for AR and negative for AP. Collaterals is equal to fixed assets divided by total assets. It is expected that firms having higher fixed assets have better access to banks credits, so they need less trade credits. Industry and form of organisation dummies are included to control for specific features of different sectors.

All variables are normalized by dividing them by total sales.

Therefore, I estimate the following regressions:

$$Y = \alpha + \beta X \quad (1)$$

$$Y = (AR, AP, AR-AP) \quad (2)$$

$$X = (\text{inventories, finished goods, raw materials, size*inventories, size, EBIT, liquid assets, collaterals, short term bank loans, industry dummies, form of organisation, year dummies}) \quad (3)$$

Summarising previous discussion, the expected results (signs) are presented in Table 1.

Table 1: Expected results

	AR	AP	AR-AP
Size	+	+	+
Inventories	-	+	-
Finished goods	-	+	-
Raw materials	0	+	0
Inventories*size	+	+	+

Table1: Expected results – Continued

	AR	AP	AR-AP
EBIT/sales	+	+	+
Liquid assets	+	-	+
Short term banks' credits	+	-	+
Collaterals	+	-	+

Problem of endogeneity can possibly arise as trade-off between inventories and trade credit have main goal of profit maximization. So not only inventories and other control variables affect trade credit extension or receiving but also vice versa. To control for endogeneity I use GMM estimation procedure which uses two types of variables GMM-style including all endogenous variables and IV-style including strictly exogenous variables.

Accounts receivables influence inventory as using more accounts receivable firm could reduce inventories. They also could affect EBIT as selling on accounts stimulate demand, which increases revenues thus increasing profits. Liquid assets could also be dependent on accounts receivable as more trade credits are expanded less cash firm gets, as firm gets cash with delay. Level of collateral also depends on accounts receivables, increase in AR implies increase in assets, even if value of fixed assets does not change, its ratio to all assets decreases. Accounts receivable could affect bank credits, as more trade credits are given firm could need additional sources of capital among which bank credits are.

Accounts payable influence inventories as well: as firm can accumulate more inventories by taking trade credit. Liquid assets could also be dependent on account payables as more trade credits are received more cash firm saves. As banks credits are supposed to be substitute for trade credits, so the more trade

credits firm gets the less bank credits are needed. Also, if firm pays later it can make some gains on cash by not paying immediately. Only collaterals are not subject to reverse causality, thus they are included as IV-style variable.

When net credit is used as dependent variable all variables are included as GMM-style, as each of them could be inversely related with at least one of them (accounts payables and/or receivables).

Hence in the GMM estimation we include lagged dependent variables as instruments, all variables except for collaterals in AP equation are included as GMM-style variables with lags from 1 to 10.

Chapter 4

DATA DESCRIPTION

Data is taken from annual financial statements, such as “Balance sheet” and “Financial results” from the database of data set provided by National Statistics committee of Ukraine and available from KSE data center. My sample includes big and medium companies with book value of assets from 2.746 m UAH to 279 m UAH and average equals to 138 m UAH. The data comes in the form of the unbalanced panel for ten years from 2001 till 2010 with overall number of observations above 96 thousands. To exclude firms without operations during the observed period, it was dropped firms with annual sales below UAH 1,000 and with zero book value of assets were dropped from the sample. The distribution by industries is presented in Table 2.

Table 2: Distribution among industries

Industry	Observations	%
All	96233	100%
Mining	2620	3%
Construction	10240	11%
Manufacturing	41561	43%
Transportation	9255	10%
Trade	13913	14%
Services	4667	5%
Agriculture	13677	14%

For empirical estimation only manufacturing firms are included, as inventory management is more important for manufacturing firms. Manufacturing firms include 10 industries, namely: food, drink and tobacco; textile and clothing; paper and wood; publishing; chemistry; metallurgy; machinery; electronic production; transport construction; and other. Summary statistics for manufacturing firms is presented in Table 3 below

Table 3: Distribution of firms among manufacturing industries

Industry	Observations	%
Manufacturing	39220	100%
Food and tobacco	11396	29%
Textile and cloth	3130	8%
Paper and wood	1230	3%
Publishing	1545	4%
Chemistry	2659	7%
Metallurgy	6898	18%
Machinery	7599	19%
Electronic production	1421	4%
Transport construction	1575	4%
Other	1767	5%

Next I present descriptive statistics for dependent variables by size of the firms see Figure 1.

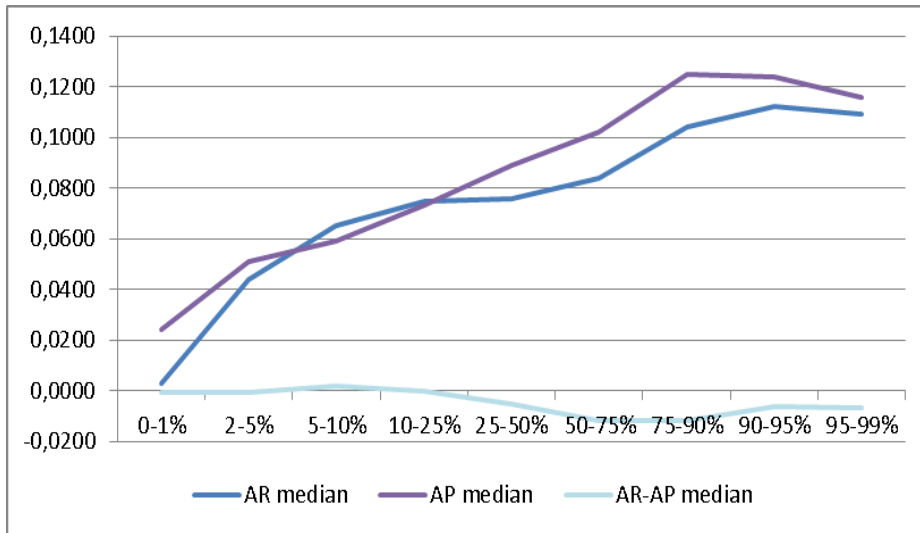


Figure 1: Distribution of dependent variables by size

From the graph we can observe a quadratic relation between size of the company (presented in billions) and AP and AR. Hence, we should include assets and assets squared in our regression rather than logarithm of assets. But as we use GMM it is better to use only linear variables, moreover, coefficient on assets squared is very small, so we can ignore the square term.

In order to check if we can predict net credit with GMM, we should predict its distribution. From the Figure 2, we could make conclusion that net credit is approximately normally distributed.

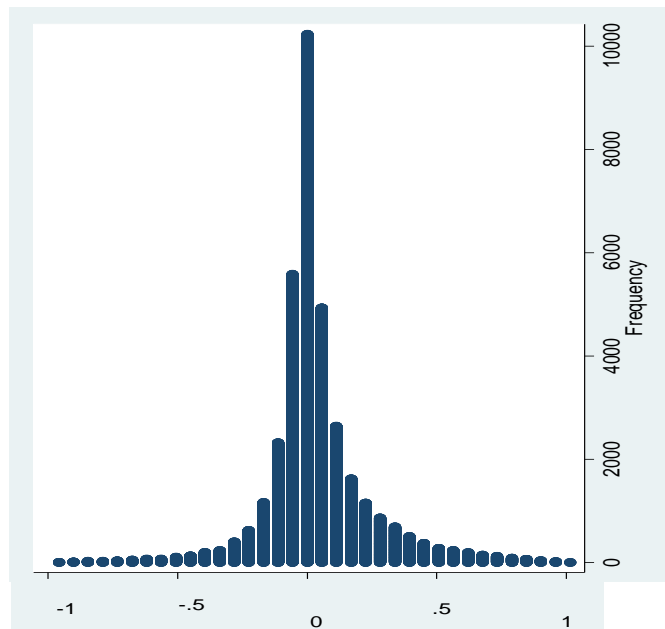


Figure 2: Distribution of net trade credit divided by sales

Descriptive statistics for all variables for manufacturing firms is presented in Table 4. In our sample the mean and median for accounts payable are higher than for accounts receivables, firms, on average, tend to receive more trade credits than extend, so more firms are net borrowers in Ukraine (net trade credit is negative), it could be signal for lower price of trade credits.

Table 4: Descriptive statistics

	N	Mean	Median	Sd
Dependent variables				
Accounts receivables	39179	0.608	0.078	13.674
Accounts Payables	39179	1.205	0.092	21.45
Net Trade Credit	39179	-0.597	-0.009	18.99
Variables of interest				
Inventories	39179	0.953	0.182	18.616
Raw materials	39179	0.561	0.107	7.132
Finished goods	39179	0.392	0.047	16.1
Control variables				
Assets	39179	0.082	0.008	0.55
EBIT	39179	-0.537	0.006	14.794
Liquid	39179	1.063	0.069	32.142
Banks	39179	0.639	0	43.438
Collaterals	39179	0.562	0.582	0.228

Obtained descriptive statistics shows very high difference between mean and median for many variables, latter are up to ten times higher than mean value. This is a signal for presence of outliers. We drop the highest 1% values, and obtain descriptive statistics presented in Table 5.

Table 5: Descriptive statistics without top 1%

	N	Mean	Median	Sd
Dependent variables				
Accounts receivables	37143	0.18	0.076	0.379
Accounts Payables	37143	0.304	0.088	0.792

Table 5: Descriptive statistics without top 1% - Continued

	N	Mean	Median	Sd
Net Trade Credit	37143	-0.125	-0.009	0.704
Variables of interest				
Inventories	37143	0.413	0.178	0.787
Raw materials	37143	0.256	0.105	0.554
Finished goods	37143	0.157	0.048	0.384
Control variables				
Assets	37143	0.041	0.008	0.113
EBIT	37143	-0.153	0.008	1.541
Liquid	37143	0.188	0.066	0.469
Banks	37143	0.098	0	0.266
Collaterals	37143	0.559	0.581	0.223

Table 6: Descriptive statistics without top 1% and AR/sales, AP/sales<1

	N	Mean	Median	Sd
Dependent variables				
Accounts recivables	34327	0.118	0.07	0.144
Accounts Payables	34327	0.152	0.077	0.191
Net Trade Credit	34327	-0.034	-0.005	0.193
Variables of interest				
Inventories	34327	0.332	0.164	0.577
Raw materials	34327	0.204	0.097	0.405
Finished goods	34327	0.128	0.044	0.281
Control variables				
Assets	34327	0.042	0.008	0.115
EBIT	34327	-0.065	0.011	0.921
Liquid	34327	0.149	0.062	0.347

Table 6: Descriptive statistics without top 1% and AR/sales, AP/sales<1 -
Continued

	N	Mean	Median	Sd
Banks	34327	0.093	0	0.245
Collaterals	34327	0.557	0.577	0.219

After dropping top 1% percentile of the distribution it is still obvious that not all outliers were eliminated (see Figures 2, 3). We observe that in the tails of the distribution the ratios of AR to sales and AP to sales exceed 1, constituting around 10% of all data. Firm can't give more trade credits than its sales, so values of AR/sales higher than 1 could be outliers. Accounts payables normally shouldn't exceed purchasing but from our data it is unavailable, so we predict it by the cost of goods sold, if firm is profitable the last shouldn't exceed sales, so AP/sales ratio should also be less than 1. However, such high values of these ratios are indicative of the accumulation of payables or receivables from previous periods.

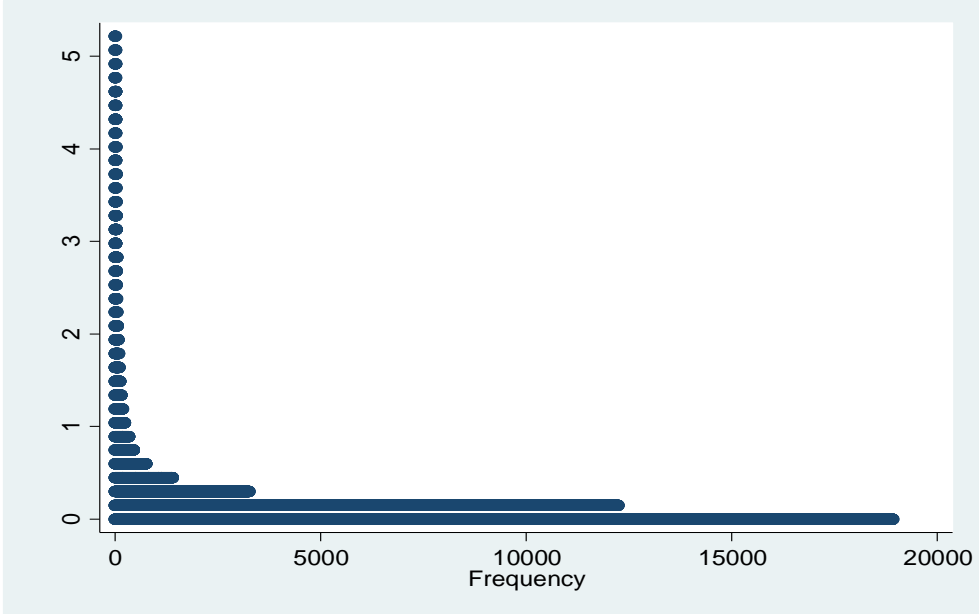


Figure 3: Distribution of AR/sales

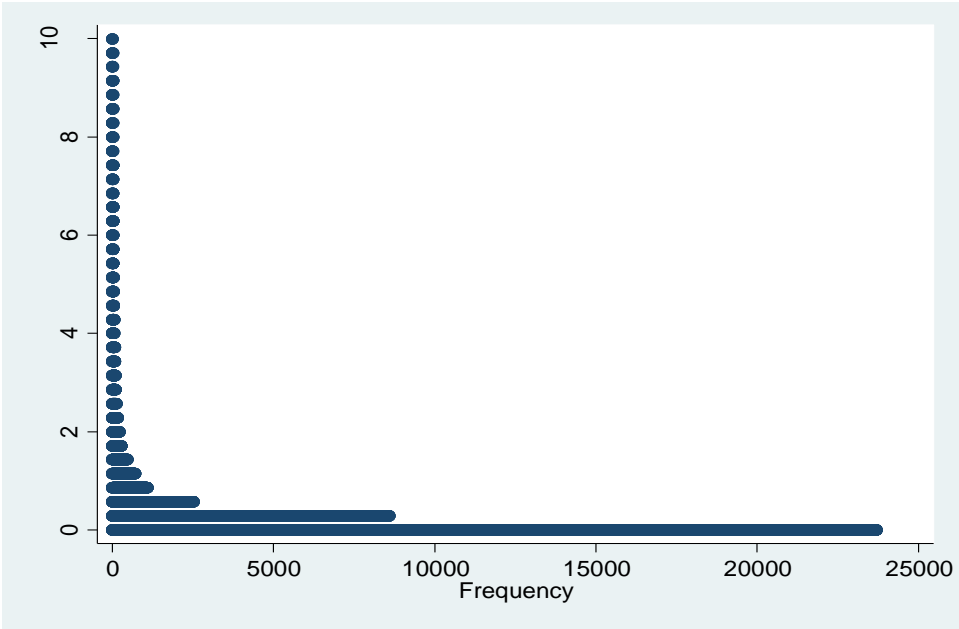


Figure 4: Distribution of AP/sales

Given the above and as a robustness check we estimate regressions dropping values of AR/sales and AP/sales exceeding 1 to see if our results aren't driven by those outliers.

The obtained results (see Table 7) suggest that for higher value of inventories (higher than mean) account receivables and payables are also higher, but this results could be change if we control for other determinants.

Table 7: Dependent variables by inventories.

	More than mean	Less than mean	Predicted sign
Inventories			
N	7155	27172	
AR	0.173	0.103	+
AP	0.233	0.131	+
AR-AP	-0.059	-0.028	-
Finished goods			
N	7093	27234	
AR	0.164	0.106	+
AP	0.218	0.135	+
AR-AP	-0.054	-0.03	-
Raw materials			
N	6750	27577	
AR	0.1715	0.105	+
AP	0.231	0.133	+
AR-AP	-0.060	-0.028	-

Chapter 5

EMPIRICAL RESULTS

Regressions results for AR in three specifications with inventories (1), division of inventories into raw materials and finished goods (2), and including interaction term between inventories and size (3) are presented in Tables 8-10. Table 8 shows results for trade credit expanded (AR), while Table 9 presents results for trade credit received (AP). Results for net trade credit (AR-AP) are summarized in Table 10.

Table 8: Results for accounts receivables

	(1)	(2)	(3)
Inventories	0.091		0.076
	(0.003)***		(0.002)***
Finished goods inventories		0.171	
		(0.010)***	
Row material inventories		0.079	
		(0.002)***	
Inventories*size			0.919
			(0.130)***
EBIT	-0.015	-0.011	0.001
	(0.014)	(0.015)	(0.006)
Size	-1.489	-1.400	-1.494
	(0.705)**	(0.730)*	(0.636)**

Table 8: Results for accounts receivables - Continued

	(1)	(2)	(3)
Banks	-0.053	-0.130	-0.058
	(0.042)	(0.070)*	(0.039)
Liquid assets	0.115	0.124	0.121
	(0.014)***	(0.010)***	(0.011)***
Collaterals	-0.090	-0.285	-0.364
	(0.890)	(0.764)	(0.835)
Constant	-12.892	10.368	-40.753
	(75.422)	(59.452)	(78.821)
N	37,143	37,143	37,143
Year dummies	yes	yes	yes
Industries dummies	yes	yes	yes
Form of organization dummies	yes	yes	yes
AR(1)	0.142	0.103	0.231
AR(2)	0.334	0.312	0.635
Sargan test	0.000	0.235	0.857
Note: Standard errors in parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$			

The obtained results suggest that inventories have positive effect on accounts receivables in all specifications, even if we separate finished goods and raw materials. Also bigger firms and firms with higher banks credits are found to give less trade credits. These results don't coincide with our predictions, and reject hypothesis about trade-off between inventories and accounts receivable. But such results could be driven by firms with high accumulated accounts receivable from previous periods, which probably have problems with sales, so they could also accumulate inventories of both types. To deal with this problem we run regressions on the sample of firms with AR/sales and AP/sales ratios below 1.

Also, Sargan test indicates presence of weak instruments in the first specification, while in second and third specifications the null hypothesis of instruments exogeneity cannot be rejected. Tests for autocorrelation in first and second lags (AR(1) and AR(2)) indicate its absence, so it is possible to include first lag and deeper lags of independent variables.

Table 9: Results for accounts payables

	(1)	(2)	(3)
Inventories	-0.002		-0.053
	(0.013)		(0.013)***
Finished goods inventories		0.324	
		(0.037)***	
Raw material inventories		-0.049	
		(0.013)***	
Inventories*size			3.145
			(0.645)***
EBIT	-0.023	0.005	0.036
	(0.043)	(0.019)	(0.050)
Size	-2.118	-3.525	-2.607
	(3.567)	(3.236)	(2.719)
Banks	0.459	0.568	0.458
	(0.184)**	(0.199)***	(0.185)**
Liquid assets	0.063	0.102	0.091
	(0.055)	(0.068)	(0.056)
Collaterals	12.234	14.212	8.008
	(12.621)	(12.581)	(10.874)
Constant	43.143	234.914	-148.707
	(520.611)	(453.136)	(373.044)

Table9: Results for accounts payables – Continued

	(1)	(2)	(3)
N	37,143	37,143	37,143
Year dummies	yes	yes	yes
Industries dummies	yes	yes	yes
Form of organization dummies	yes	yes	yes
AR(1)	0.226	0.223	0.238
AR(2)	0.787	0.334	0.510
Sargan test	0.000	0.006	0.000
Note: Standard errors in parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$			

By Sargan test we reject hypothesis of instruments exogeneity, so results could be biased by weak instruments, moreover results don't coincide with predicted signs, for example, inventories are supposed to be positively related or negligible to AP but they turn to be negative, when interaction with size is included. So, we also need to check if these results are not driven by firms with accumulated AP from previous periods. Due to AR(1) and AR (2) tests all lags could be included as there is no serial correlation.

Table 10: Results for net trade credit

	(1)	(2)	(3)
Inventories	-0.052		-0.378
	(0.017)***		(0.282)
Finished goods inventories		0.489	
		(0.577)	
Raw material inventories		-1.280	
		(1.201)	

Table 10: Results for net trade credit - Continued

	(1)	(2)	(3)
Inventories*size			4.852
			(4.125)
EBIT	0.048	-0.190	-0.067
	(0.107)	(0.382)	(0.139)
Size	1.995	1.426	-1.136
	(0.943)**	(3.178)	(2.360)
Banks	-1.500	-0.301	-0.962
	(0.470)***	(1.676)	(0.518)*
Liquid assets	0.091	0.156	0.094
	(0.019)***	(0.138)	(0.019)***
Collaterals	-0.500	-1.190	1.509
	(0.945)	(1.323)	(1.958)
Constant	83.601	76.844	-76.309
	(92.095)	(855.891)	(160.197)
<i>N</i>	37,143	37,143	37,143
Year dummies	yes	yes	yes
Industries dummies	yes	yes	yes
Form of organization dummies	yes	yes	yes
AR(1)	0.493	0.782	0.467
AR(2)	0.602	0.823	0.604
Sargan test	1.000	1.000	1.000
Note: Standard errors in parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$			

The results for net trade credit are less impressive: almost all variables of interest are all insignificant. Although by Sargan test instruments are predicted to be valid.

Given the presence of autocorrelation for the first lag (p-value for AR(1) for first lag is <0.05), so we include only second and deeper lags in the estimation.

Robustness check

To check if some outliers don't change results, we drop values higher than 1 for AP/sales and AR/sales (our sample become smaller by 7.6%). Ratios of AR to sales and AP to sales above 1 indicate accumulated debt rather than trade credit from the current period, which firms give to stimulate demand and decrease inventories. As we are interested in the trade-off between inventories and trade credit in the current period using in the sample of only firms with ratios below 1 serves our purposes.

The results change in all regressions (AR, AP, AR-AP), with coefficients which are now more in line with our predictions. The lagged values are also become better instruments according to Sargan test. Results are presented in Tables 11-13.

Table 11: Results for accounts receivable on reduced sample

	(1)	(2)	(3)
Inventories	0.056		0.038
	(0.022)**		(0.023)
Finished goods inventories		-0.128	
		(0.046)***	
Raw material inventories		0.099	
		(0.017)***	
Inventories*size			0.501
			(0.261)*
EBIT	-0.062	-0.023	-0.058
	(0.023)***	(0.016)	(0.024)**

Table 11: Results for accounts receivable on reduced sample

	(1)	(2)	(3)
Size	-0.107	-0.553	-0.254
	(0.343)	(0.494)	(0.305)
Banks	-0.038	0.033	-0.031
	(0.022)*	(0.032)	(0.019)
Liquid assets	0.117	0.119	0.119
	(0.002)***	(0.001)***	(0.002)***
Collaterals	0.147	0.049	0.165
	(0.388)	(0.382)	(0.353)
Constant	-50.000	-21.103	-49.450
	(43.896)	(34.050)	(40.575)
N	34,327	34,327	34,327
Year dummies	yes	yes	yes
Industries dummies	yes	yes	yes
Form of organization dummies	yes	yes	yes
AR(1)	0.170	0.075	0.193
AR(2)	0.902	0.885	0.652
Sargan test	1.000	1.000	1.000
Note: Standard errors in parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$			

Results presented in Table 11 show that inventories are positively affecting AR in specification (1) without division into finished goods and raw materials. In specification (2) accumulation of finished goods negatively influences accounts receivable, which coincide with our predictions and results estimated by Vaidaya (2011). This means that firms are ready to sell products on credit to decrease inventories storage. If firm produces more than it can sell immediately, it has to choose between storage of these products or selling them on credit. In the case of

selling on credit it decreases finished goods inventories and increases accounts receivable. At the same time if firm gets more raw materials inventories it tends to give more trade credits to decrease storage cost at least by disposing of finished goods. In general, bigger inventories stimulate firms to give more trade credits to reduce finished goods storage costs. Also, bigger firms with higher inventories tend to give more trade credits (as in Bougheas, 2009) to offset the negative effect of inventories. Also firms with better access to outside and internal financial resources (more profitable firms and firms with more bank credits), tend to give less trade credits (which is significant only for first specification). It could be explained by the fact that giving trade credits is not valuable in Ukraine, so firms having financial resources tend not to give trade credits, as they could invest this money into something more profitable. And firm with better access to bank credits are not intermediaries between banks and their customers. These results contradict Bougheas (2009), who takes sample of the UK firms and finds positive effect of both variables, while they coincide with Vaidaya (2011) results on the sample of Indian firms. So, this could be driven by similar feature of developing countries.

Liquid assets are positive and significant, implying that the more liquid assets firm has the less urgency in cash payment for sales it experiences, and hence it can extend trade credits. Size of the firm and its collaterals are insignificant.

Table 12: Results for accounts payables on reduced sample

	(1)	(2)	(3)
Inventories	0.043		0.081
	(0.038)		(0.042)*
Finished goods inventories		0.274	
		(0.129)**	

Table 12: Results for accounts payables on reduced sample - Continued

	(1)	(2)	(3)
Row material inventories		-0.029	
		(0.027)	
Inventories*size			-0.907
			(0.505)*
EBIT	0.046	-0.017	0.043
	(0.037)	(0.027)	(0.032)
Size	-0.371	-0.995	-0.066
	(0.495)	(0.488)**	(0.442)
Banks	0.323	0.324	0.306
	(0.094)***	(0.105)***	(0.086)***
Liquid assets	0.049	0.046	0.046
	(0.003)***	(0.002)***	(0.003)***
Collaterals	1.578	1.985	1.466
	(0.909)*	(0.917)**	(0.856)*
Constant	-51.203	-31.924	-54.579
	(57.022)	(42.567)	(55.858)
N	34,327	34,327	34,327
AR(1)	0.075	0.353	0.072
AR(2)	0.283	0.596	0.355
Sargan test	1.000	1.000	1.000
Note: Standard errors in parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$			

Sargan test indicates no problems with instruments, and absence of autocorrelation in first and second lags ($AR(1)$ and $AR(2) > 0.05$) permits to include first and deeper lags. The results obtained for accounts payable show positive relationship between inventories in the second and third specifications

and not in the first specification. These results coincide with both Vaidaya (2011) and Bougheas (2009). Positive effect could be explained by difficulties in paying their bills for firms, which have problems with sales, meaning they can't sell all products produced and hence increase inventories of finished goods. Bigger firms offset this positive effect and pay their bills earlier.

Accounts payable is found to be complements with bank credits, contradictory to Bougheas (2009) and consistent with Vaidaya (2011), and with Burkart and Ellingsen (2004). It could be explained, on the one hand, following Burkart and Ellingsen (2004), who argue that financially bound firms use both bank credits and trade credits. And on the other hand, it could be explained by the fact that conditions for trade credits at least are no worse than for bank credits, as firms with larger bank credits do not avoid trade credits, so trade credits are at least no more expensive or even cheaper.

Positive sign on liquid and collaterals could be explained by higher creditworthiness of borrowers, thus lenders have more confidence to get payments back, so they are more likely to give trade credits.

Table 13: Results for net trade credit on reduced sample

	(1)	(2)	(3)
Inventories	-0.005		-0.063
	(0.055)		(0.055)
Finished goods inventories		-0.468	
		(0.097)***	
Raw material inventories		0.118	
		(0.035)***	

Table 13: Results for net trade credit on reduced sample – Continued

	(1)	(2)	(3)
Inventories*size			1.523
			(0.775)**
EBIT	-0.125	-0.015	-0.114
	(0.056)**	(0.034)	(0.050)**
Size	1.435	1.358	0.733
	(0.527)***	(0.587)**	(0.506)
Banks	-0.360	-0.257	-0.335
	(0.106)***	(0.076)***	(0.094)***
Liquid assets	0.066	0.072	0.072
	(0.005)***	(0.002)***	(0.006)***
Collaterals	-0.295	-0.826	-0.247
	(0.498)	(0.466)*	(0.477)
Constant	-22.120	19.521	-22.776
	(40.934)	(35.953)	(37.837)
N	34,327	34,327	34,327
AR(1)	0.084	0.352	0.134
AR(2)	0.647	0.732	0.700
Sargan test	1.000	1.000	1.000
Note: Standard errors in parenthesis * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$			

Sargan test does not reject exogeneity of instruments and AR(1) and AR(2) confirm absence of autocorrelation, so we use lags from 1 to 10. Results are very similar to accounts receivables, inventories become significant only in case of their type division and finished goods have negative sign but raw materials have positive sign. Firms with large finished goods inventories tend to decrease them by giving trade credits and increase accounts payable but in smaller amount.

Firms with better access to financial sources are net trade credits receivers, which can be viewed as one more signal of cheaper trade credits compared bank credit. Firms with better access to financial resources do not operate as financial intermediaries, as they take more credits than give to their customers. But size has positive influence, both interaction term and size variable, implying that bigger firms give more trade credits than receive.

Chapter 6

CONCLUSION

Empirical research has been made to evaluate hypothesis about using trade credits as an instrument of inventories management controlling for other determinants of trade credits in Ukraine. Similar investigations are made for UK and India. The sample of big and median manufacturing firms is used to provide empirical results.

Empirical results confirm hypothesis about a trade-off between finished goods inventories and trade credits. This means that in Ukraine firms use trade credit as an instrument for inventories management. This is confirmed by negative sign of the coefficient on finished goods in both equations with accounts receivables and with net trade credit. Moreover, firms are supposed to increase accounts payable, when they do not have possibility to sell all commodities, which have been produced. So in case of overproduction firms increase accounts receivables to stimulate demand and sell at least for future cash, but also increase accounts payables, as they do not have resources to pay their bills.

Firms with higher availability of both internal and external financial resources take more and give less trade credits. From these results we can conclude that for Ukrainian firms it is more valuable to take trade credits than give them. Also, from data analysis mean and median for accounts payable are higher than for receivables. These results could be explained by high cost of bank credits in Ukraine and probably lower cost of trade credits. But to confirm this prediction

further investigations are needed, using data from questionnaires about price of trade credit and its extend and received values.

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