

# Financial Aspects of Transactions with FDI: Trade Credit Provision by SMEs in China

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**DISCUSSION PAPER No. 99**

**Financial Aspects of Transactions with  
FDI: Trade Credit Provision by SMEs  
in China**

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**Abstract**

This paper will document financial aspects of transactions, and trade credit supply behavior with FDI among small and medium-sized enterprises(SMEs) based on two original surveys, conducted in four cities in China in 2003. The survey was designed to capture the nature of inter-firm transactions, trade credit and other financial conditions. Literature on FDI mainly refers to technology transfer, employment or investment. This paper focuses on the role and significance of FDI in the supply of trade credit due to its trade credit enforcement technology.

Yanagawa, Ito and Watanabe [2006] developed a model which indicates that when a seller has higher enforcement technology or a buyer has richer liquidity, both trade credit and transaction volume will be increased. In this paper, we confirmed that FDI and G contributed to the provision of trade credit and had a positive external effect on trade credit enforcement towards China's economy. (1) Sales towards FDI customers have the power to increase the trade credit ratio,

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even when controlling other factors such as choice of payment instrument, competitiveness, and ex post default management. This implies that FDI does provide trade credit, not only because it has superior liquidity, but because it is also superior in terms of enforcement of trade credit repayment. (2) Cash constraints of the buyer influence the decisions concerning trade credit provided by the seller, as a model in Yanagawa, et al. [2006] predicted, and this implies that strategic default is a serious concern among SMEs in China. (3) Spillover effect exists in payment enforcement technology in transactions with FDI customers.

**Keywords:** incomplete contract, trade credit, spillover of technology, FDI, government-owned firms

**JEL classification:** O5, K0, G2, P31

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## **1. Introduction and problem setting**

The role of FDI in the host country's economy is mainly argued with reference to technology transfers in terms of production, management, and so on. This paper will focus on other aspects: how transactions with FDI will contribute to the financial condition of domestic firms; credit on transactions, and risk-sharing on transactions. All inter-firm transactions have financial aspects by nature. Financial function refers here to the provisions of (a) credit or financial resources, (b) payment/settlement function and instruments, (c) risk management, and (d) incentive control. The supply of goods or services from supplier to buyer accompanies payment in the opposite direction. This payment contract often generates a provision of credit or risk-sharing when the supply of goods and the payment has a time difference. Further, payment contracts may also be provided with incentive mechanisms, e.g. linkage between quality assessment and payment.

These financial functions are substantially subject to institutions, not only in the developed economies, but particularly in developing economies or transitional economies. The institutions referred to here are legal institutions such as civil law, company law, security law and courts, and other enforcement entities who implement decisions by the court. China is a good example to observe and understand how the institutions affect financial aspects of inter-firm transactions, because the legal institution for firms operating in China can be distinguished by ownership type, roughly speaking, as publicly owned firms (state-owned firms and collective-owned firms), private firms and foreign-owned firms (FDI). In practice, firms operating in China have complained of vicious late payment practices, called triangle debt in Chinese, and these have been on the policy agenda since the late 1980s and up to the present.

In China, where numerous FDI firms are operating, what is their contribution to the Chinese economy? Usually, it is in the spillover of technology. However, this paper will focus on the financial aspects of FDI contribution, particularly the flow of financial resources via trade credit. FDI enhances trade credit volume in China via this channel, and contributes to the improvement of the financial environment of the Chinese economy. The first contribution of this paper is to document this point, i.e., that FDI provides more trade credit for the Chinese economy, based on data.

Why then does FDI have a positive effect on the increase of trade credit? Theoretically, two hypotheses are in contest. The first one claims that FDI can provide larger trade credit due to abundant cash and liquidity. The other claims that FDI has a more effective technology with which to prevent or manage the strategic default of a buyer, and thus can provide larger liquidity. This paper will show that the latter

argument is more consistent with data. This is the second contribution of this paper.

## 2. Analytical framework

### 2.1 Theoretical model

Yanagawa, Ito and Watanabe [2006] developed a model of trade credit provision under an environment where contract enforcement is imperfect. A rough description of the model is as follows: We have one buyer and one seller, who will make a contract on the transaction of goods. The goods  $X$  are traded at price  $P$ , the buyer will make a payment  $T$ , out of the total of  $PX$  when the goods are delivered from the seller. The buyer will benefit  $V(X)=vX$  by trading this product, and the cost function of the seller is  $C(X)=cX$ . Trade volume  $X$  will be endogenously determined in the negotiation process between buyer and seller. We also assume that  $v$  and  $c$  are exogenously given and that  $v>c$ .

At date 1, buyer and seller agree to trade the product and specify the payment schedule. In order to deliver the products at date 1, the seller incurs the cost of production  $cX$ . The goods  $X$  are traded at price  $P$ , the buyer will make a cash on delivery payment  $T$ , out of the total of  $PX$ , when the goods are delivered from the seller. The residual  $PX-T$  is the volume of trade credit from the seller to the buyer<sup>1</sup>. When the enforcement of this trade credit contract is imperfect, the buyer has an incentive not to pay ( $PX-T$ ).

To formulate the strategic default incentive by the buyer, we assume that the seller can seize only a part of the buyer's benefit,  $svX$ , when the default occurs. We call  $s$  the enforcement technology of the seller and we assume  $s<1$ . Here, the buyer, or the receiver of trade credit, does not have to repay  $(1-s)vX$ . Under this situation, the contracted price  $P$  is almost meaningless, because regardless of the contracted price  $P$ , both parties may expect that the buyer will default and the seller will receive only  $svX$ . Hence, the seller can expect to receive,

$$\text{Min}[PX-T, svX].$$

We also assume the buyer will have 100% bargaining power, and also has a cash amount of  $A$ . The buyer will solve the following problem,

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<sup>1</sup> Theoretically, trade credit might be given from the buyer to the seller in the form of prepayment, but this is recognized as marginal in practice, and our survey also confirmed this point.

$$\text{Max } A+vX-T-\text{Min}[PX-T, svX]$$

$$\text{s.t. } T+\text{Min}[PX-T, svX]>_cX : \text{Individual rationality condition of the seller}$$

$$A>T. \quad : \text{Cash constraint of the buyer}$$

By solving this problem, we obtain the following results:

Proposition 1. As long as  $c>sv$  holds, the equilibrium transaction volume contracted price, cash on delivery payment and trade credit become;

$$X^*=A/(c-sv)$$

$$P^* \geq c$$

$$T^*=A$$

$$P^*X^*-T^*=svA/(c-sv)$$

Proposition 2 The equilibrium trade volume  $X^*$  and trade credit  $P^*X^*-T^*$  are an increasing function of the *cash held by the buyer*,  $A$  and the *enforcement technology of the seller*,  $s$ .

This result implies that enforcement mechanisms or the enforcement technology of the seller is important for trade volume, and hence the profit of the buyer (not only that of the seller, whose technology level affects trade and credit volumes). When a firm buys goods from the supplier and will later sell their products to the customer, the transaction between the firm and the supplier may affect the transaction between the firm and the customer, or vice versa. The model in Yanagawa, et al. [2006] shows that  $A$  will affect others through changes in trade volume and cash in hand.

Proposition 3: The equilibrium trade volume and trade credit from the supplier to the firm are an increasing function of the enforcement technology of the surveyed (customer) firm<sup>2</sup>. Enforcement technology has an external effect which enhances both trade and trade credit volumes.

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<sup>2</sup> See proof and detailed structure of the model in Yanagawa, et al. [2006].

## 2.2 Empirical questions and problems in empirical application

In Yanagawa, et al. [2006], we placed the government-owned firms in the middle of a transaction chain, and confirmed that the government-owned firms have a positive effect on payment enforcement, based on the survey data obtained at Yibin City, Sichuan Province (see IDE-DRC Survey below), where actually no FDI were operating. This paper will take the firm between supplier and customer as the FDI firm. If the FDI has a high enforcement technology for payment, it may increase transaction credit and transactions in the host country. If the enforcement technology of payment enforcement has an external effect, and enhances trade volume and trade credit, the FDI may play a very important role in the financial aspect. This financial function also needs to be recognized as a positive role of FDI.

Applying the propositions in the model analysis above to this empirical motivation, our empirical questions here are as follows;

- Q.1 Does a transaction with FDI provide credit to domestic firms? Is it bigger than that provided by other ownership type firms?
- Q.2 Does FDI have better enforcement technology compared to domestic firms?
- Q.3 Does a transaction with FDI generate a larger transaction volume due to a trade credit/enforcement technology factor.
- Q.4 Does FDI enforcement technology have a positive external effect on trade credit enforcement?

In the theoretical model, the cash in hand of the buyer,  $A$ , and enforcement technology of the seller,  $s$ , are the exogenous variables which determine trade volume  $X$  and trade credit volumes  $PX-T$ . The model depicts how cash constraint affects trade credit provision, as well as the enforcement technology. In this paper, we are interested in the role of FDI in payment contract enforcement and trade credit provision. Thus, our main concern in this paper is with the impact of enforcement technologies on trade credit provisions<sup>3</sup>.

Regarding empirical application, the problem is how to capture the level of

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<sup>3</sup> For cash in hand,  $A$ , it is also not easy to tell which variable should be selected. For example, first we have to choose cash assets on the asset liability table or cash flow. Among cash flows, we have information on net cash flow in or gross cash flow, or cash flow in sales, or cash flow from financial activities that might be related to loans from banks or other external parties. The PBOC-JICA survey contains information on firms' transactions with banks and on bank information. Detailed tests on cash constraints will be possible.

enforcement technology. We are only able to obtain proxy information. Enforcement technology can be recognized as a composite of several factors; (a) payment instruments offered by financial institutions, (b) administrative and legal institutions regarding the enforcement of contracts, (c) competitiveness of the firms, and (d) firm's skill or experience of contract enforcement. In our survey, we have related information, but we do not know how these factors comprise enforcement technology. The enforcement technology might be a simple linear combination of the factors above, or may have a specific functional form, but we do not have information to distinguish these here. Therefore, we will assume that enforcement technology is a linear combination of all the related information that might be connected to enforcement technology, then test which factors contribute to an enhancement of trade credit supply.

### **2.3 Institutions**

Next, we need to see how institutional factors or institutions may affect the enforcement of payment schedules of trading contracts, or the buyer's incentive to default.

#### **(a) Ownership**

In China, corporate activities have been regulated according to ownership type: until corporate law became effective in 1993, state-owned enterprises were established based on the "State Owned Enterprise Law" enacted in 1988, town and village enterprises were established under the "Town and Village Enterprises Accounting Rule" introduced in 1986 or the "Town and Village Enterprises Law" enacted in 1996. Private enterprises are governed by their regulations and Foreign Direct Investment Enterprises are regulated under the Foreign Direct Investment Law and related regulations respectively. Even after the Corporate Law came into force, individual firms were regulated under their respective legal grounds until they were transferred to the company under the corporate law. Each law provides target category firms with clauses on financing, profit distribution and accounting rules. Among these laws and regulations, there were no unified rules or principles. On the other hand, although the legal systems are very complicated, there remains substantial ambiguity within which companies may operate. These defects of the laws and regulations were alleviated by administrative action.

Regarding contract enforcement, institutions influential on trade credit and other financial demands and supplies, are presumably different from each other



according to ownership type. At least until re-entry into WTO, FDI company regulations were distinct from domestic company regulations. Domestic companies also differ from each other by coming under different legal regulations; publicly owned firms and private firms. Therefore, when we take a look into the nature of transactions with SMEs in China, it would be reasonable to classify the SMEs in our survey into three groups by ownership type: the first is FDI, the second is the publicly owned enterprise, which includes state-owned and collective-owned enterprises (town and village enterprises) (G), and thirdly, privately owned enterprises (P).

#### (b) Payment instruments

When thinking about payment enforcement, the selection of payment instruments is important, and the functions that each instrument plays are subject to the institutions of the home economy. In our survey, the surveyed firms were asked to describe the share of following six payment instruments; (1) cash, (2) cheques, (3) bank notes (4) bank drafts, (5) commercial drafts and (6) credit card. (1) cash is an instrument the seller prefers most and does not allow for any trade credit. (2) A cheque is an instrument whereby banks will guarantee the payment up to the cash amount in the bank account of the buyer. (3) A bank note is a payment instrument offered by banks, usually for payment between remote areas. Local banks for each home city will guarantee the settlement within the amount of the buyer's account. For cheques and bank notes, the bank will be responsible for payment as long as the buyer's account holds sufficient cash. For (4) bank drafts, the bank will take a further risk in China. When the buyer makes a payment by bank draft, the bank will guarantee the whole amount of the payment, regardless of the liquidity of the buyer. In the market economy, a draft is issued based on the credit of the issuer, or buyer firms, and it is rare that a draft is issued based on the credit of banks for issuer firms. In China, (5) a commercial draft corresponds to a draft in the market economy. Since the reform and transition to a market economy began in China, strategic default by buyer firms has been so prevalent that it has become very difficult to issue a draft based only on the credit of firms. The bank draft is a unique institutional arrangement that was introduced in order to conquer the problem of strategic default by the issuers of drafts. (6) The credit card is a payment instrument whereby a card-issuing company will provide short-term credit for payment.

### 3. Data and Descriptive Statistics

#### 3.1 Data

The data we have collected consists of two surveys: one was conducted at Yibin City, Sichuan Province, in January 2003, which was conducted by the Development Research Center and the Institute of Developing Economies (hereafter called the DRC-IDE Survey). The other was conducted by the People's Bank of China and commissioned by the Japan International Cooperation Agency, at Beijing City; Dongguan City, Guangdong Province; and Xi'an City, Xianxi Province in December 2000 (hereafter called the PBOC-JICA Survey). The two surveys were implemented using a very similarly structured questionnaire in the section concerning inter-firm transactions, and thus we have been able to pool the two surveys here to analyze firms' behavior regarding trade credit.

<Figure 1 Map of survey sites>

The survey consists of 465 private enterprises, 124 government enterprises and 49 FDI firms; 638 firms in total (Table 1). Beijing has largest number, 26, of FDI companies, but Yibin, whose data are utilized in Yangawa et al. [2006] to document the positive role of government-owned firms, has no FDI among the surveyed firms.

< Table 1 Distributions of location and ownership of surveyed firms>

The survey was designed to ask the surveyed firm for information on transactions with (1) customer firms located inside the home city of the surveyed firms, (b) customer firms located outside the home city, (3) suppliers located in the home city, and (4) suppliers outside the home city (Figure 2). Target transaction partners were selected on the principle of being the largest company to have active transactions with the surveyed firm at the time of implementation of the survey. The distinction of the city border was motivated by the wish to capture the influences of administrative action or enforcement, when legal enforcement in China is often criticized as being too weak.

<Figure 2 Information structure of the survey>

### 3.2 Profiles of Transactions with FDI: Descriptive statistics

#### 3.2.1 Trade credit and Transaction volume

We are interested in what factor affects trade credit supply, and furthermore, transaction volume. Firstly, we take a look at what actually happens with two endogenous variables in the model, trade credit (Table 2) and transaction volumes (Table 3). Concerning the size of trade credit, other than accounts receivable or payables on asset liability tables, we surveyed the ratios of (1) payment after delivery, (2) cash on delivery, and (3) prepayment, where the sum of these three factors is supposed to be 100 per cent. As we found that the size of (3) prepayment is marginal, here we do not consider net trade credit to be  $(1) - (3)$ , but take the gross share of (1) payment after delivery ratio as a ratio of trade credit,  $(PX-T)/X$  in the model description, and (2) cash on delivery as  $T$ , payment at date 1 in the model.

Table 2 shows ratios of trade credit in sales (credit is given by the surveyed firm to the customers), and trade credit in procurement (credit is received by the surveyed firms from the suppliers). In customer-surveyed firms' transactions, trade credit ratios towards FDI or Government-owned firms are all beyond 70 per cent in terms of median, and particularly from FDI sellers to FDI or Government-owned customers these are as high as 90 per cent. On the contrary, when a private firm is a receiver of a trade credit contract, all ownership types become conservative, and provide the least share among the three types of ownership. As a supplier of credit, private firms seem to be conservative in that they provided the least share at each category. In surveyed firm-supplier transactions, we found a similar tendency, though it was less apparent.

<Table 2 Ratio of payment after delivery in a transaction>

Concerning transaction volume, although variances are much larger than with the trade credit ratio, we can see that transactions from FDI to all ownership types are

larger than from other types in terms of median. As a receiver of credit, FDI and government-owned firms are more or less the same in transaction volume. Similarly to trade credit ratio, privately owned firms trades are no larger than others as both receiver and supplier of the credit. The descriptive data implies that FDI and government-owned firms contribute to China's economy as active providers of trade credit and enhancer of economic size.

<Table 3 Transaction volume by ownership type>

### 3.2.2 Proxies of enforcement technology

How, then, are the factors related to enforcement technology or cash in hand? In our survey, the following information was available; ownership types of trading partners, structure of payment instruments, geographical or administrative area information such as addresses of trading partners, and shares of sales according to market sites, i.e., home city and exports. Competitive conditions and experiences of default in trade credit and ex post management to the default incident were surveyed as well. Here we take a look at the nature of firms by ownership type between trading partners.

#### (a) Payment instruments

Choice of payment instruments is important in managing default risk by the buyer. Table 4 documents the share of payment instruments for each transaction between customers and surveyed firms. Here, we can find a distinction by ownership type. Among the six instruments, the cheque is the major instrument in terms of both median and mean. The second most frequently used instrument is cash. It is interesting that FDI and private firms prefer cash as a buyer, but on the contrary government-owned firms seem to prefer to receive cheques. Bank notes follow the top two, and the bank draft is in fourth place (Appendix 1).

#### (b) Geographical/administrative factors

Arrangement for payment enforcement depends on where customers are located; the availability of payment instruments will change. For example, the bank note is offered when settling payment between remote sites, cheques were originally introduced to

settle local payments. In addition, the availability of information on customers, institutional arrangements to manage ex post when a default occurs may depend on geographical or administrative distribution. Tables in Appendix 2 show shares of sales in export and home city of surveyed firms, classified by pairs of customer's ownership type – surveyed firm's ownership type. For export, FDI sellers, particularly FDI-FDI pairs, show a far higher share than other ownership types. On the contrary, more than half of total sales of G sellers are to the home city market, higher than other ownership types. Ownership types of buyers do not show systematic differences (Appendix 2 Marketing area).

#### (c) Competition

To measure the level of competitive factors and bargaining power, the following information was surveyed: (1) uniqueness of the product sold to the customer (if the products is unique =1, if it is a commodity =0), (2) the number of rival firms, in transactions with the customer (This question is surveyed for an answer in count data. If no competitors=0, few competitors=1, several competitors=2, numerous competitors=3). (3) Share of products purchased among total inputs, (4) whether they have potential suppliers other than the current transaction partner (If yes=1, no=0).

For uniqueness of goods, around 60 per cent of transactions with FDI customers trade unique goods from the current supplier, those with private firms trade as low as 20 to 40 per cent, those with Government-owned firms traded at a middle level of around 40 to 50 per cent (Appendix 3 Competitiveness and bargaining power).

#### (d) Default experience and its management

To see how the firms managed default incidents, we set the following questions: (1) From 1999 to 2003, were you faced with default by the buyer? (This questioned required a choice of 1 out of the following 3 situations, 1. No default (yes=1, no=0), 2. Delayed payment that was eventually paid in full (yes=0, no=1), 3. Complete default (yes=1, no=0).

For cases where the FDI supplier sold products to FDI and private customers, higher shares of surveyed firms answered that they have not been defaulted (FDI customer-FDI surveyed firms answered 0.61 per cent in mean, FDI customer-private surveyed firms answered 0.51 per cent). On the contrary, these two categories of firms answered lowest to the question whether or not they have been completely defaulted.

For ex post management to a default incident, we cannot see any systematic differences by ownership types in these descriptive statistics (Appendix 4 Default experience and ex post management).

## 4. Estimation

### 4.1 Estimation Strategy

The model in the previous section shows that, under an environment where strategic default by the buyer may occur, and this is very probable in the case of China, amounts of trade credit and cash on delivery, and transaction volumes in equilibrium are determined as follows:

$$\begin{aligned} \text{Trade credit function;} & \quad P^*X^*-T^*= svA/(c-sv) \quad , \\ \text{Transaction volume function;} & \quad X^*= A/(c-sv) \quad . \\ \text{Ratio of trade credit in a transaction;} & \quad (P^*X^*-T^*)/X^* = sv \end{aligned}$$

It is deduced that volume variables are an increasing function of A, cash in hand of the buyer, and s, enforcement technology of the seller, and that the ratio of trade credit is a function of s, enforcement technology.

#### (a) Fractional logit and exponential regression

Data available for dependent variables are (a) ratio of payment after delivery, (b) transaction volume with four specific transaction partners (customer in home city, customer outside home city, supplier in home city, and supplier outside home city), and (c) binary dummy relating to not experiencing default, or being completely defaulted.

In the first case, the ratio is a fractional variable distributed in [0, 1]. Our data often take the boundary values 0 or 1. In this case, fractional logit regression is proposed by Papke and Wooldridge [1996]. First we assume that conditional expectation follows logistic functions;

$$E(y | \mathbf{x}) = \exp(\mathbf{x} \boldsymbol{\beta}) / [1 + \exp(\mathbf{x} \boldsymbol{\beta})] = G(\mathbf{x} \boldsymbol{\beta})$$

This modeling allows us to predict values for y in (0, 1). Just as with the binary logit model, the derivative of conditional expectation on  $x_j$  is  $\beta_j g(\mathbf{x} \boldsymbol{\beta}) (g(\mathbf{x} \boldsymbol{\beta}))^2$ .

$\beta$ )= $G'(\mathbf{x}\beta)$ ). Here, we can take this model to be a quasi maximum likelihood function as a binary response model following a logistic cdf function,

$$l_i(\beta) = y_i \log[\exp(\mathbf{x}\beta)/[1+\exp(\mathbf{x}\beta)]] + (1-y_i) \log[1-\exp(\mathbf{x}\beta)/[1+\exp(\mathbf{x}\beta)]].$$

Then, we can estimate  $\beta$  by quasi maximum likelihood estimation. Here,  $y_i$  can take any value in  $[0, 1]$ , but interpretation needs some caution as fractional values are regarded as a probability of choosing the value 1 (or zero) here. We will take fractional logit regression model to estimate the trade credit ratio function, where the dependent is the ratio of payment after delivery.

The second type of dependent variables, trade credit and transaction volume, are a positive continuous response. Here, we take an approach to estimate the exponential quasi maximum likelihood estimator, where the log likelihood function is specified as,

$$l_i(\beta) = -y_i / m(\mathbf{x}, \beta) \cdot \log[m(\mathbf{x}, \beta)].$$

This estimator is consistent for  $\beta$  as long as  $m(\mathbf{x}, \beta)$  is correctly specified. Here, we assume  $m(\mathbf{x}, \beta) = \exp(\mathbf{x}\beta)$ , as it is natural and not reasonable that trade credit volume or transaction volume follows an exponential distribution.

In the third case, binary response variables, the probit estimator is useful.

#### (b) Endogeneity of unobserved variables

For independent variables, we have (a) characteristics of traded products, and (b) nature of transaction partners. Some variables are continuous, and some are binary response data or count data. As we have already argued, although we are interested in information representing the “level of enforcement technology,” we do not have sufficient and necessary information concerning which variables are correct variables, but have only proxies. Thus, our estimation might suffer from an endogeneity problem from unobserved variables.

As our data is cross-sectional data, and does not have time variant information for each individual entity, we cannot fully utilize the panel data method to eliminate individually fixed effects. However, we have asked for specific information on each of two transactions for both sales and procurement for each firm so as to eliminate individually fixed characteristics by using the fixed effect estimator. However, unfortunately, we found that the data collection rate in our survey was not high, and

was often missing multiple data for sales or procurement. This strategy was therefore later abandoned.

Instead, we broadened the definition of “individual” from “by firm” to “by ownership type,” as we are interested in behavior of FDI, compared to Government-owned firms or Private-firms. We carried out dummy variable regression by ownership-pairs (i.e., 3 x 3= 9 dummies). By doing this, we were able to eliminate ownership type unobservable variables.

Our empirical motivation here is to estimate trade credit and transaction functions in order to evaluate the role of FDI firms in trade credit provision. As set out in the previous section (1.2), we have four empirical questions.

Specification for each question and results will be shown below.

## 4.2 Trade credit and transaction functions

Empirical Question 1: Does a transaction with FDI provide credit to domestic firms? Is it bigger than that provided by other ownership type firms?

To answer this question, we will estimate the trade credit ratio function and the trade credit volume function. First, we look at the trade credit ratio. From the model, the trade credit ratio is an increasing function of proxies of enforcement technology. We have this information for both directions of transaction; customer cum the surveyed firm (sales) pair, the surveyed firm cum supplier (procurement) pair. Coefficients  $\beta$  were estimated by fractional logit regression. Tables 4 and 5 present results respectively for sales and procurement.

We take shares of payment instruments as a key variable of enforcement technology. Column (1) for both Tables 4 and 5 present the basic relationship. Column (2) added ownership cum ownership dummy, then administrative region in (3), share of market area in (4), competitiveness or bargaining power in (5), start year of transaction in (6) are cumulatively added. For a transaction between a customer and surveyed firms, we have information of default experience (7), and ex post management to default in the period between 1999 and 2003 (8).

In sales, we can see the following features; R(1) when payment is settled by cash, the trade credit ratio is lower than for commercial draft, a default payment instrument. This is robust for the whole specification. However, there is a doubt of endogeneity between the cash payment ratio and the trade credit ratio, via the cash on delivery ratio. Secondly R(2), for the ownership-pair dummy, dummies for an FDI customer with government-owned firms and FDI supplier show robust positive and



significant coefficients. This indicates that if a G firm and FDI firms sell to an FDI customer, they will provide a larger trade credit ratio, compared to the default case, i.e., Private surveyed firm cum Private customer in specification (1) to (5). Thirdly R(3), in sales specification, addition of administration, share of market, competitiveness or default experiences did not erase the significance of ownership type dummies. R(4), if firms have taken ex post management measures to a default in a transaction in the most recent four years, they raised the trade credit ratio to the customer. This is an interesting result, but whether it is to be evaluated positively or negatively is still ambiguous. For a positive interpretation, we can say that a firm learns about payment enforcement technology, and thus can enlarge the credit ratio. However, groups of firms who stop transactions on default in the previous stage, raise trade credit 70 per cent, presumably towards new trading partners. This might be related to a tendency for newer transaction partners to offer larger credit in trade credit volume estimation, which is a counter-intuitive result. Competitiveness or start year of transaction did not show any significant trend.

On the procurement side, the cash payment ratio shows a similar tendency with sales. The ownership dummy for FDI customer cum FDI seller shows robustly positive and significant coefficients, which is common in sales specifications. On the contrary, competitiveness or bargaining power proxies show positive significant coefficients; when the share of the products sold among the buyer's input is higher, that is bargaining power is stronger, less trade credit was provided. If a potential alternative supplier exists, more trade credit was given. In total, these results imply that a more competitive supplier will provide less trade credit.

<Table 4 Trade credit ratio function, (1) in sales>

<Table 5 Trade credit ratio function, (2) in procurement >

Empirical Question 2: Does a transaction with FDI generate a larger transaction volume due to a trade credit/enforcement technology factor

The second question asks whether enforcement technology factors enhance trade credit volume and transaction volume. The model predicts that both variables are an increasing function of cash in hand of the buyer, as well as the enforcement technology of the seller. Data on cash in hand of the buyer and enforcement technology of the buyer is available only for transactions between surveyed firm-buyer and suppliers. Here the independent variables are the same as in the trade credit ratio function (Table 4), and coefficients were estimated by exponential quasi maximum likelihood function.

The findings are that R(5) payment by cash reduces trade credit volume and transaction volume, compared to a case where payment is by commercial draft. R(6) ownership dummies do not show any robust significance, R(7) higher bargaining power of the seller reduces trade credit volume, R(8) a newer transaction partner will provide a larger trade credit, and transaction volumes are also large. This is a counter-intuitive result. R(9), as the model predicts, cash in hand matters in trade credit, cash in hand of the buyer limits the trade credit provided by the seller, but does not affect transaction volume.

#### **4.3 Probability function of default experiences**

##### Empirical Question 3 Does FDI have better enforcement technology compared to domestic firms?

In order to test what factors affect the probability of default, probit estimation is carried out in Table 7. Independent variables are more or less same as the trade credit function in sales. Results on the “no default” dummy and “completely defaulted” dummy show asymmetric results.

In the no default probability function, the ownership dummy becomes insignificant when administration and competition factors are added. R(10) There is no ownership-specific factor, other than competitiveness, market, and so on, factors that matter in no default probability or complete default probability. R(11) Among competition factors, the more rivalry that exists, the less probable default will be. R(12) In a complete default function, when traded goods are unique for the buyer, the probability is lowered 60 per cent. Uniqueness or bargaining power of products can reduce default risk.

#### **4.4 External effect of enforcement technology**

The last empirical questions were;

##### Q.4 Does FDI enforcement technology have a positive external effect on trade credit enforcement?

The model indicated that sequential trading induces a positive external effect of enforcement technology. What we can do to test this proposition with the data in hand is to test whether credit given by the supplier is affected by the enforcement technology of the surveyed firm towards their customer. Enforcement technology of the surveyed firm

is exercised towards the customer to secure the repayment of credit, is completely insignificant to a transaction between the surveyed firm and their supplier if the external effect above does not exist. If it shows a significance with positive sign, a positive external effect exists. We tested both dependents here, the trade credit ratio and the trade credit volume.

The findings here are as follows; R(13) in trade credit ratio from the supplier to the surveyed firms, ownership type still matters even after competition, experience, and market share factors are controlled. To be specific, if the surveyed firm is FDI or a Government-owned firm and the trading partner is an FDI customer, trade credit volumes are increased. R(14) if the buyer required a higher cash on delivery ratio from his customer, the trade credit ratio from supplier to the buyer is lowered. That is, firms which sell at a higher cash on delivery ratio towards customers, pay at higher cash on delivery ratios towards their suppliers.

## **5. Summary and Conclusion**

In this paper, we tested and confirmed that FDI and G contributed to provision of credit and had a positive external effect on trade credit enforcement towards China's economy. (1) Sales towards FDI customers have the power to increase trade credit ratios, even after controlling following factors such as choice of payment instruments, competitiveness, ex post default management. This implies that FDI do provide trade credit, not only because they have superior liquidity, but because they are superior in enforcement of trade credit repayment. (2) Cash constraints of the buyer matter in decisions of trade credit provided by the seller, as the model in Yanagawa, et al. [2006] predicted, and this implies that strategic default seriously affects SMEs in China. (3) A spillover effect in payment enforcement technology in transactions with FDI customers exists. These are consistent with the model's prediction. However, we also found (4) that a more competitive supplier will prefer cash on delivery payment, and consequently, will provide less trade credit to the economy. (5) For a shorter transaction period, the supplier will provide larger trade credit. These seem to contradict the model's prediction or intuition.

How to capture the level of enforcement technology is still a problem ridden with ambiguity, and it will be necessary to reexamine how each factor that constitutes enforcement technology here, such as the length of transaction, bargaining power among rivals, the uniqueness of goods, and the number of rivals interact with each other, and then affect the enforcement power of the firms, and trade credit provision decisions.

## References

Yanagawa, N., S. Ito, M. Watanabe [2006] "On a Positive Role of State Owned Firms in Trade Credit," Discussion Paper No. 58, Institute of Developing Economies.

Allen, Franklin, M. Qian and M. Qian [2004] "Law, Finance , and Economic Growth in China," Center for Financial Institutions Working Papers, Wharton School Center for Financial Institutions, University of Pennsylvania.

Papkes, Leslie. E, and J. M. Wooldridge [1996] "Econometric Methods of Fractional Response Variables With an Application to 401(K) Plan Participation Rates," *Journal of Applied Econometrics*, Vol. 11, No.6, pp. 619-632.

Roland, Gerald and Thierry Verdier [2003] "Law enforcement and transition," *European Economic Review*, Elsevier, vol. 47(4), pages 669-685, August.

Figure 1 Map of survey sites



(Source) Author.

(Map) [http://www.lonelyplanet.com/mapshells/north\\_east\\_asia/china/china.htm](http://www.lonelyplanet.com/mapshells/north_east_asia/china/china.htm)

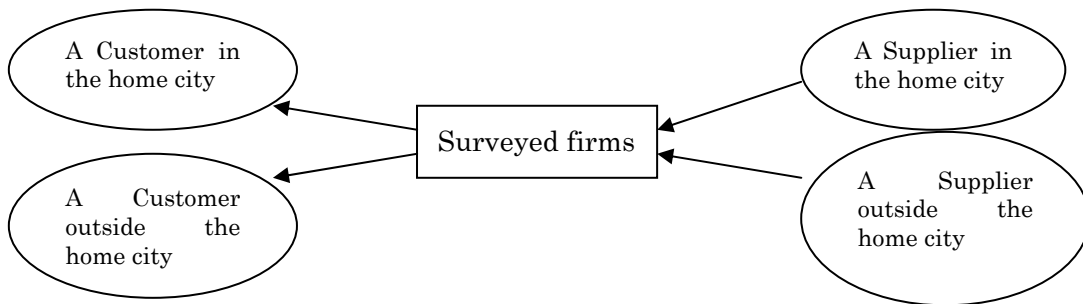
Table 1 Distribution of location and ownership type of surveyed firms

Location and ownerships of surveyed firms

(# of firms)	Beijing	Dongguang	Xian	Yibin	Total
FDI	26	7	16	0	49
G	41	8	56	19	124
P	133	91	150	91	465
Total	200	106	222	110	638

(Source) JICA-PBOC Survey and IDE-DRC Survey.

<Figure2 Information structure of the survey>



**Table 2 Ratio of payment after delivery in a transaction**

\* Ratio of Payment after delivery

\*Sales

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	90	100	77.38	30.97	21
	G	0	100	100	77.74	31.65	19
	P	0	67.5	100	58.89	38.60	36
G	FDI	0	90	100	69.69	40.43	16
	G	0	70	100	60.40	41.68	85
	P	0	70	100	57.53	39.90	306
P	FDI	0	30	100	49.00	39.39	40
	G	0	55	100	54.07	39.41	88
	P	0	50	100	49.10	39.75	402
							1013

\*Procurement

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	60	100	68.42	32.87	19
	G	0	70	100	59.31	39.01	36
	P	0	70	100	65.33	33.35	15
G	FDI	0	80	100	58.33	42.77	27
	G	0	30	100	44.62	39.32	79
	P	0	52.5	100	53.00	39.06	78
P	FDI	0	50	100	49.28	42.63	118
	G	0	40	100	45.35	41.05	273
	P	0	70	100	55.51	39.30	319

(Source) IDE-DRC Survey, JICA-PBOC Survey

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(Note) The boxed party I.e. buyer or seller, is the directly surveyed firms in our survey.



**Table 3 Transaction Volume by ownership**

\*Transaction volume

\*Sale

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	30	800	50000	3,518	11,073	20
	G	20	525	13960	1,567	3,615	14
	P	30	500	30000	1,926	5,929	25
G	FDI	30	500	100000	6,055	23,452	18
	G	10	500	100000	3,000	12,481	65
	P	5	500	40000	1,733	4,495	261
P	FDI	12	475	13960	1,497	2,995	26
	G	10	240	50000	1,759	6,392	73
	P	2.5	389	800000	4,102	44,924	318

\*Procurement

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	8	983	25000	5,291	9,261	18
	G	43	575	5000	1,116	1,403	14
	P	10	300	10000	985	1,927	30
G	FDI	1.8	145	20000	1,146	3,949	25
	G	1.5	565	22500	2,001	3,520	78
	P	5	300	19000	979	2,411	75
P	FDI	2.5	200	9000	821	1,602	114
	G	1	315	28726	1,590	3,326	262
	P	2	320	80000	1,529	5,362	302

(Source) JICA PBOC survey

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(Note) Boxed party I.e. buyer or seller, is the directly surveyed firms in our survey.

Table 4 Trade credit ratio function, (1) in sales

Trade credit ratio in sales																								
Dependent: Ratio of payment after delivery in sales transaction																								
	(1)			(2)			(3)			(4)			(5)			(6)			(7)			(8)		
Log Likelihood	-597.4			-576.6			-569.4			-484.8			-468.3			-419.8			-176.9			-151.2		
Pearson Residuals(1/df)	0.648			0.642			0.637			0.6			0.6			0.622			0.587			0.589		
AIC	1.204			1.198			1.190			1.2			1.2			1.190			1.189			1.214		
# of obs	1001			984			984			843			816			741			333			287		
Share of payment instruments (%)	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	z	Coef.	S.E.	z	Coef.	S.E.	z	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.
cash	<b>-0.005</b>	0.002	0.002	<b>-0.007</b>	0.002	0.000	<b>-0.009</b>	0.002	-4.530	<b>-0.007</b>	0.002	-3.290	<b>-0.007</b>	0.003	-2.820	0.005	<b>-0.015</b>	0.005	0.004	<b>-0.017</b>	0.004	0.000	<b>-0.019</b>	0.005
cheque	<b>0.002</b>	0.001	0.000	<b>0.002</b>	0.001	0.058	<b>0.003</b>	0.002	1.890	<b>0.005</b>	0.002	2.590	<b>0.004</b>	0.002	1.730	0.084	<b>-0.002</b>	0.005	0.651	<b>-0.002</b>	0.003	0.467	<b>-0.005</b>	0.004
banknote	<b>0.004</b>	0.001	0.055	<b>0.000</b>	0.001	0.933	<b>0.000</b>	0.002	0.250	<b>0.001</b>	0.002	0.510	<b>0.000</b>	0.002	-0.200	0.845	<b>-0.006</b>	0.005	0.202	<b>-0.007</b>	0.004	0.120	<b>-0.009</b>	0.005
bankdraft	<b>0.004</b>	0.002	0.138	<b>0.001</b>	0.003	0.750	<b>0.001</b>	0.003	0.460	<b>0.002</b>	0.003	0.810	<b>0.002</b>	0.003	0.620	0.537	<b>-0.005</b>	0.005	0.377	<b>-0.003</b>	0.006	0.642	<b>-0.005</b>	0.006
creditcard (Commercial draft)	<b>0.007</b>	0.008	0.361	<b>0.007</b>	0.008	0.414	<b>0.007</b>	0.008	0.920	<b>0.007</b>	0.008	0.890	<b>0.007</b>	0.008	0.790	0.429	<b>0.007</b>	0.009	0.416	<b>0.015</b>	0.013	0.258	<b>0.015</b>	0.013
Buyer-Seller Ownerships (dummy)																								
dGG_C				0.388	0.210	0.065	0.538	0.213	2.520	0.490	0.256	1.920	<b>0.567</b>	0.261	2.170	0.030	<b>0.626</b>	0.287	0.029	0.142	0.353	0.688	0.109	0.410
dGF_C				<b>1.344</b>	0.404	0.001	<b>1.128</b>	0.425	2.650	<b>1.139</b>	0.437	2.610	<b>1.211</b>	0.441	2.740	0.006	<b>1.252</b>	0.451	0.006	<b>0.871</b>	0.651	0.181	<b>0.752</b>	0.678
dGP_C				0.288	0.191	0.132	0.297	0.191	1.560	0.366	0.208	1.760	<b>0.393</b>	0.208	1.890	0.059	<b>0.555</b>	0.206	0.007	<b>1.039</b>	0.303	0.001	<b>1.016</b>	0.321
dFF_C				<b>1.341</b>	0.412	0.001	<b>1.080</b>	0.414	2.610	<b>0.827</b>	0.411	2.010	<b>0.861</b>	0.409	2.110	0.035	<b>1.053</b>	0.419	0.012	1.177	0.624	0.059	1.124	0.662
dFG_C				0.729	0.474	0.124	<b>0.958</b>	0.473	2.030	0.389	0.539	0.720	<b>0.407</b>	0.544	0.750	0.454	<b>0.566</b>	0.583	0.332	1.302	0.680	0.056	1.085	0.667
dFP_C				0.007	0.253	0.977	-0.021	0.262	-0.080	-0.094	0.300	-0.310	<b>-0.072</b>	0.300	-0.240	0.811	<b>-0.216</b>	0.314	0.492	<b>-0.389</b>	0.551	0.480	<b>-0.480</b>	0.778
dPG_C				<b>0.263</b>	0.128	0.040	<b>0.416</b>	0.135	3.090	<b>0.404</b>	0.144	2.800	<b>0.471</b>	0.148	3.180	0.001	<b>0.437</b>	0.160	0.006	<b>0.714</b>	0.239	0.003	<b>0.683</b>	0.257
dPF_C				0.487	0.276	0.077	0.391	0.278	1.410	0.240	0.289	0.830	<b>0.296</b>	0.295	1.000	0.316	<b>0.256</b>	0.328	0.436	<b>0.622</b>	0.430	0.148	<b>0.319</b>	0.427
(dPP_C)																								
Administrative region (dummy)																								
Beijing							<b>0.334</b>	0.15338	2.17	0.313	0.163	1.92	<b>0.283</b>	0.168	1.680	0.055	<b>0.239</b>	0.179	0.182	<b>0.627</b>	0.249	0.012	<b>0.670</b>	0.273
Dongguang							<b>-0.376</b>	0.17747	-2.12	<b>-0.489</b>	0.191	-2.55	<b>-0.437</b>	0.198	-2.210	0.011	<b>-0.487</b>	0.208	0.019	<b>-0.437</b>	0.302	0.148	<b>-0.411</b>	0.330
Xian (Yibn)							<b>-0.296</b>	0.15431	-1.92	<b>-0.302</b>	0.166	-1.82	<b>-0.247</b>	0.171	-1.440	0.069	<b>-0.279</b>	0.180	0.122	<b>-0.358</b>	0.270	0.185	<b>-0.394</b>	0.292
Share of market site (%)																								
Home city										<b>-0.003</b>	0.002	-1.380	<b>-0.003</b>	0.002	-1.530	0.126	<b>-0.004</b>	0.002	0.066				<b>0.003</b>	0.003
Export										<b>0.003</b>	0.003	0.930	<b>0.003</b>	0.003	0.970	0.331	<b>0.003</b>	0.003	0.297				<b>0.005</b>	0.005
Competitiveness of goods																								
Unique( If goods is unique to customer==1, IF NOT ==0)													<b>-0.009</b>	0.1219	-0.07	0.941	<b>-0.014</b>	0.130	0.913				<b>-0.215</b>	0.221
# of rival(no rivalry=0, few rival=1, a few rival=2, numerous rival=3)													<b>0.025</b>	0.0663	0.37	0.71	<b>0.046</b>	0.073	0.529				<b>-0.009</b>	0.117
Length of transaction																								
start year of transaction																			0.000	0.000	0.190		<b>0.000</b>	0.000
Default experiences (dummy)																								
No default																							<b>-0.377</b>	0.354
delayed																							<b>0.025</b>	0.190
(Completely default)																							<b>0.895</b>	0.205
Ex post management to default (dummy)																								
changeterms																							<b>0.413</b>	0.240
stoptrade																							<b>0.681</b>	0.250
Suit																							<b>0.591</b>	0.230

(Source) Author. (Note) 1) Fractional logit estimator. Coefficients for dummy variables indicate a marginal effect when x changes from 0 to 1. 2) Bold is coefficient with 5% significance.

Table 5 Trade credit ratio function, (2) in procurement

Trade credit ratio in procurement																		
Dependent: Ratio of payment after delivery in procurement transaction																		
	(1)			(2)			(3)			(4)			(5)			(6)		
Log Likelihood	-585.1			-560.3			-548.19			-463			-412.5			-386.0		
Pearson Residuals	0.650			0.647			0.638			0.647			0.638			0.634		
AIC	1.204			1.207			1.188			1.197			1.196			1.195		
# of obs	980			950			950			805			723			681		
Share of payment instruments (%)	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z
cash	<b>-0.004</b>	0.002	0.004	<b>-0.003</b>	0.002	0.047	<b>-0.004</b>	0.002	0.043	<b>-0.016</b>	0.005	0.003	<b>-0.006</b>	0.003	0.056	<b>-0.020</b>	0.007	0.005
cheque	<b>-0.006</b>	0.002	0.013	<b>0.005</b>	0.001	0.000	<b>0.008</b>	0.002	0.000	<b>-0.003</b>	0.005	0.558	<b>0.003</b>	0.003	0.274	<b>-0.009</b>	0.007	0.180
banknote	<b>0.004</b>	0.001	0.000	<b>0.002</b>	0.001	0.234	<b>0.004</b>	0.002	0.039	<b>-0.007</b>	0.005	0.148	<b>0.000</b>	0.003	0.892	<b>-0.012</b>	0.007	0.090
bankdraft	<b>0.000</b>	0.001	0.852	<b>-0.004</b>	0.003	0.113	<b>0.001</b>	0.003	0.763	<b>-0.008</b>	0.006	0.143	<b>0.000</b>	0.004	0.984	<b>-0.013</b>	0.008	0.088
creditcard	<b>-0.009</b>	0.008	0.307	<b>-0.007</b>	0.009	0.422	<b>-0.005</b>	0.008	0.551	<b>-0.004</b>	0.011	0.732	<b>0.007</b>	0.011	0.538	<b>0.008</b>	0.019	0.669
(Commercial draft)																		
Buyer-Seller Ownerships (dummy)																		
dG x G_S				<b>-0.447</b>	0.198	0.024	<b>-0.332</b>	0.195	0.090	<b>-0.161</b>	0.220	0.466	<b>-0.058</b>	0.228	0.800	<b>-0.111</b>	0.238	0.641
dG x F_S				<b>0.132</b>	0.335	0.694	<b>0.100</b>	0.334	0.765	<b>0.442</b>	0.367	0.229	<b>0.465</b>	0.418	0.266	<b>0.469</b>	0.432	0.278
dG x P_S				<b>-0.014</b>	0.199	0.945	<b>0.106</b>	0.199	0.593	<b>0.370</b>	0.236	0.117	<b>0.277</b>	0.251	0.270	<b>0.355</b>	0.265	0.179
dF x F_S				<b>0.748</b>	0.361	0.038	<b>0.713</b>	0.357	0.046	<b>0.691</b>	0.349	0.048	<b>0.795</b>	0.401	0.047	<b>0.666</b>	0.453	0.142
dF x G_S				<b>0.460</b>	0.437	0.293	<b>0.465</b>	0.394	0.238	<b>-0.175</b>	0.394	0.658	<b>-0.141</b>	0.440	0.749	<b>-0.183</b>	0.454	0.687
dF x P_S				<b>0.143</b>	0.289	0.620	<b>0.038</b>	0.274	0.889	<b>-0.150</b>	0.308	0.626	<b>-0.233</b>	0.337	0.488	<b>-0.313</b>	0.340	0.357
dP x G_S				<b>-0.319</b>	0.135	0.018	<b>-0.273</b>	0.142	0.055	<b>-0.233</b>	0.159	0.143	<b>-0.145</b>	0.165	0.378	<b>-0.263</b>	0.171	0.124
dP x F_S				<b>-0.180</b>	0.182	0.323	<b>-0.228</b>	0.191	0.232	<b>-0.152</b>	0.205	0.457	<b>-0.060</b>	0.214	0.779	<b>-0.133</b>	0.220	0.546
(dP x P_S)																		
Administrative region (dummy)																		
Beijing							<b>0.151</b>	0.16615	0.362	<b>0.013</b>	0.183	0.943	<b>0.185</b>	0.190	0.329	<b>0.067</b>	0.199	0.736
Dongguang							<b>-0.195</b>	0.19377	0.313	<b>-0.142</b>	0.221	0.522	<b>0.058</b>	0.222	0.793	<b>-0.085</b>	0.234	0.718
Xian							<b>-0.699</b>	0.17141	0	<b>-0.807</b>	0.190	0.000	<b>-0.555</b>	0.197	0.005	<b>-0.604</b>	0.204	0.003
(Yibn)																		
Share of market site (%)																		
Home city										<b>-0.003</b>	0.002	0.191	<b>-0.085</b>	0.234	0.718	<b>-0.002</b>	0.002	0.406
Export										<b>0.005</b>	0.003	0.100	<b>-0.604</b>	0.204	0.003	<b>0.005</b>	0.003	0.105
Competitiveness of goods																		
Goods by the supplier/ Total input of buyer(%)													<b>-0.006</b>	0.002	0.016	<b>-0.006</b>	0.003	0.012
Existence of potential supplier(Yes=1, No=0)													<b>0.458</b>	0.191	0.016	<b>0.478</b>	0.202	0.018
Length of transaction																		
start year of transaction																<b>0.001</b>	0.000	0.062

(Source) Author. (Note) 1) Fractional logit estimator. Coefficients for dummy variables indicate a marginal effect when x changes from 0 to 1. 2) Bold is coefficient with 5% significance.

Table 6 Trade credit and transaction volume functions

Volume													
Dependent: Trade credit volumed from supplier to surveyed firm						Dependent: Transaction volume between supplier and surveyee							
	(1)			(2)			(1)			(2)			
Log Likelihood	-4999			-3626			-5590			-4270			
Pearson Residuals	1.6			1.7			4			2			
AIC	13.1			13.1			16			15			
# of obs	764			557			721			573			
Share of payment instruments (%)	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	
cash	<b>-0.016</b>	0.004	0.000	<b>-0.019</b>	0.005	0.000	0.002	0.005	0.717	<b>-0.009</b>	0.005	0.045	
cheque	-0.006	0.003	0.062	-0.007	0.005	0.143	0.005	0.005	0.279	-0.004	0.004	0.298	
banknote	-0.006	0.003	0.094	-0.007	0.005	0.151	0.006	0.005	0.262	-0.005	0.004	0.286	
bankdraft	-0.006	0.004	0.103	<b>-0.011</b>	0.005	0.040	<b>0.017</b>	0.005	0.001	<b>-0.001</b>	0.005	0.787	
creditcard (Commercial draft)	-0.017	0.009	0.068	<b>-0.024</b>	0.008	0.002	-0.006	0.014	0.642	-0.005	0.016	0.749	
Buyer-Seller Ownerships (dummy)													
dGG_S	-0.238	0.192	0.217	<b>-0.463</b>	0.212	0.029	-0.155	0.234	0.509	-0.157	0.213	0.461	
dGF_S	0.388	0.309	0.209	0.156	0.371	0.674	0.245	0.525	0.640	-0.372	0.283	0.189	
dGP_S	0.018	0.204	0.929	<b>-0.666</b>	0.248	0.007	-0.164	0.390	0.674	0.237	0.421	0.573	
dFF_S	0.120	0.218	0.581	0.275	0.348	0.429	0.235	0.309	0.446	-0.469	0.386	0.224	
dFG_S	0.046	0.244	0.849	-0.171	0.485	0.724	-0.297	0.393	0.450	-0.971	0.474	0.041	
dFP_S	0.027	0.205	0.896	0.090	0.242	0.709	-0.278	0.294	0.344	<b>-0.765</b>	0.316	0.016	
dPG_S	-0.128	0.121	0.290	-0.278	0.147	0.059	0.120	0.197	0.543	0.069	0.151	0.647	
dPF_S (dPP_S)	-0.035	0.152	0.821	-0.133	0.182	0.465	-0.210	0.209	0.315	0.088	0.177	0.620	
Administrative region (dummy)													
Beijing	<b>0.634</b>	0.151	0.000	<b>0.738</b>	0.183	0.000	<b>1.383</b>	0.210	0.000	<b>0.751</b>	0.184	0.000	
Dongguang	0.103	0.158	0.513	-0.142	0.187	0.445	<b>0.770</b>	0.241	0.001	0.107	0.183	0.561	
Xian (Yibn)	0.071	0.144	0.622	-0.174	0.163	0.286	<b>1.785</b>	0.196	0.000	<b>1.125</b>	0.185	0.000	
Bargaining power													
Goods by the supplier/ Total input	<b>0.005</b>	0.002	0.022	<b>0.007</b>	0.003	0.009	<b>0.020</b>	0.003	0.000	<b>0.021</b>	0.002	0.000	
Existence of potential supplier(Ye	0.345	0.179	0.054	0.438	0.250	0.080	-0.104	0.170	0.539	-0.144	0.175	0.410	
Length of transaction													
start year of transaction	<b>0.002</b>	0.000	0.000	<b>0.003</b>	0.000	0.000	<b>0.002</b>	0.000	0.000	<b>0.003</b>	0.000	0.000	
Cash in hand													
cash flow 2001				<b>0.000</b>	9E-05	0.003				5E-05	9E-05	0.62	
cash outstanding 2001				<b>0.000</b>	3E-06	0.001				4E-05	8E-05	0.58	
Transaction volume	<b>0.001</b>	0.000	0.000	<b>0.001</b>	0.000	0.000	sale2001	0.000	0.000	0.332	<b>0.000</b>	0.000	0.000
Transaction volume^2	<b>0.000</b>	0.000	0.000	<b>0.000</b>	0.000	0.000	sale2001	0.000	0.000	0.449	<b>0.000</b>	0.000	0.003

(Source) Author. (Note) 1) Exponential quasi maximum likelihood estimator. Coefficients for dummy variables indicate marginal effect when x changes from 0 to 1. 2) Bold is coefficient with 5% significance.

Table 7 Probability of “no default” and “complete default”

Probability of no default and complete default												
Dependent: No default dummy						Dependent: Completely default						
	(1)			(2)			(1)			(2)		
Log Likelihood	-610.7			-431.8			-562.5			-406.1		
Pearson Residuals(1/df)	1.014			1.036			1.016			1.015		
AIC	1.285			1.235			1.189			1.168		
# of obs	972			735			970			733		
Share of payment instruments (%)	Exp B	s.e.	P> z	Exp B	s.e.	P> z	Exp B	s.e.	P> z	Exp B	s.e.	P> z
cash	<b>0.993</b>	0.001	0.000	0.995	0.004	0.203	<b>0.995</b>	0.001	0.002	1.003	0.004	0.489
cheque	<b>0.994</b>	0.001	0.000	0.994	0.004	0.115	<b>0.996</b>	0.001	0.000	1.003	0.003	0.399
banknote	<b>0.995</b>	0.001	0.000	0.996	0.004	0.243	<b>0.994</b>	0.001	0.000	1.000	0.003	0.942
bankdraft	<b>0.991</b>	0.002	0.000	<b>0.990</b>	0.004	0.013	<b>0.992</b>	0.002	0.000	1.002	0.004	0.664
creditcard (Commercial draft)	<b>1.013</b>	0.005	0.013	<b>1.017</b>	0.007	0.010	0.989	0.006	0.051	0.995	0.007	0.445
Buyer-Seller Ownerships (dummy)												
dGG_C	1.076	0.170	0.641	0.787	0.173	0.277	1.119	0.178	0.478	1.353	0.291	0.161
dGF_C	0.647	0.232	0.223	0.487	0.186	0.060	0.628	0.225	0.194	0.987	0.367	0.972
dGP_C	<b>1.348</b>	0.206	0.050	1.188	0.212	0.335	<b>1.048</b>	0.165	0.768	1.317	0.241	0.132
dFF_C	<b>2.160</b>	0.639	0.009	1.436	0.494	0.293	0.636	0.217	0.185	0.953	0.348	0.895
dFG_C	0.759	0.273	0.444	0.356	0.190	0.053	1.515	0.490	0.199	2.142	0.835	0.051
dFP_C	1.336	0.290	0.182	0.830	0.214	0.471	0.599	0.159	0.054	1.008	0.304	0.980
dPG_C	1.017	0.105	0.868	0.879	0.115	0.325	0.987	0.105	0.904	1.166	0.158	0.256
dPF_C (dPP_C)	1.001	0.234	0.996	0.634	0.188	0.123	1.001	0.236	0.995	1.445	0.393	0.176
Ratio of cash on delivery	<b>1.679</b>	0.196	0.000	<b>1.917</b>	0.277	0.000	0.833	0.101	0.130	0.862	0.127	0.311
Administrative region (dummy)												
Beijing				<b>1.601</b>	0.244	0.002				0.771	0.116	0.084
Dongguang				1.262	0.218	0.178				<b>1.510</b>	0.253	0.014
Xian (Yibn)				<b>1.531</b>	0.232	0.005				0.779	0.117	0.095
Share of market site (%)												
Home city				1.0005	0.002	0.754				0.998	0.002	0.204
Export				1.0004	0.003	0.884				1.000	0.003	0.994
Competitiveness of goods												
Unique( If goods is unique to customer==1, IF NOT =:				1.195	0.130	0.103				<b>0.648</b>	0.072	0.000
# of rival(no rival=0, few rival=1, a few rival=2, num				<b>0.883</b>	0.052	0.036				1.085	0.066	0.183
Length of transaction												
start year of transaction				0.9999	2E-04	0.639				1.000	0.000	0.060

(Source) Author.

(Note) 1) Probit estimator. Coefficients for dummy variables indicate a marginal effect when x changes from 0 to 1. 2) Bold is coefficient with 5% significance.

Table 8 Positive external effect of “buyer’s enforcement technology”

External effect of enforcement technology												
Dependent: Ratio of payment after delivery from supplier to the surveyed						Dependent: Trade credit volume from supplier to surveyed firm						
	(1)			(2)			(1)			(2)		
Log Likelihood	-539.2			-249.5			-6,374			-2,763		
Pearson Residuals(1/df)	0.654			0.611			126			1		
AIC	1.219			1.171			15.40			12.45		
# of observation	906			469			830			448		
Share of payment instruments (%)	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z	Coef.	S.E.	P> z
cash	<b>-0.005</b>	0.002	0.005	<b>-0.015</b>	0.006	0.012	<b>0.037</b>	0.002	0.000	<b>-0.009</b>	0.004	0.012
	0.002	0.001	0.084	-0.010	0.006	0.058	<b>0.043</b>	0.002	0.000	-0.004	0.003	0.178
banknote	0.002	0.001	0.183	<b>-0.014</b>	0.006	0.012	<b>0.044</b>	0.002	0.000	-0.005	0.003	0.182
bankdraft	-0.003	0.003	0.310	-0.010	0.006	0.106	<b>0.047</b>	0.008	0.000	-0.004	0.004	0.373
creditcard (Commercial draft)	0.003	0.007	0.644	-0.002	0.010	0.864	<b>0.046</b>	0.006	0.000	-0.005	0.005	0.289
Buyer-Seller Ownerships (dummy)												
dG x G_C	-0.285	0.199	0.153	0.071	0.327	0.828	0.315	0.187	0.092	0.075	0.251	0.765
dG x F_C	<b>1.340</b>	0.456	0.003	<b>1.945</b>	0.755	0.010	<b>0.706</b>	0.320	0.027	0.081	0.314	0.796
dG x P_C	0.071	0.197	0.717	0.491	0.260	0.059	<b>0.457</b>	0.166	0.006	0.305	0.174	0.079
dF x F_C	<b>1.618</b>	0.319	0.000	<b>1.449</b>	0.668	0.030	<b>1.357</b>	0.243	0.000	0.104	0.349	0.766
dF x G_C	0.530	0.447	0.236	-0.076	0.540	0.889	<b>1.128</b>	0.423	0.008	-0.209	0.352	0.553
dF x P_C	0.086	0.265	0.745	0.130	0.330	0.693	<b>2.451</b>	0.833	0.003	0.066	0.266	0.805
dP x G_C	-0.139	0.134	0.299	-0.321	0.214	0.134	<b>1.092</b>	0.391	0.005	0.025	0.149	0.869
dP x F_C (dP x P_C)	0.237	0.331	0.475	-0.470	0.390	0.227	<b>0.668</b>	0.234	0.004	-0.298	0.262	0.256
Administrative region (dummy)												
Beijing				-0.300	0.234	0.200				<b>0.601</b>	0.174	0.001
Dongguang				-0.322	0.279	0.249				0.221	0.186	0.234
Xian (Yibn)				<b>-0.850</b>	0.247	0.001				-0.058	0.187	0.756
Share of market site (%)												
Home city				0.000	0.003	0.934				0.0011	0.0021	0.598
Export				0.008	0.004	0.059				<b>0.0055</b>	0.0025	0.029
Competitiveness												
Unique( If goods is unique to customer==1, IF NOT =				0.187	0.169	0.267				0.075	0.119	0.530
# of rival(no rivalry=0, few rival=1, a few rival=2, num				<b>0.185</b>	0.089	0.037				0.056	0.077	0.465
Length of transaction												
start year of transaction				0.001	0.000	0.056				<b>0.0021</b>	0.000	0.000
Ex post management to default (dummy)												
change terms				<b>0.555</b>	0.236	0.018				<b>0.370</b>	0.152	0.015
stop transaction				0.194	0.238	0.414				<b>0.3519</b>	0.153	0.021
suit				0.328	0.230	0.153				<b>0.5349</b>	0.166	0.001
Ratio of cash on delivery				<b>-1.689</b>	0.263	0.000				<b>-1.038</b>	0.228	0.000
Transaction volume							<b>0.001</b>	####	0.000	<b>0.002</b>	0.000	0.000
Transaction volume^2							<b>0.000</b>	0.00	0.00	<b>0.000</b>	0.000	0.000

(Source) Author.

(Note) 1) Fractional logit estimator for trade credit ratio. Exponential quasi maximum likelihood for trade credit volume. Coefficients for dummy variables indicate a marginal effect when x changes from 0 to 1. 2) Bold is coefficient with 5% significance.

Appendix 1 Payment instruments between customers and surveyed firms

\*Payment instruments between customer and surveyed firms

\*\* cash

\*Total

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
	FDI	0	10	100	23.86	30.00	22
FDI	G	0	20	100	32.83	40.42	23
	P	0	10	100	27.92	36.00	36
	FDI	0	0	10	0.79	2.51	19
G	G	0	0	100	9.72	21.61	88
	P	0	0	100	8.69	20.94	312
	FDI	0	0	100	22.30	35.97	40
P	G	0	10	100	32.93	36.99	92
	P	0	10	100	23.93	31.64	410
							1042

\*cheque

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
	FDI	0	20	100	24.55	30.04	22
FDI	G	0	20	100	43.04	45.17	23
	P	0	20	100	40.14	41.88	35
	FDI	0	30	100	39.47	44.62	19
G	G	0	50	100	48.35	42.57	88
	P	0	30	100	44.66	45.10	313
	FDI	0	5	100	34.23	41.98	40
P	G	0	30	100	40.76	42.22	92
	P	0	30	100	40.76	40.39	412
							1044

\*bank note

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
	FDI	0	0	100	21.82	39.11	22
FDI	G	0	0	100	13.04	30.96	23
	P	0	0	100	30.14	44.09	36
	FDI	0	0	100	43.68	49.13	19
G	G	0	0	100	29.94	39.66	89
	P	0	0	100	37.38	42.22	315
	FDI	0	0	100	26.75	40.36	40
P	G	0	0	100	19.24	31.80	92
	P	0	0	100	26.45	37.26	410
							1046

\*bank draft

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
	FDI	0	0	100	29.05	39.74	21
FDI	G	0	0	100	10.87	29.99	23
	P	0	0	30	2.00	6.77	35
G	FDI	0	0	100	9.74	23.83	19
	G	0	0	100	12.47	24.65	87
	P	0	0	100	8.01	20.01	313
P	FDI	0	0	100	10.75	28.59	40
	G	0	0	80	5.16	15.38	92
	P	0	0	100	6.88	21.27	408
							1038

\*commercial draft

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
	FDI	0	0	15	0.71	3.27	21
FDI	G	0	0	5	0.22	1.04	23
	P	0	0	0	0.00	0.00	35
G	FDI	0	0	30	4.74	11.24	19
	G	0	0	70	2.88	10.13	86
	P	0	0	100	2.30	13.14	311
P	FDI	0	0	100	2.80	15.88	40
	G	0	0	55	0.71	5.85	91
	P	0	0	100	1.69	9.77	409
							1035

\*credit card

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
	FDI	0	0	0	0.00	0.00	21
FDI	G	0	0	0	0.00	0.00	23
	P	0	0	30	0.86	5.07	35
G	FDI	0	0	30	1.58	6.88	19
	G	0	0	80	1.34	8.98	87
	P	0	0	50	0.51	4.31	311
P	FDI	0	0	80	3.63	15.19	40
	G	0	0	90	1.09	9.43	92
	P	0	0	100	1.26	7.46	408
							1036



## Appendix 2 Marketing areas

\*Share of main Market (1) export with customer

\*Total

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	56	100	46.83	37.92	23
	G	0	0	100	19.61	32.49	22
	P	0	0	100	23.13	36.64	34
G	FDI	0	0	99	10.00	26.24	14
	G	0	0	70	2.10	10.24	63
	P	0	0	100	1.76	10.18	271
P	FDI	0	0	100	33.03	44.59	32
	G	0	0	100	10.57	28.11	81
	P	0	0	100	8.53	24.13	371
							911

\*Share of main Market (1) export supplier

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	10	80	32.18	32.77	17
	G	0	1	100	18.00	33.84	10
	P	0	1	100	35.19	44.74	31
G	FDI	0	0	100	10.74	26.11	23
	G	0	0	100	6.85	20.75	68
	P	0	0	100	10.58	28.64	65
P	FDI	0	0	80	1.93	10.48	111
	G	0	0	100	5.45	20.40	259
	P	0	0	100	9.77	25.03	277
							861

\*marketing site (2) home city inside with customer

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	25	80	24.13	21.35	23
	G	0	60	100	58.57	39.68	23
	P	0	20	100	35.24	36.13	38
G	FDI	0	10	100	29.30	32.49	20
	G	0	50	100	50.04	34.08	91
	P	0	30	100	41.31	35.47	319
P	FDI	0	15	100	27.11	36.76	35
	G	0	50	100	49.10	37.99	93
	P	0	40	100	43.86	34.13	420
							1039

\*Marketing site (2) City inside with supplier

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	12.5	50	17.05	16.12	20
	G	0	15	100	25.14	26.68	14
	P	0	25	100	34.90	37.48	31
G	FDI	0	50	100	50.00	36.24	27
	G	0	30	100	42.80	35.51	83
	P	0	60	100	56.39	37.52	85
P	FDI	0	40	100	44.98	33.31	126
	G	0	40	100	44.18	35.49	285
	P	0	30	100	40.08	35.13	332

### Appendix 3 Competitiveness and bargaining power

\*Competitiveness of goods if the good is unique==1, if the good is commodity==0

\*Total

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	1	1	0.59	0.50	22
	G	0	1	1	0.59	0.50	22
	P	0	1	1	0.56	0.50	36
G	FDI	0	0	1	0.42	0.51	19
	G	0	1	1	0.51	0.50	92
	P	0	1	1	0.50	0.50	311
P	FDI	0	0	1	0.44	0.50	41
	G	0	0	1	0.21	0.41	92
	P	0	0	1	0.29	0.45	421
							1056

\*Share of the products in the supplier's input

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	10	35	100	50.93	34.45	20
	G	5	25	100	34.00	28.19	12
	P	3	20	90	28.81	23.90	29
G	FDI	2	30	95	37.96	22.12	24
	G	2	40	100	45.67	27.60	77
	P	3	30	80	34.42	22.58	77
P	FDI	2	30	100	37.75	26.20	119
	G	1	30	190	39.69	29.22	258
	P	0	30	100	37.83	27.23	290
							906

\*Rivalry if no rival==0, one rivals==1, a few rivalry with customer

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	2	3	1.90	0.89	21
	G	0	2.5	3	1.86	1.36	22
	P	0	3	3	2.28	1.03	36
G	FDI	0	2	3	1.78	0.94	18
	G	0	2	3	2.02	1.01	92
	P	0	2	3	2.19	0.81	318
P	FDI	0	2	3	2.08	0.73	40
	G	0	3	3	2.38	0.97	92
	P	0	3	3	2.35	0.86	413
							1052

\* Do you have potential substitute supplier? Yes=-1 No==0 with supplier

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	1	1	0.75	0.44	20
	G	0	1	1	0.86	0.36	14
	P	0	1	1	0.82	0.39	33
G	FDI	0	1	1	0.74	0.45	27
	G	0	1	1	0.81	0.39	79
	P	0	1	1	0.84	0.37	85
P	FDI	0	1	1	0.75	0.44	122
	G	0	1	1	0.85	0.36	276
	P	0	1	1	0.91	0.29	336

#### Appendix 4 Default experiences and ex post management

\*no default experience in between 1999 to 2003

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	1	1	0.61	0.50	23
	G	0	0	1	0.17	0.39	23
	P	0	0	1	0.32	0.47	38
G	FDI	0	0	1	0.26	0.45	19
	G	0	0	1	0.38	0.49	93
	P	0	0	1	0.35	0.48	319
P	FDI	0	1	1	0.51	0.51	39
	G	0	0	1	0.43	0.50	93
	P	0	0	1	0.36	0.48	425

\*being completely defaulted

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	0	1	0.13	0.34	23
	G	0	0	1	0.26	0.45	23
	P	0	0	1	0.29	0.46	38
G	FDI	0	0	1	0.37	0.50	19
	G	0	0	1	0.30	0.46	93
	P	0	0	1	0.29	0.45	318
P	FDI	0	0	1	0.13	0.34	39
	G	0	0	1	0.30	0.46	93
	P	0	0	1	0.27	0.45	424

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\*When default happens, stopped transaction

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	0	1	0.44	0.53	9
	G	0	1	1	0.58	0.51	19
	P	0	0	1	0.43	0.50	28
G	FDI	0	0	1	0.14	0.36	14
	G	0	0	1	0.46	0.50	61
	P	0	0	1	0.32	0.47	214
P	FDI	0	0	1	0.39	0.50	23
	G	0	0	1	0.47	0.50	58
	P	0	0	1	0.43	0.50	289

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\*When default happens, suited

Borrower (Buyer)	Lender (Seller)	min	median	max	mean	s.d.	n
FDI	FDI	0	0	1	0.33	0.50	9
	G	0	0	1	0.26	0.45	19
	P	0	0	1	0.14	0.36	28
G	FDI	0	0	1	0.29	0.47	14
	G	0	0	1	0.30	0.46	61
	P	0	0	1	0.28	0.45	214
P	FDI	0	0	1	0.30	0.47	23
	G	0	0	1	0.28	0.45	58
	P	0	0	1	0.25	0.44	289

(Source) JICA PBOC survey