TRADE CREDIT DETERMINANTS OF UKRAINIAN ENTERPRISES

by

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A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Arts in Economics

Economics Education and Research Consortium

MA Program in Economics

National University "Kyiv-Mohyla Academy"

2002

Approved by _____
Chairperson of Supervisory Committee

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Program Authorized
to Offer Degree _____

Date _____

National University "Kyiv-Mohyla
Academy"

Abstract

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This thesis investigates trade credit (TC) phenomena in Ukraine. In essence, a trade credit is a loan provided by a supplier to its customers in conjunction with product sales, and, thus is an important alternative source of enterprise's financing. We find that the problem of overdue trade credits was much sharper in Ukraine than in other transition countries in 1998. Preliminary macroanalysis suggests that arrears in TC are strongly associated with "forced" TC practices and underdeveloped financial institutions. Based on micro-level financial data for 609 Ukrainian enterprises we analyze the determinants of TC usage and test our main hypothesis of the existence of a substitution effect between trade credits and bank loans. We find that firm's arrears and financial needs are strongly associated with higher TC usage, while better access to bank lending – with less trade credits. Private, as well as concentrated state ownership leads to less trade credits. The data supports the proposition that firms with larger amount of bank loans restrict their usage of trade credits. So, the main emphasis for policymakers should be on further improvement of financial system in Ukraine. The paper concludes with possible explanations of the received results and some policy implications.

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ACKNOWLEDGMENTS

The author wishes to express her gratitude to Prof. Jerzy Konieczny for support and useful suggestions at the early stage of this research. Special thanks are provided to Prof. Ghaffar Mughal for his insightful comments throughout the process of thesis writing. We would like also to thank Prof. Magdalena Sokalska for helpful discussions.

Our sincere appreciation is provided to Prof. Stefan Lutz for valuable advice, guidance, and continuous feedback during the whole two years and thesis development in particular.

Finally, the author is thankful to all her colleagues, especially to Marianna Kudlyak and Nataliya Boyko, for their support and willingness to help.

GLOSSARY

Accounts Payables – the sum reflected on account, which shows how much a firm owes its suppliers.

Accounts Receivables – the sum reflected on account, which shows how much customers owe to a firm.

"Forced" trade credits – credits that are forced upon the creditor in the sense that they happen mainly on a customer's demand.

SSCU – The State Statistics Committee in Ukraine

SSMSC – Ukrainian State Stock Market and Securities Commission

Trade credit (TC) – a loan a supplier provides to its customers in conjunction with sales. The level of accounts payable reported by firms usually represents it. But we will use "TC extended" and "TC received " to distinguish between supply and demand of TC. Further we will use trade credit extended and accounts receivable, trade credit received and account payables interchangeably.

Veksels - promissory notes issued by enterprises, banks or government with specified maturities and discount rates.

Chapter 1

INTRODUCTION

The process of transition involves changes in business environment, forms and ways of enterprise activities, and in the determinants of firms' performance in response to institutional changes, government policies, and overall economic development.

The main problem of enterprises in developing countries remains their survival and development, for which financing is one of the key determinants. The importance of financial sector development, where banks play a special role in providing enterprises with necessary external financing, is widely recognized. Among other related studies, the work of Sultan and Michev (2000) and Bokros (2001) demonstrates that financial sector in Ukraine is still weak and undeveloped. This fact calls for revealing other possible sources of firm's financing in Ukraine.

Evidence from developed countries shows that in addition to borrowing from financial institutions, firms widely use trade credit, or in other words, financing from their suppliers (Petersen and Rajan, 1996; Demirguc-Kunt and Maksimovic, 2001). In financial terminology trade credit is represented by accounts payables and accounts receivables. Trade credit amounts to 15-20% of GDP in Canada, USA, Great Britain, and 55-60% in Japan (Shaffer, 2000). According to the substitution hypothesis of trade credit, the latter is expected to be more prominent in countries with undeveloped financial sector and is likely to be an important phenomenon in Ukraine as well.

Although a normal phenomenon in those countries, in transition economies, the share of trade credit in a country's GDP, especially overdue arrears, is much larger (Legeida, 2001; Commander and Mussen, 1998). In Ukraine, the share of total payables have increased from 47 to 68% of GDP from 1997 to 2001 and total receivables – from 40 to 66% of GDP. In spite of the positive tendency of decreasing overdue payables and receivables, they remain a large part of total trade credits, more than 40% at the beginning of 2001. The high level of accounts receivables and payables cause the increase in the duration of financial cycle of enterprises, which consequently hampers their development and leads to considerable amount of overhead expenses.

Financial statements of a firm do not allow us to distinguish between overdue and total payables and receivable. So, we will investigate the total amount of trade credit in our analysis on micro level.

The normal explanation for overdue payables would be default by customers. In transition countries arrears to the budget and off-budget funds constitute a disproportional share of total enterprise arrears, which may indicate the transfer of liquidity from the budget rather than across firms.[1] In addition to tax and wage arrears, arrears for utility services (primary electricity and gas) are the second largest portion of arrears. Such arrears have to be considered as implicit subsidies to the enterprises (Vincentz, 2000). This pattern of behavior calls for deeper analysis.

We will consider several well-developed theories explaining why trade credit is used in developed countries. At the root of them lies the high level of trust among suppliers and customers, the condition of repaying the credit on certain date, and also well functioning enforcement mechanism. In transition countries,

[1] Commander and Mumssen, 1998, explain this fact in Russia.

these conditions are far away from their level in developed countries, which implies some peculiarities for those economies. Non-monetary transactions, disorganization, network effects, and liquidity squeeze are the major widely discussed problems in the literature on inter-firm debt in transition countries. Although not fully applicable, existing trade credit theories, designed to explain the developed countries' experience, may still shed some light on the use of trade credit in transition economies.

In our work, we will try to explain the phenomena of trade credit among Ukrainian enterprises. Specifically, we will focus upon the following questions: Why credit constrained firms are able to give loans to other firms? What firms receive credits? How trade credit is related to other types of credit, especially enterprises' arrears? What is the role of state in this process?

In Chapter 2 of this thesis, we discuss the literature on trade credit and related issues in transition as well as in developed countries. In the third part, we consider the macroeconomic conditions that characterize the Ukrainian situation. In the fourth part, we analyze the determinants of trade credit and relationships among different characteristics of firms using micro data on Ukrainian enterprises. We conclude with the discussion of results and draw some policy implications.

C h a p t e r 2

THEORIES OF TRADE CREDIT AND TRANSITION ECONOMIES PECULARITIES

Trade credit or lending by suppliers to their customers in the form of goods is a recognized form of natural inter-firm relationship. It stems from the development of mercantile credit in the nineteenth century when merchants needed to obtain short-term credits in circumstances under which banks did not lend. In present times, trade credit is still widely used as a means of financing working capital in countries where financial intermediaries and markets are well developed. US researchers found that 18% of the total assets of US firms in 1991 consisted of accounts receivable; trade credit is more than a quarter of total corporate assets in Germany, France and Italy (Demirguc-Kunt and Maksimovic, 2001, p. 1). In many OECD, countries it exceeds bank financing of firms, both short-term and long-term (Schaffer, 2000).

Theories of Trade Credit (TC)

Trying to answer the puzzling question why firms use trade credit researchers developed many theories, which generally fall into two categories. The first category focuses on financial motive for trade credit usually possible when financial markets are imperfect. Emerly (1984) argues that different borrowing and lending rates of interest are pure financial incentives for firms to use trade credit to realize the arbitrage. Petersen and Rajan (1996) summarize this view under financial advantage theories.

According to those theories the supplier of TC has a cost advantage over financial institution. Petersen and Rajan (1996) mention three sources of cost advantage:

- Advantage in information acquisition arises because the supplier may easily (faster and at lower cost) monitor the buyer's financial operations through mutual commercial relationships

- Advantage in controlling the buyer. The threat to cut off future supplies in case of non-payment practices of the buyer is likely to be more credible than the treat from financial institution to reduce financing in the future.

- The supplier of TC can also price discriminate among different credit quality buyers, especially among those who are credit constraint, charging a higher price for delayed payments than for other clients.

Thus, according to the financial theory of TC, among factors that determine the amount of TC are such that characterize customer's credit quality, supplier and buyer relationships with financial institutions, customer's relationships with supplier, its demand for and availability of funding, features of production process etc.

The second category focuses on transaction motivation of trade credit. It allows for minimizing transaction costs of paying bills every time the goods are delivered; managing the sales separating the payment schedule from delivery one; smoothing production cycle by placing the inventories among customers; or forecasting future cash outlays. A transaction cost theory of trade credit use is developed in Ferris, 1981.

Suppliers may also price discriminate through trade credit among low quality borrowers, which are usually credit rationed by financial institutions (Petersen and Rajan, 1996).

Empirical research on trade credit is represented by the variety of work: some focus on the determinants of credit usage, others investigate its relationship with monetary policy, or response to external shocks, e.g. to variable demand (Emerly, 1987).

In their 1996 study Petersen and Rajan empirically test the existing theories of trade credit. Their findings suggest that firms use trade credit relatively more when borrowing from financial institutions is not available. There is also some evidence of price discrimination through trade credit among US firms. One more important observation is that firms with better access to bank credits offer more trade credit, thus acting as intermediaries between financial institutions and other firms.

An interesting paper of Demirguc-Kunt and Maksimovic (2001) explores the role of trade credit in economic development. Using firm level data in cross-country comparison they find that large non-financial firms do act as intermediaries for smaller ones. In their study the provision of trade credit appear to be complementary to the development of financial institutions: the amount of trade credit offered is larger in countries with more developed banking system and legal infrastructure. This suggests important implications for policymakers. The problem with financing small and medium enterprises may be solved through better provision of bank credits to large firms not only directly to small and medium ones. The large firms will act efficiently as financial intermediaries for smaller firms, providing the latter with larger amount of trade credits then would do banks.

The importance of TC in enterprises' financing and development is also supported by a study of Fisman and Love (2001). They show that industries with high trade credit usage exhibit higher rates of growth in countries with relatively weak financial institutions.

The theories and findings discussed above apply mostly developed countries. Only the last two consider the question of developing economies. Those theories do not doubt that credit will be repaid within a given period and assume certain level of trust between customer and supplier, as well as no crucial problems with contract enforcement. But these problems exist in transition countries such as Ukraine or Russia, so we should take them into account while analyzing the phenomenon of trade credit.

The consequences of weak legal and financial systems, disorganization in the economy and other issues arising during transition are such widely discussed phenomena as non-monetary payments, barter and overdue trade credits that were unusually high in Ukraine and Russia in recent years.

There is evidence that Ukrainian firms are credit constrained. Trade credit among Ukrainian firms also is larger compared to other transition countries. But how firms can transform credits to other, credit constraint firm, if bank credit is rationed in the economy? This apparent puzzle may be partly explained by barter and offset schemes and more likely by implicit subsidies that government provide to enterprises in form of tax redemption, offsets between utilities enterprises etc. Another related problem are large overdue trade credits and "forced" trade credits among Ukrainian enterprises.

Usually, tax and wage arrears are regarded as "forced" credit, because of involuntarily decision of the creditor involved (Vincentz, 2000). The demand for such credits is forced by the decision of a debtor (an enterprise). To some extent

overdue trade credits also are of that type. For example, until recent times, utilities firms in Ukraine were not allowed to cut off non-solvent customers, which lead to extensive "forced" trade credits in form of utilities services (electricity, gas).

Because of very large stocks of trade credit and overdue trade credit in transition countries, many researchers consider them as examples of weak financial discipline and investigate whether they are a source of soft budget constraints for enterprises. In his 1997 work devoted to the problem of soft budget constraints of firms in transition, Schaffer argues based on evidence for selected transition countries that firms in transition do impose hard budget constraints on their customers and overdue credits are at the end paid off. This is so despite the lack of working bankruptcy laws and low numbers of bankruptcies. As banks apply even more stringent financial discipline to their clients, the true source of soft budget constraints for firms in transition countries is the government in the forms of subsidies and tax arrears. Dmitrov's 1999 study of budget constraints of Bulgarian enterprises also found that the government rather than firms is the reason for soft budget constraints by directly or indirectly tolerating late payments to suppliers, especially to utilities (forced trade credits).

Commander and Mumssen (1998), which analyze the reasons for non-monetary transactions in Russia, support this view. They mention three main reasons for growth of non-monetary transactions: tax incentives, liquidity squeeze, and disorganization and network effects. The authors argue that non-monetary transactions create trade credit between firms, but it is mostly the reallocation of credit, which, nevertheless, helps to smooth inefficiency in the credit system. Thus firms with excess liquidity and access to bank credit can transform credits to other enterprises. When bank and other capital are scarce, firms increasingly rely on their suppliers to satisfy their working capital needs. Considering a large share of arrears to budget and overdue payables in Russian economy, the authors

suggests that along with the transfer of liquidity across firms there are the transfer of liquidity from the budget to firms.

Most studies on transition economies, especially on Ukraine and Russia, focus on barter phenomenon and little is done to investigate trade credit. Indeed we find no paper on Ukraine concentrating on that problem.

The 2000 study of Marin et.al on Ukrainian data somewhat touches the problem. Their primary finding is that barter is not forced by soft budget constraints, lack of restructuring, or by the shadow economy. Instead barter and trade credits are mainly a substitute for bank credit and help to deal with the problem of trust in the economy.

Making use of extensive literature on trade credit in developed countries and taking into account problems of transition countries, we will investigate the issue of trade credit in Ukraine.

Particular questions and hypothesis we address, are as follows:

- What factors determine the allocation of TC on the firm level?
- How do the peculiarities of a transition economy affect the use of TC in Ukraine?
- Is the high level of trade credits caused by the lack of financial resources, especially bank financing for Ukrainian enterprises?

In the following section, we investigate the problem of large stocks of trade credit in Ukraine in relationship with other economic indicators on macro level.

Chapter 3

MACROECONOMIC CONDITIONS AND ENTERPRISE FINANCING IN UKRAINE

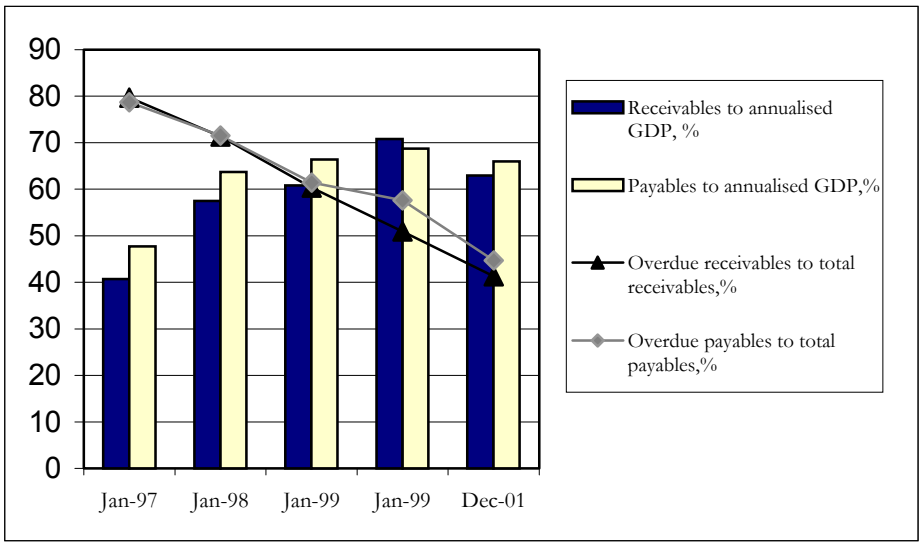
The main actors on the market of external financing are banks as the natural source of credits, the firms themselves supplying trade credit, and government with its explicit and implicit financing that also affects the decisions of bank and firms.

In this section, we try to connect some macroeconomic indicators with trade credit movements in Ukraine. Specifically we focus on the structure of total payables and receivables between Ukrainian enterprises, distributions of trade credit among sectors and industries, and the relationship between trade credit, inflation and development of banking system.

The State Statistics Committee in Ukraine provides data on accounts receivables ("debitors'ka zaborgovanist'") and account payables ("kreditors'ka zaborgovanist'") in general, distinguishing between the following categories: between Ukrainian enterprises, to FSU countries, and to other countries. That classification is provided in the appendix Table A1 with sample data on Dec. 1, 2001. Receivables and payables between Ukrainian enterprises constitute most of the accounts, which is approximately 90% of total. The latter can be treated as trade credit, but more accurate figures give receivables and payables for goods, works and services, which SSCU also singles out in "between Ukrainian enterprises" category. So, under trade credit we mean receivables (payables) for goods and services, unless mentioned otherwise.

The following figure 1 represents the levels of trade credit as the percentage of GDP in Ukraine for different years.

Figure 1. Trade Credit in Ukraine over 1997-2001



Source: The State Statistics Committee in Ukraine

As shown in the picture, trade credit in Ukraine has risen from 40% to 70% in 1999, staying on high level more than 60% of GDP. Ukrainian numbers are higher than those of Russia (35-40%), Kazakhstan (25% in 1999), Poland (15%), or even Japan (55-60%) (Schaffer, 2000), but do not appear extraordinary.[2]

Overdue trade credit is also a usual phenomena in the West, amounting on average to 30% of total trade credit. Among transition countries overdue trade

[2] Schaffer 2000 points out that, due to underestimates of GDP because of the existence of large shadow economies (which are mostly cash economies) in Ukraine and Russia, trade credit volumes in those countries are more likely to be overestimated.

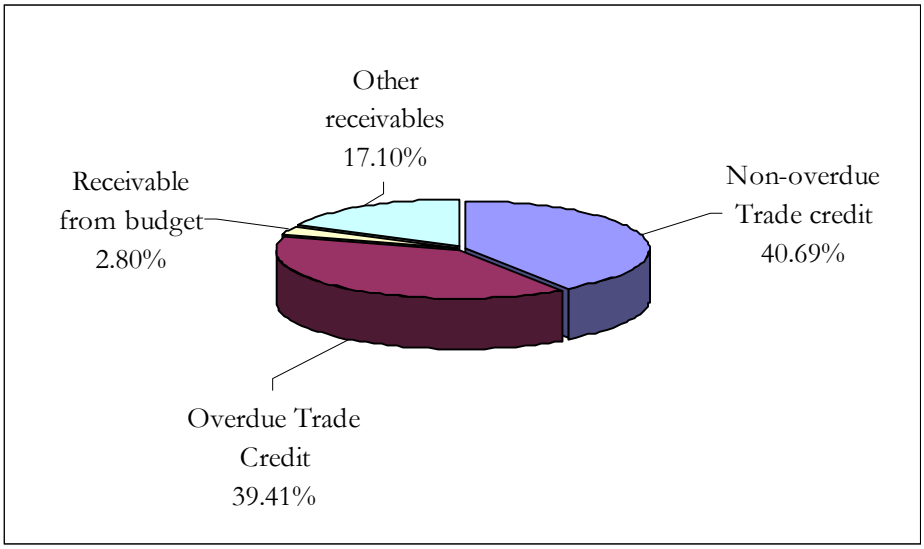
credit is typically about half of the total (see also Table A2 in the appendix for more detailed information on TC in other countries).

The declining trend for overdue trade credit in the total amount to half its size from 1997 to 2001 could be explained by the sharp devaluation of the gryvna at the end of a year, which facilitated debt payments by enterprises. Another reason is the recent economic growth, which halted the increase of overdue trade credits (Legeida, 2001).

The Table A3 in the appendix represents the typical government statistics structure of payables and receivables of the "between Ukrainian enterprises" category, as well as the share of overdue accounts. Trade credit constitutes the largest part of total liabilities and receivables, while payables to workers and budget are comparatively small. There is also overall unbalanced pattern between TC: accounts payable exceed accounts receivable.

Table A4 in the appendix provides some additional information on the structure of industrial enterprises liabilities and receivables and portions in arrears. Trade credit extended to customers exceeds trade credit received from suppliers, which means that industrial enterprises are net creditors to the rest of the economy. This pattern is persistent over the last years (UEPLAC, different issues). Also arrears among all categories of liabilities constitute a fraction greater than 50% of total liabilities demonstrating general non-payment practices among Ukrainian enterprises. We summarize evidence on accounts receivables in the figure below. We can clearly see that together non-overdue trade credit and overdue trade credit constitute more than 80% of total receivables between Ukrainian enterprises.

Figure 2. Structure of Enterprises' Receivables, 1 December, 2001 (as a percent of total receivables)



Source: SSCU

Taking into account that the stock of trade credit extended on this date amounts to 66% of annualized GDP in year 2001 or 7.9 months of payment delay (the ratio of trade credit to monthly output), such high share of trade credit in enterprises' receivables gives concerns about inter-enterprise nonpayment "crisis" related to long-term overdue trade credit.

Following the method of Schaffer 2000, we can examine how serious the problem of overdue trade credit in Ukraine looking for the stocks and flows of trade credit. As SSCU published the term structure of overdue trade credit extended only till 1998 year, in the following table we use the last information available.

To estimate the minimum share of output that is paid for on time or within three months of the due date Schaffer makes two extreme simplifying assumptions:

- The first one is that all receivables that become overdue are not paid for at least 3 month. This assumption is more than plausible in Ukraine, where contracts are hardly enforced and overdue payments are of usual practice.

- Secondly, the author also assumes that production and sales, as well as payment practice remain constant.

Let us assume that monthly output is Q (constant over some time) and that fraction of it O is becoming overdue every month. So, every month O is added to the stock of overdue credit. After three month it will be 3*O (three times O), from which we can find the fraction of output becoming overdue, every month, more than three months (remember the first assumption). It will be the stock of receivables overdue three months or less divided by 3, or 2.14/3=0.71 as in Table 2. From this follows that at least 1-0.71=0.29 or almost 30% of output is paid within 3 months. The calculations are summarized in the Table below.

Table 1**. Stocks and flows of trade credit extended in Ukraine on 1 Jan. 1998**

	Receivables on 1 Jan. 1998		% of trade credit in total receivables
	mln grn.	in months of output*	
Receivables	59009,2	6,90	79,65
Of which, not overdue	16934,7	1,98	76,14
Of which, overdue	42074,5	4,92	81,15
3 months or less	18299,8	2,14	77,72
from 3 months to 1 year	15400,4	1,80	84,74
from 1 to 2 years	6634,2	0,78	87,71
more than 2 years	1740,1	0,20	67,90
Estimated maximum monthly outflow from the stock of overdue 3 months or less-		0,71	-
Estimated minimum share of output paid for within 3 months of the due date -		0,29	-

* normalized by average monthly output

Source: State Statistics Committee of Ukraine; own estimates

The estimated figure is much smaller than those estimated for 1997 industrial enterprises by Schaffer in Russia (84%). Of course, we must remember such problems as incorrect reporting by firms, measurement errors in state statistics, and, certainly, our simplifying assumptions. But simply looking at the incredible output share of overdue receivables less than 3 month, which is 2.14 (monthly output is 2 times less than credits extended), we can speculate about what kind of sources financed such credits. Mutual non-payments among enterprises, explicit and implicit state subsidies in form of delayed tax payments and exemptions, firm's financing by their employees (wage arrears), or non-

payments for communal services (energy, gas), all together are responsible for such a pattern of trade credit behavior.

Figure A1 in the appendix shows a positive relationship between the consumer price index lagged one month and the ratio of overdue enterprises' receivables in monthly output. When inflation is rising trade credit arrears are rising as well, but the relationship is not very strong. The evidence is somewhat strange – enterprises extend trade credit expecting higher inflation in next period. This pattern of behavior may be explained by large "forced" trade credits practices in Ukraine, when the decision to extend trade credit is involuntarily and comes from the customer side.

There is also small positive relationship between ratio of non-overdue receivables in monthly output and fraction of bank credits in monthly GDP represented in Figure A2 in the appendix. The evidence is in favor of complementary hypothesis of TC investigated in Demirguc-Kunt and Maksimovic (2001). The implication is straightforward – "normal" (not overdue) TC is conditioned on country's financial development. The estimated correlation coefficient between overdue TC fraction and bank credits fraction in monthly output shows the significant negative relationship. So, the financial development is likely to help to facilitate the problem with trade credit arrears.

Chapter 4

EMPIRICAL EVIDENCE OF TRADE CREDIT IN UKRAINE

4.1. Sample and Data Description

Our empirical investigation is based on the accounting records of 609 medium and large Ukrainian enterprises. Balance sheets, financial statements, and ownership data over 1999 and 2000 are from a database maintained by the Ukrainian State Stock Market and Securities Commission (USSMSC). As data on closed joint stock companies is not publicly available, our sample is limited to open joint stock companies, which are required to submit their financial report in electronic format to the Commission.

The selected enterprises represent five sectors of the economy. More than fifty percent of the firms are in manufacturing sector (industry). About twenty percent constitute enterprises in construction, building materials and mining industries. The rest thirty percent of the firms is divided among utilities, transport, trade and catering, and services sectors. Small firms are largely underrepresented in our sample. For example, firms with less than 200 employees constitute only 20 percent of the sample. The sample represents all oblasts of Ukraine with about 37 percent of enterprises in industrialized region (Dnipropetrovsk, Donetsk, Zaporizhzhya, Lugansk and Kiev oblasts), 23 percent in significantly less industrialized (and thus with lower market opportunities) region, and the rest 40 percent of firms' in the least developed oblasts. Table 2 below gives the sectoral, size, and regional distribution of the sample.

By ownership structure we distinguish between enterprises with more than 50% of stock owned by state, those with less than 50% state share, and private, with no state ownership. Private enterprises constitute almost half of our sample, with

almost equal numbers of state and mixed one. State managed enterprises may face softer budget constraints. We consider this type of ownership group as more likely to exhibit that pattern and then investigate whether it affects the trade credit allocation.

Table 2 **Composition of the Enterprise Sample**

Sample characteristics	**Number of firms**	**% of total**
SECTOR		
Services	32	5.3
Trade and catering	41	6.7
Transport and communication	51	8.4
Utilities	53	8.7
Construction, building materials and mining	117	19.2
Manufacturing	315	51.7
SIZE		
< 200	124	20.4
200 – 1,000	95	15.6
1,000 – 10,000	371	60.9
> 10, 000	19	3.1
REGION		
Central	273	44.8
Western	52	8.5
North	54	8.9
South	26	4.3
Eastern	204	33.5
Total	609	100.0

Firms that report positive profits in the year 2000 constitute only about 30 percent of the sample and 70 percent of firms are loss-making, respectively. In spite of suspicion in reliability of official firms reports such distribution of firms' performance is quite realistic for Ukraine in the period 1998-2000 before significant output growth in the year 2001. Following Vincentz (2000), we

summarize the distribution of credits by categories of sample enterprises in the year 2000 in the Table 3 below.

Table 3 **Distribution of credits by categories,** end of 1999 sample

CATEGORY	No of firms receiving credit	% of firms receiving credit	% of credit by 10 highest debtors	% of credits by 20 highest debtors	skewness*
Long-term bank credits	61	10.0	87.7	98.6	12.8
Short-term bank credits	262	43.0	44.5	65.8	7.4
Trade credits (payables)	606	99.5	40.7	56.6	6.9
Tax arrears	608	99.8	39.8	48.5	15.1
Wage arrears	605	99.3	18.6	27.7	5.3
Trade credits (receivables)	597	98.0	47.2	61.1	9.4

*Skewness (asymmetry) of distribution characterizes the degree of distribution asymmetry relative to its mean. Positive skewness shows deviation of distribution towards positive values.

The table above shows that almost all firms in the sample use trade credits and have some types of arrears. Slightly more than forty percent of the firms have short-term credits and only 10 percent of the firms have long-term credits in the year 2000. The ten highest debtors in bank credits categories received more than half of the credits. The top twenty of debtors receives more than 50 percent of trade credit. The asymmetry of credit distribution is measured by skewness coefficient, which is calculated for firms with non-zero debt in corresponding category. All types of credits are highly positively skewed, which means that a small number of firms in certain category is highly indebted. Such picture reveals scarce and very uneven distribution of banks credits among enterprises, while trade credit and arrears characterize almost every enterprise.

The use of trade credit by small and medium and large firms

To compare our evidence on TC with findings in previous studies, it is instructive to look at the use of TC by small and large firms. Since firms' size varies from 10 to more than twenty thousand employees with a sample mean of two thousand, we decided to draw a distinction between small and medium enterprises with less than 200 employees (approximately 20 % of the sample) and large enterprises with more than 200 employees. This is the most conventional approach to defining small and medium enterprises (SME), which is used in EBRD Transition Report (1999).

We calculate the ratios to sales of accounts payables and receivables by five sector categories for both subsamples of SME and large enterprises. They are summarized in Tables A5 and A6 in the appendix.

First of all, the numbers in the tables indicate the same problem with extensive use of TC by Ukrainian enterprises: accounts payable constitute 54 and 87 percent of sales for SME and large firms respectively; accounts receivable – 80 and 54 percent of firms' sales. Those numbers are disproportional comparing with findings of Petersen and Rajan (1996) for US, where, for example, small firms' accounts receivable to sales are 7.3 percent and 18.5 for large firms. In Ukraine, where other sources of external financing are bound enterprises relies primary on mutual trade credits.

On general, large firms borrow more through TC, but small and medium firms extend more TC. Only small and medium manufacturing firms are net debtors, that is received more TC then extend. Other sectors are net creditors. For the large firms subsample, the evidence is different: except services and transportation sectors others are net debtors. Consistent with the macro level evidence (Legeida, 2001) is the fact that utilities enterprises use much more TC compared to other sectors (more than three times higher).

Summarizing we should note the overall unbalanced pattern between TC received and extended. That is, enterprises in the sample borrow relatively more through

TC than extend trade credits to other firms. Although this can be random result due to the selected sample it, nevertheless, is consistent with macro evidence.

4.2. Econometric Model

The usual practice to test trade credit theories and examine the determinants of firm's trade credit usage is to construct the reduced form equations explaining supply and demand for TC. The primary reason for this is limited information on trade credit transactions. We follow the logic of Petersen and Rajan (1996) to motivate our econometric specification.

As the first step, we distinguish between trade credit extended and trade credit received, which means that a firm may be a supplier and a demander of TC at the same time. For a particular firm the amount of trade credit extended depends on the firm's willingness and ability to extend trade credit, as well as on the ability or desire of its customers to repay their debt. Therefore, trade credit relationships may be specified in the following system of equations (Petersen and Rajan, 1996, p.6):

$$\begin{cases} Q^d = a_d Price_{TC} + b_d Demand\_factors + e_d & (4.1) \\ Q^s = a_s Price_{TC} + b_s Supply\_factors + e_s & (4.2) \end{cases}$$

The authors note several problems with estimating this system:

- the market for TC is not typically cleared: effective interest rate on trade credit vary with the credit quality of customers;

- Accounting data on TC do not allow distinguishing between supply and demand motivation of a firm: we know about only about one side of the transaction.

As we point earlier, the decision of a firm to lend depends on its finances as well as on its customer demand. In the absence of data on the firm's customer, such decision can be explained only with characteristics of the firm, e.g. the supplier. But when we exclude demand factors from the equation, the estimated coefficients will be inconsistent. Petersen and Rajan argue that when demand and supplier factors are uncorrelated, which is the case "if the firm's customers are generally short of other forms of credit", the amount of TC extended is determined primary by its supplier. Therefore, accounts receivables will be a good measure of trade credit supplied. And we get the following reduced form equation:

$$Q_s = \beta_s Supply\_factors + \eta \qquad (4.3)$$

The supply factors include characteristics of the supplier, which we will consider in the following subsection.

The situation with the demand for TC is somewhat more complicated. Again it will depends upon two sides: on supplier side - the trade credit extended to the firm and on the demand for credit by the firm itself. And we still do not have information about firm's supplier. Petersen and Rajan calculate the predicted values from the auxiliary regression of the firm's purchases made on account on its characteristics as proxies for supply of TC and then estimate the demand for TC using these predicted values. We do not have information on purchases made on account, neither on their fraction in total firm's annual purchases. Following other TC researches (e.g. Marotta, 2000) we will use accounts payables as a measure for TC demanded. We will also use a simple reduced form equation to explain factors that affect demand for TC. It will be very similar to the equation for the supply of TC, because explanatory variables will be also firm's characteristics. But the interpretation of some determinants will be different, because of different motivation of supplier and demander.

Taking into account that both supply and demand equations are in reduced-form caution should be taken when interpreting the results. Nevertheless, these equations "explaining" trade credit will help us to reach more definite conclusions about the relationships between the use of TC and suggested explanatory variable by controlling for other variables in the model.

The standard proxies for trade credit usage are accounts receivables and accounts payables. If we consider the firm as a supplier, its accounts receivables are a proxy for its trade credit supply. Trade credit demand can be proxied by a firm's accounts payables.

According to theories of TC the determinants of its use can be classified as "transaction" and "financial", which are a "loose approximation given the double nature of TC as a financing and a marketing instrument" (Marotta, 2000, p.11).

Often variables characterizing firm's financial strength, reputation, production process and organizational complexity can be interpreted from both a financial and a transaction perspective. For example, such features as sector or union belongings of a firm can indicate lower transaction costs in a firm's operations due to inclusion in some homogeneous group and can be classified as transaction variables. On the other hand, such features can also determine a firm's credibility and liquidity risks. The predicted impact on TC of such variables could also be different.

In next section we propose explanations for the effects of financial, ownership, and other firm's characteristics on its trade credit supply and demand.

4.3. Determinants of Trade Credit

Our data allows us to include the following variables explaining supply of TC according to the discussed theories:

- The supplier's access to financing should be positively related to firm's size and age. To extend trade credit a firm has to raise funds in capital markets, where size and age are important determinants of its creditworthiness. Also empirical findings are such that small firms rely more on TC rather than on bank financing, while large firms use more long- and short-term bank financing and extend TC to smaller firms. We will use log of employment as a proxy for firm's size and predict a positive coefficient on that variable. Another variable that represents a firm's ability to secure bank loans is the ratio of net fixed assets to firm's total assets. This collateral measure should be positively related to TC supply.

- Another source to extend credit is firm's internal cash, which can be proxied by net income. We expect that more profitable firms extend more trade credits. Profitability of firm can be measured by the ratio to sales of profit (losses). In the model we will include two variables representing profitability, distinguish between profits proper firms and loss-making firms.

- Liquidity position of a firm is proxied by the *quick ratio* (high liquid assets to current liabilities). High values may mean that the firm has less incentive to promote sales through investing in low-return trade credits (Marotta, 2000).

- Membership in credit unions or associations, having bank as a primer investor may also indicate firm's access and ability to extend credits.

- Changes in firm's sales may indicate an economic shock (Petersen and Rajan, 1996), which affect firm's ability to extend trade credit. We will

include two variables distinguishing between firms with negative or positive sales growth.

- Although not suggested by previous research ownership characteristics may appear to be important for firms' performance in transition countries. To account for industries specific features we also include sector dummies. In addition among explanatory variables for TC supply we introduce tax and wage arrears, which are continuous characteristics of Ukrainian firms and represent a kind of source of external financing for them.

Based on the above discussion, an econometric model of TC supply can be represented by the following equation:

$$supply_i = a_1 + a_2 ln(empl)_i + a_3 quickratio_i + a_4 collateral_i + a_5 sgpos_i + a_6 sgneg_i + \\ + a_7 bankcredit_i + a_8 profs_i + a_9 loss_i + a_{10} olddebts_i + a_{11} taxarr_i + a_{12} wagearr_i + \\ + a_{13} union_i + a_{14} state + a_{15} private + a_{16} hhi\_nonstate_i + \sum_{i=17}^{21} a_i sector + e_i \qquad (4.3)$$

where *supply* – accounts receivables adjusted by sales; *ln(empl)* – natural logarithm of the number of employees of the firm i; *quickratio* – the ratio of cash to current liabilities of a firm; *collateral* – the ratio of firm's net fixed assets to total assets; *profs* – ratio of positive profits to sales and zero otherwise; *loss* –ratio of losses to sales (positive numbers), zero otherwise; *sgpos* – sales growth if negative, zero otherwise; *sgneg* - sales growth if negative and zero otherwise; *olddebt* – accounts receivable written-off as bad debts; *union* – one if firm belong to a union, association; *taxarr* – ratio of tax arrears to sales; *wagearr* – ratio of wage arrears to sales; s*tate* – one if more than 50% of the firm stock is hold by the state, zero otherwise; *private* – one if firm's stock is held by private legal or physical entities both domestic and/or foreign; *hhi_nonstate* – interaction term of state-dominated dummy and ownership concentration measure; s*ector* – dummy variables, which equal one if a firm is in a particular sector;

Summary statistics on the variables are provided in Table A7 in the appendix.

We include short-term bank credit to investigate the complementarity hypothesis of bank financing. The possible endogeneity problem between the dependent variable and bank debt will de discussed later in this subsection. Here, all variables are taken on the end of year 2000 and stock variables are adjusted by firm's sales.

Demand for trade credit is conventionally proxied with accounts payables. The same firm's characteristics may affect its credit demand and we offer the following explanations of their influence:

- Firm's investment opportunities, represented by the positive growth in sales should be positively related to demand on funding, including trade credit.

- Most studies suggest the demand for funding is likely to inversely depend on firm's own profitability (e.g. Demirguc-Kunt and Maksimovic, 2001). We use two variables as in the model for TC supply and expect positive coefficient on profit-making firms and negative on loss-proper ones.

- Access to credit from financial institutions, determined by firm's size, collateral measure, or industry type, indicates the firm's independence from trade credit suppliers.

- Ownership characteristics may significantly influence firm's activity

Thus TC demand can be explained with the following econometric model:

$$demand_i = a_1 + a_2 ln(empl)_i + a_3 quickratio_i + a_4 collateral_i + a_5 sgpos_i + a_6 sgneg_i + \\ + a_7 bankcredit_i + a_8 profs_i + a_9 loss_i + a_{10} olddebts_i + a_{11} taxarr_i + a_{12} wagearr_i + \\ + a_{13} union_i + a_{14} state + a_{15} private + a_{16} hhi\_nonstate_i + \sum_{i=17}^{21} a_i sector + e_i \quad (4.4)$$

where all variables are the same as in equation (4.3).

Having short-term bank credit among the explanatory variables allows us to check the substitution hypothesis between bank lending and accounts payables, as alternative forms of external financing.

One more econometric model we are going to estimate is of a type proposed by Demirguc-Kunt and Maksimovic (2001) empirical study. As short-term bank debt and accounts payable are the alternative forms of external financing, we are interested in the determinants of the choice between them. The econometric model to be estimated is one where the dependent variable is the ratio of the firm's short-term debt to accounts payables. Taking into account the model of the study mentioned before and transition context we decide to estimate the following econometric model:

$$bankdebt\_ratio_i = a_1 + a_2 ln(empl)_i + a_3 quickratio_i + a_4 collateral_i + a_5 sgpos_i + a_6 sgneg_i + \\ + a_7 profs_i + a_8 loss_i + a_9 taxarr_i + a_{10} wagearr_i + a_{11} state + a_{12} private + e_i \quad (4.5)$$

where *bankdebt_ratio* – is the ratio of short-term firm's credit to accounts payables; and other variables are the same as in equations (4.3) and (4.4).

4.4. Estimation Techniques

Most empirical studies such as Rajan and Petersen (1996), Marotta (2000), and finally Demirguc-Kunt and Maksimovic (2001) apply ordinary least squares method to their TC models. We follow their example to estimate equation (4.3) and (4.4). We also use robust (White/sandwich) estimates of coefficients to

correct for heteroskedasticity, the usual feature of cross-section data. To take into account that trade credit financing are censored at zero we also try the Tobit estimation technique. In case of large censoring in the data this method will take into account the probability of observing positive financing shares and will give proper estimates. However, as is evident from the data analysis in the previous section, censoring of accounts receivable and accounts payable is very small (less than 10% of observations), which gives little ground for using the Tobit method. And, indeed, the estimated Tobit models give results quite similar to OLS results, with significance, magnitudes, and signs preserved for most coefficients and we do not report them in this paper (for comparison of results see Tables A9 and A10 in the appendix).

Another important problem to be addressed is the possible endogeneity of regressors. For example, not only a firm's profitability affects trade credit received or extended, but the latter also affects profitability in turn. The same may be true for sales growth, accumulation of tax, or wage arrears, as they all are tied to firms' performance, which surely depends on its credit usage. Problems with tax, wage arrears, and drop in sales growth, and thus in profits, are persistent picture of Ukrainian business reality during the transition process and seems to depend on other, mostly institutional problems related to prolonged financial, legal, and labor market developments. Although recent government statistics show improved figures on wage arrears and growth in output, the stock of non-overdue TC in the economy does not change significantly (see discussion in Chapter 3). In this thesis, the endogeneity problem related to firms' profitability was addressed using available instruments such as lagged values, sector, and region dummies. The applied Hausman tests rejected instrumental variable technique in favor of OLS. So, we argue that most of our explanatory variables may be treated as exogenous.

However, the endogeneity problem with short-term bank credit may be more serious. On the one hand, access to bank lending affects firms' ability to extend or to shorten their TC usage. On the other hand, liabilities to or of a firm are the important figures on which banks direct their attention when making credits. Accounts receivables and payables are parts of firm's financial characteristics, such as liquidity, leverage etc. One more relationship arises when firms that largely finance their customers with trade credits (for reasons of sales promotion, stability of sales or payments management, etc.) or, are highly indebted with accounts payables, strive for bank credit to balance their financial state.

To address the issue of endogeneity we use instrumental variables estimation technique (IV), which requires finding a set of proper instruments for short-term bank credit. Following Shvydko (2001) we choose the amount of bank loans in the previous year, return on equity, and firm's capital intensity measure as the instruments for the amount of bank loans in year 1999. According to econometric theory, proper instruments should satisfy two requirements. First, they should highly correlate with the instrumented variables. Second they should not correlate with the error terms of the trade credit equations.

The amount of bank loans in the year 1999 strongly correlates with the amount of short-term credit in the year 2000 with a correlation coefficient of 0.5 significant at the 1% level. The capital intensity measure, calculated as the ratio of net sales to net fixed assets, and return on equity, are important determinants of firms' access to bank credit (Demirguc-Kunt and Maksimovic, 2001, p.17). Return on equity (the ratio of net profits to own capital), the measure of firm's profitability, in principle, should be negatively related to the use of debt by firm. According to Table A8 in the appendix (that presents the correlation matrix of variables), that measure positively correlates with the amount of bank loans in our sample. This could be explained by the fact that Ukrainian firms have high demand for external financing, even if they exhibit some higher level of

profitability, which in turn, determines a firm's ability to attract bank credits. We decided to include those financial measures for the year 1999 (instead of for 2000, as all other variables), because of possible endogeneity problems between them and the amount of trade credit in the year 2000. Other variables from trade credit equations, such as governance and industry indicators, also can serve as instruments for bank loans and instruments for themselves (Berger and Udell, 1995). Assuming that the chosen instruments are not correlated with the error terms in the trade credit equations, we can write down the model to be estimated by IV method in the following two-stage specification:

First stage (instrumented bank credit equation):

$$\begin{aligned} bankcredit_i &= a_1 + a_2 bankcredit\_99_i + a_3 nsfna\_99_i + a_4 roe\_99_i + a_5 ln(empl)_i + \\ &+ a_6 quickratio_i + a_7 collateral_i + a_8 profs_i + a_9 loss_i + a_{10} sgpos_i + \\ &+ a_{11} sgneg_i + a_{12} olddebts_i + a_{13} taxarr_i + a_{14} wagearr_i + \\ &+ a_{15} union_i + a_{16} state + a_{17} private + a_{18} hhi\_nonstate_i + \sum_{i=19}^{23} a_i sector + e_i \end{aligned} \quad (4.6)$$

where new variables among the right-hand side variables are the chosen instruments: *bankcredit_99* – is bank loans to sales ratio, *nsnfa_99* – the capital intensity measure, *roe_99* – the return on equity measure, all at the year 1999.

Second stage (trade credit equation):

$$\begin{aligned} TC_i &= a_1 + a_2 ln(empl)_i + a_3 quickratio_i + a_4 collateral_i + a_5 sgpos_i + a_6 sgneg_i + \\ &+ a_7 bankcredit^{\mathbf{f}}{}_i + a_8 profs_i + a_9 loss_i + a_{10} olddebts_i + a_{11} taxarr_i + a_{12} wagearr_i + \\ &+ a_{13} union_i + a_{14} state + a_{15} private + a_{16} hhi\_nonstate_i + \sum_{i=17}^{21} a_i sector + e_i \end{aligned} \quad (4.7)$$

where *TC* – stands either for accounts receivables or accounts payables ratio to sales*; bankcredit* ^{f} – are fitted values of short-term bank credits ratio to sales in 2000 received from the first stage equation.

As a result of this estimation procedure the amount of bank loans in the year 2000 is instrumented by the amount of short-term bank credits in 1999, two additional instruments – the capital intensity measure and return on equity measure in 1999 - and the set of control variables. We may suppose that there may be an endogeneity problem between the amount of bank loans and firms profitability in the first-stage equation (4.6). But inspection of correlation coefficients among the variables, which are insignificantly low (see Table in the appendix), and practical considerations do not suggest that endogeneity may be a problem here.

Having more than one necessary instrument allows for testing their joint validity by the means of the Overidentifying Restrictions test (OIR-test). A p-value of the test that exceeds 10% would suggest that the zero hypothesis of the validity of the set of instruments could not be rejected. Having estimated models with OLS and IV methods and tested the consistency of estimates from both models (OIR-test), we use the Hausman specification test to examine the efficiency of OLS estimates compared to IV. A p-value of the test higher than 10% allows us to not to reject the hypothesis that OLS estimates are more efficient than IV estimates. We provide all tests statistics in the following subsection among the estimation results. Also the appendix table A8 presents a Stata 7.0 do-file program of all estimations done in this thesis.

Regarding the estimation method of equation (4.5). From the sample description (Chapter 4.1) we know that less than fifty percent of firms in the sample report short-term bank credit, which motivates us to use Tobit estimation to take into account censoring (the dependent variable is censored at zero in more than fifty percent of observations).

4.4 Results and Discussion

Table 4 below summarizes the estimates of the determinants of TC supply.

Table 4. **Regression results on TC Supply**
The dependent variable is accounts receivables to sales

Explanatory variable	**OLS**		**IV (2SLS)[1]**	
	Coeff.	**Robust St. Error**	**Coeff.**	**St. Error**
ln(empl)	-0.0984*	0.0294	-0.1052*	0.0359
quickratio	-0.0301*	0.0111	-0.0244	0.0223
collateral	-1.3702*	0.2494	-1.2956*	0.2354
net profits/sales if positive, zero otherwise	0.5346	0.8433	0.6316	0.7753
net profits/sales if negative (positive numbers), zero otherwise	-0.0114	0.1051	-0.0294	0.0823
sales growth if positive, zero otherwise	0.0034	0.0036	0.0034	0.0093
sales growth if negative, zero otherwise (positive numbers)	1.1137*	0.2319	1.0077*	0.2032
short-term bank credit to sales	**-0.0941**	**0.3837**	0.7603	0.5958
receivables written-off to sales	-1.0836*	0.4109	-1.0847*	0.3739
tax arrears to sales	0.5104*	0.1332	0.5217*	0.0810
wage arrears to sales	0.8232*	0.2780	0.8236*	0.2768
union membership	-0.0233	0.0874	-0.0181	0.1446
state as a primer owner	-0.4682*	0.1491	-0.4790*	0.1352
private ownership	-0.2118*	0.0813	-0.2252**	0.1030
ownership concentration in non-state firms	0.0024	0.0027	0.0022	0.0032
utilities	1.2989*	0.4392	1.3536*	0.2462
construction	-0.8263***	0.3205	-0.8326*	0.2101
manufacturing	-1.0325*	0.3214	-1.0420*	0.1974
transportation	-0.9269*	0.3336	-0.9487*	0.2305
trade	-1.1944*	0.3426	-1.2207*	0.2375
constant	2.3726*	0.3825	2.3925*	0.314871
Adjusted (pseudo) R-squared	0.4935		0.4678	
Number of observations	609		609	
OIR-test (p-value of χ^2)			0.1768	
Hausman test (p-value of χ^2)	0.1020			

*, **, *** Coefficients are significant at 1, 5 and 10 percent level respectively. [1]Short-term bank credit is instrumented by the amount of bank loans, return on equity, and capital intensity measure in the previous 1999 year.

Hausman test suggests that the proper model is the one estimated by OLS. From the table above, the coefficient of the proxy for firm's size is significantly negative indicating that larger firms supply less TC. This contradicts the findings for developed countries that large firms act as intermediaries supplying trade credits to smaller firms. The latter are considered as having less access to bank financing. The reason may be that a large number of employees, often considered as indicators of firm's restructuring, is highly likely to represent a less effective firm with limited access to credit markets. The coefficient on the quick ratio, which is the measure of firm's liquidity, is negative, suggesting that firm's with more liquid assets are reluctant to lend them in the form of low return TC. Also, those firms with higher liquidity may be considered more effective, thus doing much business in cash.

The negative coefficient on the collateral measure implies that the firms that seem to have better prospects to get bank credits do not extend more TC themselves. It is often claimed that figures on fixed assets value do not reflect their true value in Ukraine. So, we may say that when extending credits, banks might be guided by some other measures of firms' reliability.

Surprisingly, but firms' profitability does not significantly improve firms' ability to extend TC. Only firms with negative sales growth have more TC extended, which may reflect the low demand on their products on the one hand. On the other hand, the absence of developed marketing system at a firm may cause the low level of customers' payments and thus more delayed payments for the goods.

The coefficient on short-term bank credits is highly insignificant suggesting that firms with access to bank financing are not disposed to extend more trade credits.

Firms with larger written-off receivables restrict their credits, as suggested by the statistically significant and negative sign on that variable. Writing-off or clearing

of from bad debts may indicate a firm's overall restructuring and optimization of its activities, which are also reflected in better structures of its assets.

The statistically positive coefficients on tax and wage arrears suggest that firms with larger arrears finance their sales at the expense of workers (wage arrears) and government implicit subsidies (tax arrears). Thus the evidence shows that arrears, as indicators of firm's soft budget constraint, go along with firm's financing their customers.

Union membership has statistically insignificant effect on TC supply. The influence of state-dominated and private ownership appears to be similar: that enterprisers tend to extend less TC. Further examination of the ownership concentration within non-state firms shows that the latter has no significant influence on the firm's TC performance.

The coefficients on sectors dummies are all statistically significant indicating that supply of trade credit is crucially conditioned on the sector's type. Consistent with macroevidence, enterprises in utilities sector supply more TC, while being in other sector is associated with lower credits extended.

Summarizing we should note that our findings do not confirm predictions of standard theories about the effect of some firm characteristics, such as size, access to external financing, or profitability. Indeed, other firm's characteristics peculiar to transition economies, such as soft-budget constraint, overdue TC, or ownership structure are important determinants of firms' credit supply.

In the following table we summarize our findings on trade credit demanded, which is reflected by firm's accounts payables.

Table 5. **Regression Results on TC Demand**
The dependent variable is accounts payables to sales

Explanatory variable	**OLS**		**IV (2SLS)**[1]	
	Coeff.	**Robust St. Error**	**Coeff.**	**St. Error**
lnempl	0.0165	0.0469	0.0141	0.0493
quick ratio	-0.0822**	0.0356	-0.0802*	0.0307
collateral	-1.1901*	0.3200	-1.1642*	0.3232
net profits/sales if positive, zero otherwise	0.6796	1.0170	0.7133	1.0647
net profits/sales if negative (positive numbers), zero otherwise	0.9424**	0.4648	0.9362*	0.1130
sales growth if positive, zero otherwise	0.0118*	0.0033	0.0118	0.0127
sales growth if negative, zero otherwise (positive numbers)	0.9953*	0.3417	0.9585**	0.2791
short-term bank credit to sales	-0.4459***	0.2485	-0.1493	0.8182
receivables written-off to sales	1.3150	1.4192	1.3146*	0.5135
tax arrears to sales	0.4537***	0.2361	0.4576*	0.1112
wage arrears to sales	0.7930	0.8332	0.7931**	0.3802
union membership	0.2761***	0.1646	0.2779	0.1986
state as a primer owner	-0.4016**	0.1900	-0.4053**	0.1857
private ownership	-0.2537**	0.0994	-0.2583***	0.1414
ownership concentration in non-state firms	0.0045	0.0037	0.0045	0.0045
utilities	2.2227*	0.4740	2.2417*	0.3381
construction	0.2982	0.3258	0.2960	0.2885
manufacturing	-0.2072	0.3299	-0.2105	0.2711
transportation	-0.1610	0.3407	-0.1686	0.3166
trade	-0.0771	0.3449	-0.0862	0.3262
constant	0.5527	0.4422	0.5596	0.4324
Adjusted R-squared	0.5300		0.5135	
Number of observations	609		609	
OIR-test (p-value of χ^2)			0.1046	
Hausman test (p-value of χ^2)	0.6817			

*, **, *** Coefficients are significant at 1, 5 and 10 percent level respectively. [1]Short-term bank credit is instrumented by the amount of bank loans, return on equity, and capital intensity measure in the previous 1999 year.

The Hausman test strongly supports the model estimated by OLS and rejects the endogeneity of bank credits. The first model shows that firm's size is not a significant determinant of firm's TC demand, which may reflect the fact that most enterprises in Ukraine are heavily constrained with banking lending, both small and large one. The coefficients on firms' liquidity position and collateral measure are both of the right, statistically significant, negative sign indicating that more effective firms, as well as firms with better prospects of bank financing, use less TC financing. In line with the findings by Vincentz (2000) on a 1998 sample of Ukrainian firms, loss-making firms are not trade credit constrained and tend to finance their purchases with more credits.

Firms with positive sales growth were supposed to have better investment opportunities. Statistically significant and positive signs on firms' growth suggest that both, firms with positive and negative sales growth, use more trade credit financing. The coefficient on sales increase is rather small in magnitude (b = 0.0118), but significant at the 1% level suggesting that increases in sales raise firm's demand for credit. The coefficient on sales declines is larger in magnitude (b = 0.9953) suggesting that firms whose sales fall have much higher accounts payables. Combined with the evidence from Table 4, this suggests that suppliers are willing to extend more trade credits to low sales growth firms to support their activity rather than invest in high sales growth firms.

The coefficient of particular interest to us, on short-term bank credits, is statistically significant at the 10 % level. It follows that firms with larger bank short-term financing tend to use less TC. The result is in favor of our substitution hypothesis about trade credit and short-term financing as a means of financing firms' purchases. The marginal significance of the coefficient may be due to the fact that there is not enough evidence on short-term financing in our sample, where less than fifty percent of firms have that type of bank credits. This prompts us to estimate an ad-hoc econometric model, where observations are

restricted to those firms, which report short-term financing in the year 2000. Doing so, we are trying to find additional support for the substitution hypothesis between bank lending and trade credit borrowing.

The estimation results on the restricted sample are presented in the Table 6 on the following page. On the basis of Hausman test we again choose the model estimated by OLS. The coefficient on short-term bank credits now is significantly negative suggesting that those firms, which have less access to bank financing substitute, it for accounts payable financing. In this restricted regression, most coefficients have the same signs and magnitudes as in the regression on the full sample. Exceptions are the coefficients on bad debts, tax arrears, and private ownership that now become significantly negative. Together with state ownership, which lost its effect, the results suggest that the restricted sample is represented by overall healthier firms: they have excess to bank financing and decrease their accounts payable borrowing in face of arrears and bad debts.

Table 6. **Regression Results on TC Demand (restricted sample)**
The dependent variable is accounts payables to sales

Explanatory variable	**OLS**		**IV (2SLS)[1]**	
	Coeff.	**Robust St. Error**	**Coeff.**	**St. Error**
lnempl	-0.0267	0.0509	-0.0147	0.0792
quick ratio	-0.1638**	0.0739	-0.1455	0.1389
collateral	-1.7123*	0.5310	-1.6267*	0.4768
net profits/sales if positive, zero otherwise	-0.6854	0.6440	-0.6335	1.3655
net profits/sales if negative (positive numbers), zero otherwise	1.6273*	0.2471	1.5783*	0.2577
sales growth if positive, zero otherwise	0.4888**	0.2509	0.4733	0.4651
sales growth if negative, zero otherwise (positive numbers)	1.9468*	0.5423	1.8212*	0.4137
short-term bank credit to sales	-0.7591*	0.2303	-0.2571	0.7590
receivables written-off to sales	-1.9763*	0.6615	-2.0249**	0.8872
tax arrears to sales	-1.0833*	0.2596	-1.0457*	0.2571
wage arrears to sales	2.1658*	0.4816	2.1562*	0.5978
union membership	0.1409	0.2066	0.1560	0.2312
state as a primer owner	-0.3087	0.2531	-0.3256	0.2319
private ownership	-0.3828*	0.1368	-0.3909**	0.1953
ownership concentration in non-state firms	-0.0007	0.0042	-0.0013	0.0060
utilities	2.3439*	0.6032	2.4253*	0.6009
construction	0.9366	0.2686	0.9477***	0.5690
manufacturing	0.3970***	0.2128	0.4044	0.5446
transportation	0.4808	0.2951	0.4665	0.6785
trade	0.2869	0.2368	0.2627	0.6315
constant	0.5483	0.4298	0.4083	0.8192
Adjusted R-squared	0.5577		0.5156	
Number of observations	262		262	
OIR-test (p-value of χ^2)			0.0986	
Hausman test (p-value of χ^2)	p-value=0.4509			

*, **, *** Coefficients are significant at 1, 5 and 10 percent level respectively. [1]Short-term bank credit is instrumented by the amount of bank loans, return on equity, and capital intensity measure in the previous 1999 year.

We find additional support for the substitution effect, and will continue with a discussion of the results from the estimated model on the full sample.

As with the trade credit supply case, firms' arrears are positively related to firm's trade credit usage. Again, state-dominated and private firms tend to use less TC. From the sectors coefficients only that on the utilities sector appears to be statistically significant. Enterprises in energy and gas sectors tend to rely more on TC in their activity, both from supply and demand side. This peculiarity of utility enterprises is significantly caused by specific conditions of their activity: strategic and social importance of the industry, artificial price regulation, and government interventions in their production and sales activity (e.g. resulting in "forced trade credit"). Government regulations of utilities' tariffs take into account the social state of the population in the country, and therefore allow enterprises to accumulate large accounts receivables at the expense of large accounts payables.

The findings above suggest that firms' access to external financing is an important determinant of their TC demand. We also find some evidence in favor of substitution effects between trade credit and bank financing. Our next step is to investigate the determinants of the choice between them. The estimated model is provided in the following Table 7.

Table 7. **The determinants of the choice between TC and bank lending**

Dependent variable is ratio of the firm's short-term bank credit to accounts payables

Explanatory variable	**tobit**	
	Coeff.	**Robust St. Error**
lnempl	4.6393*	0.6944
quickratio	-2.4031**	1.0250
collateral	-6.9691***	4.1557
profs	22.1149	13.5743
loss	0.6476	1.8221
sgpos	-5.5000	3.8155
sgneg	0.4344	3.7619
taxarr_00	-1.2548	2.1021
wagearr_00	2.2254	5.6630
state	-2.1293	2.1329
private	1.2766	1.8792
_cons	-37.0258*	6.1566
constant	4.6393*	0.6944
Pseudo R-squared	0.0347	
Number of observations	262 uncensored	

*, **, *** Coefficients are significant at 1, 5 and 10 percent level respectively.

Firms' size is positively related to this ratio (of bank credit to accounts receivable) suggesting that size is more important in access to bank financing than trade credit. Liquidity measure is negatively related to this ratio implying that more liquid firms cut their bank borrowing more than their accounts payable borrowing. The coefficient on collateral is marginally significant suggesting that that this measure is a more important determinant for obtaining trade credits. Profitability of firms is on the verge of significance and enters the equation with positive and numerically significant coefficient. Profitable firms seem to use more bank borrowings than trade credits. Other firms characteristics play only an insignificant role in determining the source of financing.

CONCLUSIONS

Since 1997, the share of trade credit in GDP has substantially increased, stabilizing at the high level of 60-70 %, which far exceeds the amount in other transition and developed countries. At first glance an alternative source of financing for credit restricted firms, TC in Ukraine exhibits a lot of "unhealthy" features. Analysis of TC stock and flows at the beginning of the year 1998 reveals a serious problem with overdue TC in Ukraine. Investigating aggregate trade credit in Ukraine during 1997-2001 years, we find evidence in support of the complementarity hypothesis of TC. This implies that elimination of overdue TC problems and reasonable usage of TC are conditional on financial sector development and a country's growth. Over most of the last six years, accounts receivables for goods and services reacted positively to inflationary processes in the country, which is in favor of the "forced" TC hypothesis.

We apply standard TC theories and their predictions on the micro level to analyze TC usage by Ukrainian enterprises. Our investigation shows that small and large firms heavily use trade credits to finance their purchases, as well as extend large amounts that far exceed firms' yearly sales. In our sample, short-term bank loans are used by less than half of enterprises and in an amount far less than trade accounts payables when comparing to sales. Such scarce evidence on bank credits nevertheless allows us to find statistically significant relationship between two alternative forms of financing. The model estimated on restricted sample supports our findings that there is a relationship between firms' bank financing and its usage of trade credit. So, it should be a bank credit shortage that force enterprises to turn to accounts payables financing in large amounts. We also find no evidence that firms' with larger amounts of bank debts are able to extend more trade credits to other firms.

Firms' arrears and financial needs are strongly associated with higher TC usage, while better access to bank lending is associated with less trade credits. For example, firms with negative sales growth extend more TC, as well as those firms with larger tax and wage arrears. This implies a form of transfer of liquidity from the government to firms (Schaffer, 1997). This fact goes along with findings of Vincentz (2000) that ""forced credits" (wage, tax, overdue) react as expected more according to demand and financial needs".

Private, as well as concentrated state ownership is associated with less trade credits. Sector characteristics appear to be important determinants of trade credit supply, while playing no role in determining trade credit demand. Only being an utility enterprise allows a firm to finance their customers at the expense of large accounts payables. Representing less than 9% of our sample, the utilities sector extend significantly more TC compared to other sectors that also implies "forced credit" phenomena that comes from the customers side.

Our investigation points to some implications for policymakers. The accumulation of large TC is mostly due to absent bank finance, so the government should focus on further development of the financial sector that will increase availability of bank credits for enterprises. This will also facilitate the transactions related with TC usage and circulation of veksels in the economy. For greater effectiveness the government may also provide additional incentives for the tradability of trade credit. Alfandari and Shaffer (1996) give a good example with Poland, where a firm may freely offset a payable of another firm against the cost of goods purchased from that firm. Liberalization of the tax system, from which now most enterprises try to hide their profits, is needed to allow them to accumulate cash resources. Moreover, further realization of privatization program would allow enterprises to independently manage their product and financial policy.

This investigation may serve as an initial step toward better understanding trade credit phenomena in Ukraine. Further research should examine extended set of TC determinants, which will include characteristics of firms' relationship with banks, features of production process and product distribution, trade credit "price" etc. Moreover, it would be interesting to investigate the issue of TC importance for industries growth in Ukraine, as well as to conduct the cross-country analysis on macroeconomic determinants of trade credit in transition countries.

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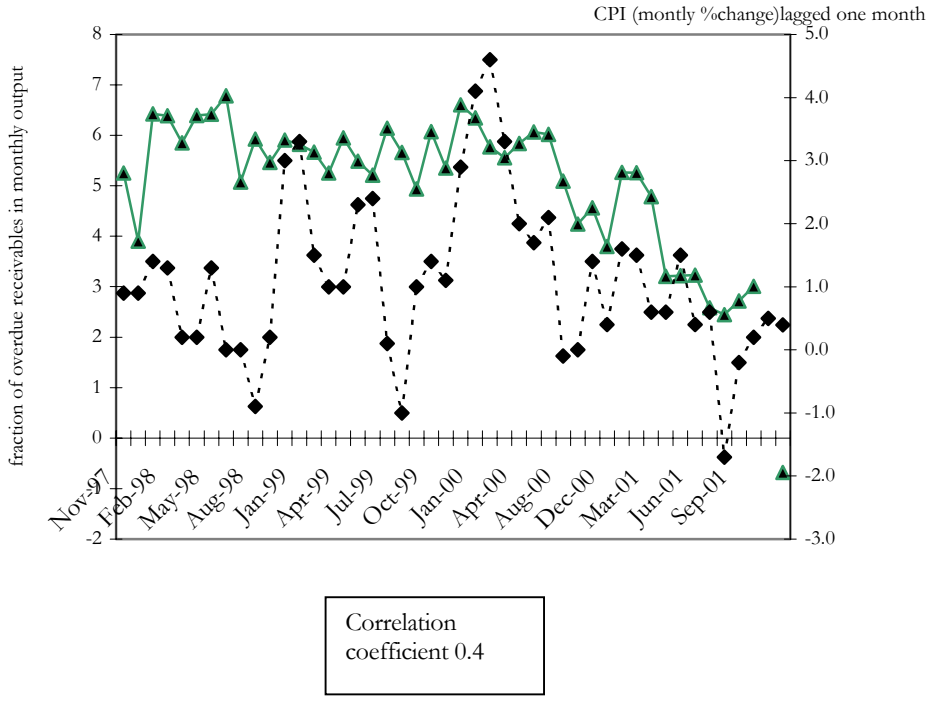
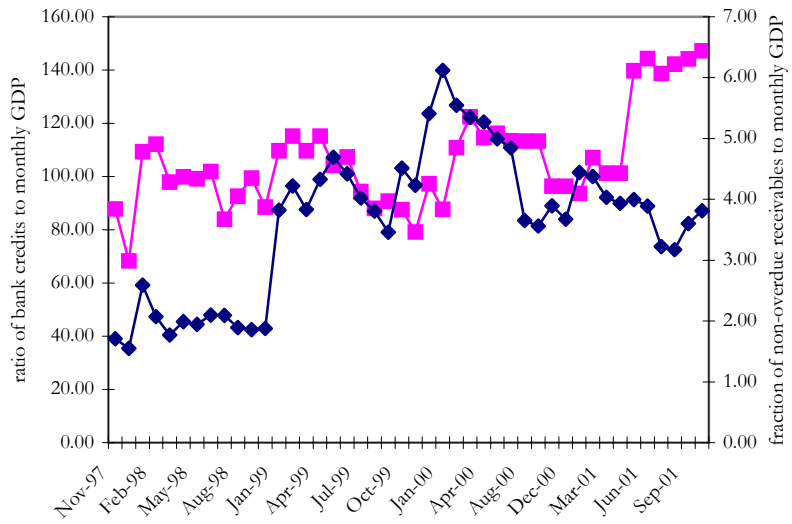
APPENDIX

Figure A1. **Trade Credit in Arrears and Inflation in Ukraine**



Correlation coefficient 0.4

Figure A2. **Non-overdue Trade Credit and Bank Credits in Ukraine, 1997-2000**



Correlation coefficient 0.23

Table A1**. Accounts Receivables and Payables on Dec.1, 2001**

	Receivables		Payables	
	mln of UAN	% of total	mln of UAN	% of total
total	185277,6	100,00	258401,8	100,00
of which:				
1.Between Ukrainian enterprises	178176,6	96,17	222431,7	86,08
2. To FSU countries	2114,6	1,14	16690,3	6,46
3. To other countries	4986,4	2,69	19279,8	7,46

Source: SSCU

Table A2. **Receivables and Payables between Ukrainian Enterprises for Dec.1, 2001,** in mln. of UAN

	Receivables			**Payables**		
	Total	Overdue	% of overdue in total	Total	Overdue	% of overdue in total
Between enterprises – total	178176,6	80217,1	45,0	222431,7	103032,2	46,3
of which:						
Goods, works and services	132161,9	71704,8	54,3	136316,9	69333,7	50,9
Vechsels	10559,0	802,6	7,6	16984,9	1415,8	8,3
Wages	0	0		6286,5	3976,8	63,3
With personnel on other operations						
Internal settlements	6379,2	1514,6	23,7	8417,3	2369,0	28,1
Tax payments						
Budget	4987,3	877,7	17,6	21148,4	14172,7	67,0
Extrabudgetary						
Avans						
Participants						
Insurance	0	0		4441	2934,5	66,1
Subsidiaries						
Fines, penalties,forfeits						

Source: State Statistic Committee of Ukraine

Table A3. **Structure of Liabilities and Receivables, and Proportion of Arrears in Ukrainian industry**

As of 1 January 2000	Ukrstat industry data	
Liabilities	Structure of liabilities, %	Arrears as % overdue
Payables to suppliers	55,8	61,6
Payables to employees	3,4	68,0
Tax payables	1,6	71,1
Budget payables	11,8	51,7
Extrabudget payables	2,6	70,3
Other liabilities	24,8	72,1

Receivables	Structure of receivables, %	Arrears as % overdue
Receivables from customers	70,3	78,7
Tax receivables	4,0	2,3
Receivables from budget	1,6	0,7
Other receivables	24,1	18,2

Source: SSCU and author's estimates

Table A4. **Trade Credit and Overdue Trade Credit in Western and Transition Countries**

Country	Total Trade Credit				Overdue Trade Credit			
	Receivables	Payables	Receivables	Payables	Receivables	Payables	Receivables	Payables
	Payment Period (months)		In % of annualized GDP		% overdue		Overdue period	
Transition countries								
Czech Republic								
1994	2.5		50		37		0.9	
Hungary								
1990	1.5	1.3	36	29				
1991	1.7	1.5	35	30	47		0.8	
Poland								
1990	1.2	1.2	20	14				
1991	1.5	1.7	22	19				
1992	1.3	1.6	19	17				
1993	1.4	1.7	19	16	51	40	0.7	0.8
Kazakhstan								
1995			25		16			
Russia								
1990	0.6	0.5	10	5				
1991	0.6	0.7	12	7				
1992	2.5		22		46		1.1	
1993	1.6		15		44	39	0.7	
1994	1.4	2.1	17	14	56	54	0.8	
1995			27		52			
Ukraine								
1997	4.8	5.7	40	47	80	79	3.8	4.5
1998	6.9	7.4	58	64	71	72	4.8	5.5
1999	7.1	7.7	60	65	60	62	4.3	4.6
2000	8.6	8.4	72	70	51	58	4.4	4.8
2001	7.9	8.2	66	68	54	51	4.3	4.2

continued

Table A4. **Trade Credit and Overdue Trade Credit in Western and Transition Countries** (continued)

Country	Total Trade Credit				Overdue Trade Credit			
	Receivables	Payables	Receivables	Payables	Receivables	Payables	Receivables	Payables
	Payment Period (months)		In % of annualized GDP		% overdue		Overdue period	
Western Countries, 1989								
Canada			16	14				
Finland	1.8		20	23	45		0.7	
France	3.5		38	35	44		1.6	
Japan			59	45				
Sweden	1.6		21	20	38		0.6	
UK	2.6		20	19	62		1.6	
US			17	14				

Sources: Alfandari and Shaffer (1996) and author's estimates.

Table A5. **Accounts Payables and Receivables to Sales Ratios**
Small and Medium Firms

Sector	Number of firms	Payables/Sales			Receivables/Sales		
		Mean	Median	%Zero	Mean	Median	%Zero
Utilities	1	3.99	3.99	0.00	3.74	3.74	0.00
Construction, building materials and mining	17	0.25	0.23	5.88	0.37	0.24	5.88
Manufacturing	23	0.84	0.18	4.35	0.71	0.09	13.04
Transport and communication	36	0.12	0.08	16.67	0.38	0.28	5.56
Trade and catering	29	0.38	0.35	0.00	0.54	0.20	10.34
Services	18	1.38	0.40	0.00	2.41	1.83	0.00
Total	**124**	**0.54**	**0.14**	**6.45**	**0.80**	**0.28**	**7.26**

Source: author's estimates

Table A6. **Accounts Payables and Receivables to Sales Ratios**
Large Firms

Sector	Number of firms	Payables/Sales			Receivables/Sales		
		Mean	Median	%Zero	Mean	Median	%Zero
Utilities	50	3.09	1.35	0.00	2.77	1.32	0.00
Construction, building materials and mining	101	1.04	0.38	0.00	0.35	0.18	1.98
Manufacturing	293	0.52	0.19	1.02	0.25	0.14	0.68
Transport and communication	15	0.13	0.10	0.00	0.17	0.16	0.00
Trade and catering	12	0.32	0.20	0.00	0.09	0.05	16.67
Services	14	0.18	0.12	14.29	0.72	0.05	14.29
Total	**485**	**0.87**	**0.26**	**1.03**	**0.54**	**0.18**	**1.24**

Source: author's estimates

Table A7. **Summary Statistics of Variables Used in Empirical Models**

Variable	Mean	Std. Dev.	Min	Max
supply_00	0.591	1.354	0.0	13.435
supply_99	0.632	2.802	0.0	57.153
demand_00	0.803	1.945	0.0	22.630
demand_99	1.383	11.619	0.0	226.256
lnempl	6.849	1.522	2.4	11.72
quickratio	0.666	1.959	0.0	34.418
collateral	0.559	0.204	0.0	0.980
sgpos	0.386	4.414	0.0	89.138
sgneg	0.344	0.226	0.0	0.922
profs	0.023	0.056	0.0	0.593
loss	0.312	0.787	0.0	8.273
bankcredit_00	0.039	0.150	0.0	2.224
bankcredit_99	0.018	0.058	0.0	0.683
olddebts	0.014	0.123	0.0	2.569
taxarrs_00	0.295	0.765	0.0	9.812
wpays_00	0.098	0.203	0.0	2.191

A8. Stata 7.0 do-file program

```
use "C:\Thesis\thesis2.dta", clear
set more off
log using thesis.log, replace
label data "Thesis_Yuliya Levchuk"
*producing sammary statistics of the variables used in the model
sum supply_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00
*producing correlation matrix of the variables
pwcorr  demand_00 supply_00 demand_99 supply_99 lnempl quick  collateral  nsnfa_99 roe_99 bankcredit_00 bankcredit_99 olddebts taxarr_00 wagearr_00 profs loss, sig
*Estimation of TC supply
reg supply_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade, ro
tobit supply_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade, ll(0)
*performing an F-test of the validity of the instruments
reg bankcredit_00 bankcredit_99 roe_99 nsnfa_99 lnempl quick collateral profs loss sgpos  sgneg olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade
test bankcredit_99 roe_99 nsnfa_99
*performing OIR-test
ivreg supply_00 lnempl quick collateral profs loss sgpos  sgneg (bankcredit_00=bankcredit_99 roe_99 nsnfa_99)  olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade
predict res1, res
matrix vecaccum EprimeZ = res1 bankcredit_99 roe_99 nsnfa_99
matrix accum ZprimeZ = bankcredit_99 roe_99 nsnfa_99
matrix ksi = e(rmse)^(-2)*EprimeZ*syminv(ZprimeZ)*EprimeZ'
scalar OIRstatistic=ksi[1,1]
scalar Probability=chi2tail(2, OIRstatistic) /* note that DF=3-1=2*/
*H0: instruments are uncorrelated with the error term
scalar list OIRstatistic /* obtained statistic */
scalar list Probability /* p-value */
*if Probability>.1, then the instruments are OK
matrix drop EprimeZ ZprimeZ ksi /* cleaning up the mess */
scalar drop OIRstatistic Probability /* same */
drop res1 /* same */
*Perfoming the Hausman test: 1)reestimating OLS w/o robust st. errors to test for endogeneity of bank loans
reg supply_00 lnempl quick collateral profs loss sgpos sgneg bankcredit_00 olddebts taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade, noheader
hausman, save
*2)estimation of IV regression where bank loans are instrumented by the amount of bank loans in the previous year, the capital intensity measure (nsnfa), and returns to equity (roe)
ivreg supply_00 lnempl quick collateral profs loss sgpos  sgneg (bankcredit_00=bankcredit_99 roe_99 nsnfa_99)  olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade
*the Hausman test with a proper estimate of a contrast variance based on the two covariance
```

```
matrices
hausman, less sigmamore
*Estimation of TC demand
reg demand_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade, ro
tobit demand_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade, ll(0)
*performing OIR-test
ivreg demand_00 lnempl quick collateral profs loss sgpos  sgneg (bankcredit_00=bankcredit_99 roe_99 nsnfa_99)  olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade
predict res1, res
matrix vecaccum EprimeZ = res1 bankcredit_99 roe_99 nsnfa_99
matrix accum ZprimeZ = bankcredit_99 roe_99 nsnfa_99
matrix ksi = e(rmse)^(-2)*EprimeZ*syminv(ZprimeZ)*EprimeZ'
scalar OIRstatistic=ksi[1,1]
scalar Probability=chi2tail(2, OIRstatistic) /* note that DF=3-1=2*/
*H0: instruments are uncorrelated with the error term
scalar list OIRstatistic /* obtained statistic */
scalar list Probability /* p-value */
matrix drop EprimeZ ZprimeZ ksi /* cleaning up the mess */
scalar drop OIRstatistic Probability /* same */
drop res1 /* same */
*Perfoming the Hausman test: 1)reestimation of OLS w/o robust st.err
reg demand_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade, noheader
hausman, save
ivreg demand_00 lnempl quick collateral profs loss sgpos  sgneg (bankcredit_00=bankcredit_99 roe nsnfa)  olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade
hausman, less sigmamore
*estimation of TC demand on the restricted sample
reg demand_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade if bankcredit_00>0, ro
reg demand_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade if bankcredit_00>0
hausman, save
ivreg demand_00 lnempl quick collateral profs loss sgpos  sgneg bankcredit_00 olddebts  taxarr_00 wagearr_00 union state private  hhi_nonstate utilities constr manuf transp trade if bankcredit_00>0
hausman, less sigmamore
*estimation on the choice between TC and bank lending
tobit bankdebt_ratio lnempl quick collateral profs loss sgpos sgneg taxarr_00 wagearr_00 state private, ll(0)
log close
```

Table A9. **Tobit estimates of TC Supply Determinants**
The dependent variable is accounts receivables to sales

Explanatory variable	OLS		tobit	
	Coeff.	Robust St. Error	Coeff.	St. Error
ln(empl)	-0.0984*	0.0294	-0.0897**	0.0355
quickratio	-0.0301*	0.0111	-0.0297	0.0218
collateral	-1.3702*	0.2494	-1.3519*	0.2304
net profits/sales if positive, zero otherwise	0.5346	0.8433	0.5576	0.7649
net profits/sales if negative (positive numbers), zero otherwise	-0.0114	0.1051	-0.0118	0.0807
sales growth if positive, zero otherwise	0.0034	0.0036	0.0038	0.0092
sales growth if negative, zero otherwise (positive numbers)	1.1137*	0.2319	1.1134*	0.1911
short-term bank credit to sales	**-0.0941**	**0.3837**	**-0.0662**	**0.2752**
receivables written-off to sales	-1.0836*	0.4109	-1.0923*	0.3698
tax arrears to sales	0.5104*	0.1332	0.5146*	0.0798
wage arrears to sales	0.8232*	0.2780	0.8340*	0.2741
union membership	-0.0233	0.0874	-0.0285	0.1435
state as a primer owner	-0.4682*	0.1491	-0.4837*	0.1341
private ownership	-0.2118*	0.0813	-0.2229**	0.1018
ownership concentration in non-state firms	0.0024	0.0027	0.0025	0.0032
utilities	1.2989*	0.4392	1.2819*	0.2413
construction	-0.8263***	0.3205	-0.8494*	0.2080
manufacturing	-1.0325*	0.3214	-1.0623*	0.1955
transportation	-0.9269*	0.3336	-0.9578*	0.2282
trade	-1.1944*	0.3426	-1.2743*	0.2366
constant	2.3726*	0.3825	2.3213*	0.3136
Adjusted (pseudo) R-squared	0.4935		0.1944	
Number of observations	609		14 left-censored 595 uncensored obs.	

*, **, *** Coefficients are significant at 1, 5 and 10 percent level respectively

Table A10. **Tobit estimates of TC Demand Determinants**
The dependent variable is accounts payables to sales

Explanatory variable	**OLS**		**IV (2SLS)**[1]	
	Coeff.	**Robust St. Error**	**Coeff.**	**St. Error**
lnempl	0.0165	0.0469	0.0188	0.0482
quick ratio	-0.0822**	0.0356	-0.1047*	0.0318
collateral	-1.1901*	0.3200	-1.1775*	0.3132
net profits/sales if positive, zero otherwise	0.6796	1.0170	0.6204	1.0469
net profits/sales if negative (positive numbers), zero otherwise	0.9424**	0.4648	0.9615*	0.1106
sales growth if positive, zero otherwise	0.0118*	0.0033	0.0119**	0.0125
sales growth if negative, zero otherwise (positive numbers)	0.9953*	0.3417	1.0006*	0.2606
short-term bank credit to sales	-0.4459***	0.2485	-0.4549	0.3765
receivables written-off to sales	1.3150	1.4192	1.3076*	0.5059
tax arrears to sales	0.4537***	0.2361	0.4425*	0.1093
wage arrears to sales	0.7930	0.8332	0.7524**	0.3749
union membership	0.2761***	0.1646	0.2718	0.1956
state as a primer owner	-0.4016**	0.1900	-0.3888**	0.1828
private ownership	-0.2537**	0.0994	-0.2560***	0.1391
ownership concentration in non-state firms	0.0045	0.0037	0.0046	0.0044
utilities	2.2227*	0.4740	2.2022*	0.3300
construction	0.2982	0.3258	0.2891	0.2842
manufacturing	-0.2072	0.3299	-0.2086	0.2670
transportation	-0.1610	0.3407	-0.2478	0.3132
trade	-0.0771	0.3449	-0.0732	0.3206
constant	0.5527	0.4422	0.5439	0.4262
Adjusted R-squared	0.5300		0.1822	
Number of observations	609		5 left-censored 604 uncensored obs.	

*, **, *** Coefficients are significant at 1, 5 and 10 percent level respectively

Table A11. **Correlation Matrix of Variables**

	Demand_00	Supply_00	Demand_99	Supply_99	roe_99	nsnfa_99	Collateral	Bankcredit_00	Bankcredit_99	Olddebts	Taxarr_00	wagearr_00
supply_00	0.7007*	1										
demand_99	0.4379*	0.0965**	1									
supply_99	0.4378*	0.2835*	0.8495*	1								
roe_99	0.0463	-0.0572	-0.0372	-0.113*	1							
nsnfa_99	-0.11*	-0.0973**	-0.0339	-0.0552	0.3917*	1						
Collateral	-0.1501*	-0.3404*	0.0249	-0.0584	-0.1884*	-0.4262*	1					
Bankcredit_00	-0.0039	0.0081	-0.0212	-0.0231	**0.0122*** **	**0.0312**	-0.0861**	1				
Bankcredit_99	-0.0053	-0.0147	-0.0159	-0.0194	**-0.1610**	**-0.0505**	**0.0216**	**0.4678***	1			
Olddebts	0.3572*	0.1**	0.6629*	0.7117*	-0.0153	-0.0393	-0.0264	-0.0007	-0.011	1		
taxarr_00	0.4822*	0.247*	0.4303*	0.4441*	-0.1037**	-0.1622*	0.0964**	0.0112	0.0298	0.4319*	1	
wagearr_00	0.3899*	0.1817*	0.219*	0.2091*	-0.1307**	-0.2130*	0.1898*	0.0209	0.0856**	0.2448*	0.5874*	
profs	-0.0751***	-0.0263	-0.0400	-0.0500	0.3498*	0.1013**	-0.1609*	-0.0246	-0.0320	-0.0150	0.0979	-0.1394
loss	0.5275*	0.1653*	0.4178*	0.3867*	-0.1100*	-0.1835*	0.1819*	0.0424	0.0576	0.3770*	0.6959*	0.6335*

*,**,*** - denotes the significance levels at 1, 5 and 10 percent, respectively.