



RIETI Discussion Paper Series 07-E-031

Enforceability in Trade Credit: Financial Aspects of Transactions with FDI

ITOH Seiro

Institute of Developing Economies

WATANABE Mariko

Institute of Developing Economies

YANAGAWA Noriyuki

the University of Tokyo



Research Institute of Economy, Trade & Industry, IAA

The Research Institute of Economy, Trade and Industry

<http://www.rieti.go.jp/en/>

Enforceability in Trade Credit:
Financial Aspects of Transactions with FDI*

April 15, 2007

Seiro ITOH(Institute of Developing Economies)
Mariko WATANABE[◇](Institute of Developing Economies)
Noriyuki YANAGAWA(The University of Tokyo)

RIETI Discussion Papers Series aims at widely disseminating research results in the form of professional papers, thereby stimulating lively discussion. The views expressed in the papers are solely those of the author(s), and do not present those of the Research Institute of Economy, Trade and Industry.

* This paper is prepared for International Conference on “Empirical Studies of Trade, FDI and Firms in East Asia” on 16-17 March, 2007, Tokyo.

[◇] Corresponding author. E-mail mariko@ide.go.jp.

Abstract

This paper documents financial aspects of transactions and trade credit supply behavior with foreign direct investment (FDI) among small- and medium-sized enterprises, based on two original surveys. The surveys, conducted in four cities in China in 2003, were designed to uncover 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/significance of FDI in the supply of trade credit due to its enforcement technology of trade credit.

Yanagawa, Ito, and Watanabe (2006) developed an incomplete contract model wherein when the seller has a higher enforcement technology or the buyer has richer liquidity, both trade credit and transaction volume will increase. In this paper we first compute the “enforcement probability” of each seller then test the propositions of the model. We confirm that (1) FDI and G firms provide larger trade credit. (2) This is due to their higher enforcement probability in trade credit. Furthermore, (3) higher enforcement probability has a positive external effect in enhancing the trade credit and transaction volume of indirect transaction partners.

However, we also find that (4) in order to raise the probability of “no default,” enhancing the ratio of cash on delivery is a necessary measure. (5) A more competitive supplier will prefer cash on delivery payment and consequently will provide less trade credit to the economy. (6) With a shorter transaction period, the supplier will provide larger trade credit. This implies that firms with a stronger bargaining power prefer providing no trade credit though they can expect higher enforcement probability, thus reduces the volume of economic activity. These negative forces against enhancing trade credit and economic activity exist at a substantial level in China. Because of this force, a strategic default problem persists in China even 30 years after the transition began.

Key word: incomplete contract, trade credit, spillover of technology, FDI, government owned firms

JEL Classification: O5, K0, G2, P31

1. Introduction

The role of FDI in the host country's economy are mainly argued with a reference to technology transfers in terms of production, management etc. This paper will focus on another important aspect: how transactions with FDI will contribute to financial condition of domestic firms; credit on the transactions, risk sharing on the 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, (d) incentive control. The supply of goods or service from supplier to buyer accompanies payment in the opposite directions. This payment contract often generates a provision of credit or risk-sharing when supply of goods and payment has a time difference. Further, payment contract 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. Institutions refereed 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 an good example to observe and understand how the institutions affect financial aspects of inter-firm transaction, because the legal institution for firms operates in China have been distinguished by ownership type, roughly speaking, as public 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, which called triangle debt in Chinese, have been policy agenda since the late 1980s and up to the present.

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

Why then FDI have positive effect to increase 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 buyer, thus they 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 transaction of goods. The goods X are traded at price P , the buyer will make a payment T out of PX when the goods are delivered from the seller. 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 $v>c$.

At date 1 buyer and seller agree to trade product and specify payment schedule. In order to delivery the product at date 1, the seller incurs the cost for production cX The goods X are traded at price P , the buyer will make a cash on delivery-payment T , out of PX when the goods are delivered from the seller. The residual $PX-T$ is a volume of trade credit from the seller to buyer¹. 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 buyer's benefit, svX when the default occurs. We call s as 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 , the both party may expect that the buyer will default and the seller gets 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,

$$\begin{aligned} \text{Max } & A+vX-T-\text{Min}[PX-T, svX] \\ \text{s.t. } & T+\text{Min}[PX-T, svX]>_cX : \text{Individual rationality condition of the seller} \\ & A>T. \quad : \text{Cash constraint of the buyer} \end{aligned}$$

¹ Theoretically, trade credit might be given from the buyer to seller in the form of prepayment. But this is recognized as marginal in practical, our survey also confirmed these point.

By solving this problem, we obtain the following results:

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

$$\begin{aligned} X^* &= A/(c-sv) \\ P^* &\geq c \\ T^* &= A \\ P^*X^* - T^* &= svA/(c-sv) \end{aligned}$$

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

This results implies that enforcement mechanism or enforcement technology of the seller, is important for trade volume, 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 sell their products to the customer, 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 increasing functions of the enforcement technology of the surveyed (customer) firm². Enforcement technology has an external effect to enhance both trade and trade credit volumes.

2.2 Empirical questions

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

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

effect, and enhances trade volume and trade credit, the FDI play a very important role in the financial aspect. This financial function also needs to be recognized as a positive role of FDI.

Applying propositions in the model analysis above into 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 other ownership firm does?

Q.2 If the answer for Q1 is yes, then, why FDI can provide larger trade credit?

Our model predicts that when the strategic default may occur, trade credit are provided more when the buyer are more liquid and the seller has a higher “enforcement technology” from the incomplete contract framework. If strategic default will not occur definitely, trade credit will be provided more only because the seller is more liquid. Hypotheses in contest here are in short:

H1 Because FDI are only more liquid to others, they provide larger trade credit regardless of enforcement technology. This presumes a world with absence of strategic default.

H2 Because FDI have higher enforcement technology as well as liquidity, FDI will provide larger trade credit. This presumes a world of strategic default.

Q.3 If H2 in Q2 is confirmed to be supported, then, does the FDI’s enforcement technology have positive external effect in trade credit enforcement?

In this paper, we are interested in a 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 provisions³⁴.

³ For cash in hand, A, it is not easy as well to tell which variable should be selected. For example, first we have to choose cash asset 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 activity that might be related to loan from bank or other external parties. The PBOC-JICA survey contains information on firm’s transactions with bank and on bank information. Detailed test on cash constraint will be possible.

⁴ Institutional factors or institutions may affect enforcement of payment schedule of trading contracts, or the buyer’s incentive to default. In the case of China, following institutions may matter:

(a)Ownership

In China, corporate activities have been regulated according to ownership types: until corporate law got effective in 1993, state owned enterprises were established based on “State Owned Enterprise Law” enacted in 1988, town and village enterprises was 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 Foreign Direct Investment Law and related regulations respectively. Even after the Corporate Law came

3. Data and Descriptive Statistics

3.1 Data

Data we have collected consists of two surveys: the one was conducted at Yibin City, Sichuan Provinces, in January 2003, conducted by Development Research Center and Institute of Developing Economies (hereafter called DRC-IDE survey). The other was conducted by People's Bank of China, commissioned by Japan International

into force, individual firms are regulated under their respective legal ground until they were reformed to the company under the corporate law. Each law provides for 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 legal systems are very complicated, there remains a substantial ambiguity within which companies to operate. These defects of 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 of WTO, FDI companies regulations are distinct from domestic company regulations. Domestic companies also differ from each other under different legal regulations: publicly owned firms and private firms. Therefore, when we take a look into the nature of transactions on 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 government-owned enterprise, which includes state owned and collective owned enterprises (town and village enterprises) (G), the 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 institutions of home economy. In our survey, the surveyed firms are asked to describe the share of following six payment instruments; (1) cash, (2) cheques, (3) bank note (4) bank draft, (5) commercial draft 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 bank will guarantee the payment up to the cash amount in bank account of the buyer. (3) A bank note is a payment instruments offered by bank, 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, bank will be responsible for payment as long as the buyer's account holds sufficient cash. For (4) bank draft, 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 payment, regardless of liquidity of the buyer. In the market economy, draft is issued based on the credit of the issuer, or buyer firms, it is rare that a draft is issued based on credit of bank for issuer firms. In China, (5) a commercial draft corresponds to draft in the market economy. Since the reform and transition to market economy began in China, strategic default by the buyer firms has been so prevalent that it was very difficult to issue a draft only based on credit of firms. Bank draft is a unique institutional arrangement that was introduced in order to conquer a problem of strategic default by issuers of draft. (6) Credit card is a payment instruments that card-issuing company will provide short-term credit for payment.

Cooperation Agency, at Beijing Municipal City, Dongguan City, Guangdong Provinces and Xi'an City, Shaanxi Provinces in December 2003 (hereafter called PBOC-JICA Survey). The two surveys are implemented using a very similarly structured questionnaire in the section concerning inter-firm transactions, thus we have been able to pool the two surveys here to analyze firm's behavior 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 the largest number, 26, of FDI companies, but Yibin has no FDI among surveyed firms, whose data are utilized in Yangawa et.al[2006] to document the positive role of government owned firms, has no FDI among surveyed firms.

Sample selection mechanisms are as follows; For DRC-IDE Survey at Yibin, the surveyed firm were listed mainly from networking of Yibin City Government. Though it might be presumable this may be biased toward to increase government-owned firms, it covers around a half of the firms in the city, we can regard it more or less same as census of the city (see Yanagawa, et. al [2006]). JICA-PBOC Survey was implemented by utilizing the local network of People's Bank of China. The surveyed firms were primarily planned to list based on the Bank's borrower's list. However, it was found that the list contains a substantial share of virtual firms, thus we can expect extremely low collection rate of the survey if we take random sampling based on the Bank's list. Therefore, we abandoned this strategy and took a procedure to list the firms based on the network of the local government, as the same with a case of Yibin. It is not explained what actually were the network of the local government was, thus we have no correct information on sample selection mechanism. We can imagine that the firms were listed mainly from the network of the government who has a frequent relationship between the governments or the People's Bank of China, the central bank.

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

The survey was designed to ask the surveyed firm for the information on transactions with (1) a customer firm located inside of home city of the surveyed firms, (b) a customer outside the home city, (3) a supplier located in the home city, (4) a supplier outside of 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 firms at the time of

the implementation of the survey. The distinction by city border was motivated to capture the influence of administrative action or enforcement, when legal enforcement in China are often criticized as being too weak.

<Figure2 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, furthermore, transaction volume. Firstly, we take a look at what actually happens in two endogenous variables in the model, trade credit(Table1) and transaction volumes(Table2). 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 size of (3) prepayment is marginal, here we do not consider net trade credit $((1) - (3))$, 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 1 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, particularly from FDI seller to FDI or Government-owned customers are as high as 90 per cent. On the contrary, when Private firm is a receiver of trade credit contract, all ownership type become conservative, and provides 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 1 Ratio of payment after delivery in a transaction>

Concerning transaction volume, although variances are much larger than with trade credit ratio, we can see that transaction from FDI to all ownership type are larger than from other types in terms of median. As receiver of credit, FDI and government owned

firms are more less the same in transaction volume. Similarly to trade credit ratio, private 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 2 Transaction volume by ownership type>

These descriptive statistics gives an answer to the first question of our empirical questions: Q.1 Does a transaction with FDI provide credit to domestic firms? Is it bigger than other ownership firm does? The answer looks "yes" from the above.

3.2.2 Factors of enforcement technology

How, then, are the factors related to enforcement technology or cash in hand? In our survey, following information are available; ownership types of trading partners, structure of payment instruments, geographical or administrative area information such as addresses of trading partner, share of market site, i.e., home city and export are shown here. Competitive conditions and experiences of default in trade credit and ex post management to the default incident are 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 to manage default risk by the buyer. Table 3 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 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 seems to prefer to receive cheques. Bank note follows the top two, and bank draft is the fourth place (Appendix 1).

(b) Geographical/administrative factors

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

settle within local payments. In addition, the availability of information on customers, institutional arrangements to manage ex post when 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 – surveyed firm's ownership. For export, FDI sellers, particularly FDI-FDI pairs, shows by far higher share to other ownerships does. On the contrary, more than half of total sales of G sellers are to the home city market, higher than other ownerships. Ownership types of buyer do not show systematic differences (Appendix 2 Marketing area).

(c) Competition

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

For uniqueness of goods, around 60 per cent 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 in 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 manage default incidence, we set following questions: (1) Since 1999 to 2003, whether faced with default by the buyer. (This questioned to choose 1 out of following 3 situations, 1. No default (yes=1, no=0), 2. Delayed payment that eventually paid in full (yes=1, no=0), 3. Complete default (yes=1, no=0).

For cases where FDI supplier sold products to FDI and private customers, higher shares of surveyed firms answered that they have not being defaulted (FDI customer-FDI surveyed firm answered 61 per cent in mean, FDI customer-private surveyed firms answered 51 per cent). On the contrary, these 2 pairs category firms answered lowest share to question whether they have been completely defaulted or not. For ex post management to a default incident, we cannot see systematic differences by ownership types in these descriptive statistics (Appendix 4 Default experience and ex post management).

4. Estimation strategy

4.1 Estimating “enforcement technology”

Regarding empirical application, the problem is how to capture level of enforcement technology. All information we have is only proxy. Enforcement technology can be recognized as a composite of several factors; (a) payment instruments offered by financial institutions, (b) administrative and legal institution regarding enforcement of contracts, (c) competitiveness of the firms, and (d) ratio of cash on delivery. In our survey, we have the related information, but we do not know how these factors comprise enforcement technology.

Fortunately, we have information of default experiences in the recent four years on transactions with customers for each surveyed firms; (1) no default at all (yes=1, no=0), (2) have ever been delayed that eventually repaid (yes=1, no=0), (3) have ever been completely defaulted (yes=1, no=0). We will estimate probability of enforcement for each these three proxies, explained by the factors of (a) to (d) above. We will define the probabilities of enforcement as follows:

Probability of enforcement (no default) = Prob(no default)

Probability of enforcement (non-delayed) = 1 - Prob(delayed)

Probability of enforcement (non-complete default) = 1 - Prob(complete default)

As the dependents are binary response variables here, probit estimator is useful. As we saw in the section of data, sample selection mechanisms for JICA-PBOC Survey was not clear, but we have no positive information that there were apparent bias in the sample selection that affects to trade credit provision. Thus, we do not care about sample selection bias.

In our analytical setting, we consider our problem in a static or stationary status setting, where transaction partners are exogenously given, then the firm decides only the ratio or volumes of trade credit, and transaction volumes. This setting is practically realistic, as the firm will start negotiating on payment condition, that is, trade credit condition, after he fixed the trading goods and the trading partner. The reverse proceeding is not necessarily realistic, because if the credit is the key problem to choose trading goods and trading partner, firm does not have to giving up a transaction with the partner, by borrowing necessary cash from third party such as financial institutions. Thus, we consider probability of enforcement computed on the past experience shows their stationary status nature.

4.2 Testing hypotheses

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

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

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

4.3 Estimation procedure

(a) Fractional logit and exponential regression

Data available for dependent variables in this paper are (a) ratio of payment after delivery, (b) transaction volume with four specific transaction partners (a customer inside home city, a customer outside home city, a supplier in home city, and a supplier in outside home city).

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

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

This modeling allows us to predict vales for y in (0, 1). Just as binary logit model, derivative of conditional expectation on x_j is $\beta_j g(\mathbf{x} \beta) (g(\mathbf{x} \beta) = G'(\mathbf{x} \beta))$. Here, we can take this model as a quasi maximum likelihood function as binary response model following 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 β by quasi maximum likelihood estimation. Here, y_i can be take any value in [0, 1], but interpretation needs some caution as fractional values are regarded as a probability to choose value 1 (or zero) here. We will take fractional logit regression model to estimate trade credit ratio function, where dependent is 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 exponential quasi maximum likelihood estimator, where 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 β 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 exponential distribution.

(b) Endogeneity of unobserved variables

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

As our data is a cross section data, it does not have time variant information for each individual entity, we cannot fully utilize panel data method to eliminate individual fixed effect. However, we have asked specific information on each two transactions for both sales and procurement for each firm so as to eliminate individual fixed characteristics by using fixed effect estimator. However, unfortunately, we found data collection rate in our survey was not high, it was often missing multiple data for sales or procurement. This strategy was therefore abandoned later. Instead, we broadened definition of “individual” from “by firm” to “by ownership types”, as we are interested in behavior of FDI, compared to Government -owned firms or private firms. We did 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, transaction functions in order to evaluate role of FDI firms in trade credit provision. As set out in the previous section, we have three empirical questions. Specification for each question and results will be shown in below.

5. Estimation Result

5.1 Probability of enforcement

We have three proxies for enforcement technologies or probability of enforcement, i.e., no

default dummy, delayed paid dummy and complete default dummy. Estimated coefficients of probit estimators on probability of enforcement are as in Table 3. Table 3 presents two specifications by each proxy for probability of enforcement. The first specification have only (a) payment instruments and (b) ownership types pairs dummies as dependents, on the other hand, the second specification have other factors (c) administrative and regional factors, (d) competitiveness and length of transaction, (e) ratio of cash on delivery in a transaction. For all three proxies, the ownership type pair dummy becomes insignificant in the second specification, but explanatory powers increase as we can see that log likelihood becomes larger. Thus, we take the second specification to obtain predicted probabilities of enforcement for the three dummies of enforcement probability.

Qualitatively speaking, probit estimators for the three dummies shows an interesting result: (1) When the factors such as administrative/geographical, competition, transaction history, ratio of cash on delivery in a transaction ((c)-(e)) added into the dependents, ownership types dummies become insignificant. (2) COD ratio are significant for being “no default”, but “delayed, but be repaid eventually,” but insignificant for being “completely default.”

<Table 3 >

The predicted mean probabilities of enforcement based on three dummies are presented in Figure1. The probability based on the “no default” dummy shows the lowest in terms of both median and means, 0.31 and 0.33 respectively. The probability of “non-delay” shows the middle in median and means, 0.61 and 0.06. The median and means of the probability of “non-complete default” are 0.74 and 0.72. Comparing the distribution of sales transaction and procurement transaction for the surveyed firms, we cannot find a systematic difference. Table 4, 5 and Appendix 5 shows profiles of predict mean probability by ownership type pairs, both in sales and in procurement, and by city. In tables for ownership types pairs, we can see that the predicted mean probability of enforcement of FDI towards FDI and private firms are high in terms of both median and mean for the no default dummy, and the non-complete default dummy. Those for private firms for the no default dummy and the non-complete default dummy are lower than other ownership types. Comparing sales transaction and procurement one, the differences above mentioned are more apparent in sales transactions. Concerning cities, we can see that the probability of enforcement is the highest in Beijing and Xi’an, and lowest in Dongguan for the no default dummy and the

non-complete default dummy in Appendix 5. It is interesting that the enforcement probability of Dongguan, where the economy is the most open and the most of FDI's in our surveys are operating, show the lowest probability of enforcement.

<Table 4>

<Table 5 >

5.2 Testing hypotheses

Now we obtained the data on the enforcement probability, we will proceed to test our empirical hypotheses.

5.2.1 Does a transaction with FDI provide credit to domestic firms?

To test this question, we ran regressions on trade credit ratio, trade credit volume and transaction volume for both in sales and procurement transactions. The dependents are basically the same with probability estimation, that is, (a) payment instruments, (b) ownership types pairs, (c) administrative/geographical factors, (d) competition and bargaining power. Results are weakly systematic: (1) ownership-type pairs dummy are significant even when the administration and competition factors are added in the specification for the data of sales transaction and trade credit volume in procurement. Particularly, when G firm and FDI sells their products to FDI, and the private firms sells to G firms, they provided larger trade credit compared to the private firms sells to the private firms (See Appendix 6). (2) Trade credit ratio regression in procurement and transaction volume regression showed opposite results; ownership type pairs dummy become significant when other factors are added. (3) Ratio of cash payments are significantly negative to trade credit ratio and volume.

The answer for Q1 is “yes” for the time being, but we had better say that FDI provides larger trade credit due to some functional reasons such as competitiveness, geographical and liquidity position, not but due to some ownership type fixed factors.

The specifications (3), (6) and (9) added quadratic forms of s^{\wedge} and estimation results supported that non-linearity of s^{\wedge} .

5.2.2 Why, then, FDI can provide larger trade credit?

Hypotheses in contest here are;

H1 Because FDI are only more liquid to others, regardless of enforcement technology.

H2 Because FDI have higher enforcement technology as well as liquidity.

To test questions above, we proceed to test structural function utilizing the enforcement probability data. First, in order to test which index of “enforcement probability” are desirable for our test, we ran trade credit ratio regression (Table 6 for trade credit ratio in sales transaction, and Table 7 for in procurement transaction). When ratio of trade credit is regressed only by “enforcement probability s,” only the probability based on “non-complete default” dummy in sales transactions shows significant and positive signs, as the theory predicted.

Table 8 shows a result of the trade credit function regression to test the H1 and H2. To test these hypotheses, we need information on “cash in hand of the buyer” and “enforcement technology of the seller.” We have full information above only for those in procurement transaction, the test is run only for this procurement transaction. First, in specification (0), we confirmed that cash flow and cash stock of the buyer matter trade credit volume. Then, we proceed to test whether the trade credit, in terms of volume, not ratio, can be explained by the enforcement probability. All three indexes show positive and significant coefficients, which is a consistent result with model prediction (Specification (1) (3)(5)). Furthermore, when we added cash flow and cash stock variables, the all coefficients of dependents are positive and significant. In this full specification ((2) (4) (6); the dependents are the cash of the buyer and the enforcement probability of the seller), the log likelihood increased substantially, which indicated the full specification are more desirable. Table 9 shows similar results in transaction volume with what happened in the trade credit volume.

These results supported that trade credit will be provided more when the enforcement technology of the seller is high and the buyer has more cash or liquidity. In the descriptive statistics and a test on Q1, where we can say that FDI provides larger trade credits. Together with findings in these two steps, we can say that the H2 is supported.

<Table 6>

<Table 7>

<Table 8>

<Table 9>

5.2.3 Does FDI's enforcement technology have positive external effect?

Finally, we will move on to test whether the enforcement technology in trade credit has a positive external effect. The model indicated sequential trading induces positive external effect of enforcement technology. The enforcement technology of the surveyed firm is exercised towards their customer to secure their repayment of credit, and it is completely indifferent to a transaction between the surveyed firm and their supplier. Thus, we can check the existence of externality by testing whether credit given by the supplier is affected by the enforcement technology of the surveyed firm towards their customer. We tested on both dependents here, trade credit ratio and trade credit volume.

Table 10 shows similar results with tests in the previous sections; ratio of trade credit was not sufficiently explained by the enforcement power. However, in trade credit volume and transaction volume function, the enforcement probability of the buyer to their customer significantly and positively matter. Thus, we confirmed that a positive external effect of enforcement technology in trade credit existed in our data.

6. Summary and Conclusion

In this paper, we tested and confirmed followings: (1) FDI and G contributed to provision of credit. (2) They can provide larger trade credit because of their higher “enforcement technology” which is measured by “enforcement probability” here, not because that they are liquid. The cash constraint of the buyer and the enforcement technology of the seller significantly matter a decision of trade credit provision by the seller, as a model in Yanagawa, et.al [2006] predicted. This result implies that strategic default seriously matters among SMEs in China. On the other hand,(3) their enforcement technology has a positive external effect towards China’s economy. This implies that the firms with higher enforcement technology keep on operating in China, the external effect of their technology will improve the enforcement probability of whole economy.

However, we also found (4) in order to raise the probability of “no default,” enhance ratio of cash on delivery is a certain measure. But this will reduce volume of credit and economic transactions. (5) More competitive supplier will prefer cash on delivery payment, consequently, will provide less trade credit to the economy, (6) Shorter transaction period, the supplier will provide larger trade credit. These findings implies that firms with stronger bargaining power prefers not providing trade credit, though they can expect to higher enforcement probability through their bargaining power. These negative forces against enhancing trade credit and economic activity

substantially exist in China. Because of this force, strategic default problem persists in China even after 30 years since the transition started.

We mainly examined impact of trade credit enforceability on trade credit supply. But, how the other factor, “cash in hand of buyer,” is provided, by whom, were not argued here. We need further investigation.

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

Table 1 Distributions of location and ownerships 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>

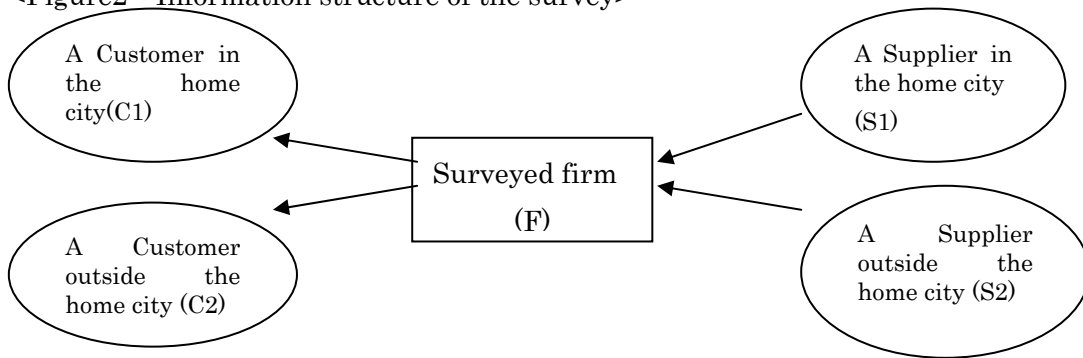


Table 1 Ratio of trade credit in a transaction

* 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 | FDI | 0 | 90 | 100 | 69.69 | 40.43 | 16 |
| P | FDI | 0 | 30 | 100 | 49.00 | 39.39 | 40 |
| FDI | G | 0 | 100 | 100 | 77.74 | 31.65 | 19 |
| G | G | 0 | 70 | 100 | 60.40 | 41.68 | 85 |
| P | G | 0 | 55 | 100 | 54.07 | 39.41 | 88 |
| FDI | P | 0 | 67.5 | 100 | 58.89 | 38.60 | 36 |
| G | P | 0 | 70 | 100 | 57.53 | 39.90 | 306 |
| P | 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 | FDI | 0 | 80 | 100 | 58.33 | 42.77 | 27 |
| P | FDI | 0 | 50 | 100 | 49.28 | 42.63 | 118 |
| FDI | G | 0 | 70 | 100 | 59.31 | 39.01 | 36 |
| G | G | 0 | 30 | 100 | 44.62 | 39.32 | 79 |
| P | G | 0 | 40 | 100 | 45.35 | 41.05 | 273 |
| FDI | P | 0 | 70 | 100 | 65.33 | 33.35 | 15 |
| G | P | 0 | 52.5 | 100 | 53.00 | 39.06 | 78 |
| P | P | 0 | 70 | 100 | 55.51 | 39.30 | 319 |

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

964

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

Table 2 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 | FDI | 30 | 500 | 100000 | 6,055 | 23,452 | 18 |
| P | FDI | 12 | 475 | 13960 | 1,497 | 2,995 | 26 |
| FDI | G | 20 | 525 | 13960 | 1,567 | 3,615 | 14 |
| G | G | 10 | 500 | 100000 | 3,000 | 12,481 | 65 |
| P | G | 10 | 240 | 50000 | 1,759 | 6,392 | 73 |
| FDI | P | 30 | 500 | 30000 | 1,926 | 5,929 | 25 |
| G | P | 5 | 500 | 40000 | 1,733 | 4,495 | 261 |
| P | 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 | FDI | 1.8 | 145 | 20000 | 1,146 | 3,949 | 25 |
| P | FDI | 2.5 | 200 | 9000 | 821 | 1,602 | 114 |
| FDI | G | 43 | 575 | 5000 | 1,116 | 1,403 | 14 |
| G | G | 1.5 | 565 | 22500 | 2,001 | 3,520 | 78 |
| P | G | 1 | 315 | 28726 | 1,590 | 3,326 | 262 |
| FDI | P | 10 | 300 | 10000 | 985 | 1,927 | 30 |
| G | P | 5 | 300 | 19000 | 979 | 2,411 | 75 |
| P | P | 2 | 320 | 80000 | 1,529 | 5,362 | 302 |

(Source) JICA PBOC survey

918

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

Table 3 Probit estimates on probability of enforcement

| Probability of enforcement | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------------|------|-------|------|---------------|------|-------|------|--------------------|------|-------|------|---------------|------|-------|------|---------------|------|-------|------|--------------|------|-------|------|
| Dependent | No default dummy | | | | Delayed dummy | | | | Completely default | | | | | | | | | | | | | | | |
| | (1) | (2) | (1) | (2) | (1) | (2) | (1) | (2) | | | | | | | | | | | | | | | | |
| Pseudo Log Likelihood | -611 | -432 | -621 | -465 | -562 | -406 | | | | | | | | | | | | | | | | | | |
| Pearson Residuals(1/d | 1.01 | 1.04 | 1.01 | 1.02 | 1.02 | 1.02 | | | | | | | | | | | | | | | | | | |
| AIC | 1.29 | 1.23 | 1.31 | 1.33 | 1.19 | 1.17 | | | | | | | | | | | | | | | | | | |
| # of obs | 972 | 735 | 970 | 733 | 970 | 733 | | | | | | | | | | | | | | | | | | |
| | Coef. | s.e. | z | P> z | Coef. | s.e. | z | P> z | Coef. | s.e. | z | P> z | Coef. | s.e. | z | P> z | Coef. | s.e. | P> z | | | | | |
| Share of payment instruments (%) | | | | | | | | | | | | | | | | | | | | | | | | |
| cash | -0.007 | 0.00 | -4.63 | 0.00 | -0.005 | 0.00 | -1.27 | 0.20 | -0.001 | 0.00 | -0.64 | 0.52 | 0.003 | 0.00 | 0.79 | 0.43 | -0.005 | 0.00 | -3.15 | 0.00 | 0.00 | 0.00 | 0.69 | 0.49 |
| cheque | -0.006 | 0.00 | -6.20 | 0.00 | -0.006 | 0.00 | -1.58 | 0.12 | -0.002 | 0.00 | -1.92 | 0.06 | 0.004 | 0.00 | 1.05 | 0.29 | -0.004 | 0.00 | -4.39 | 0.00 | 0.00 | 0.00 | 0.84 | 0.4 |
| banknote | -0.005 | 0.00 | -4.10 | 0.00 | -0.004 | 0.00 | -1.17 | 0.24 | -0.001 | 0.00 | -0.97 | 0.33 | 0.006 | 0.00 | 1.37 | 0.17 | -0.006 | 0.00 | -5.58 | 0.00 | 0.00 | 0.00 | -0.07 | 0.94 |
| bankdraft | -0.009 | 0.00 | -4.48 | 0.00 | -0.010 | 0.00 | -2.49 | 0.01 | 0.004 | 0.00 | 1.96 | 0.05 | 0.009 | 0.00 | 1.99 | 0.05 | -0.008 | 0.00 | -3.59 | 0.00 | 0.00 | 0.00 | 0.43 | 0.66 |
| creditcard (Commercial draft) | 0.013 | 0.01 | 2.49 | 0.01 | 0.016 | 0.01 | 2.57 | 0.01 | -0.020 | 0.01 | -3.03 | 0.00 | -0.017 | 0.01 | -2.19 | 0.03 | -0.011 | 0.01 | -1.95 | 0.05 | -0.01 | 0.01 | -0.76 | 0.45 |
| Buyer-Seller Ownerships (dummy) | | | | | | | | | | | | | | | | | | | | | | | | |
| dGG_C | 0.07 | 0.16 | 0.47 | 0.64 | -0.24 | 0.22 | -1.09 | 0.28 | -0.24 | 0.16 | -1.56 | 0.12 | -0.03 | 0.20 | -0.16 | 0.87 | 0.11 | 0.16 | 0.71 | 0.48 | 0.30 | 0.22 | 1.40 | 0.16 |
| dGF_C | -0.44 | 0.36 | -1.22 | 0.22 | -0.72 | 0.38 | -1.88 | 0.06 | 0.61 | 0.32 | 1.92 | 0.06 | 0.60 | 0.33 | 1.82 | 0.07 | -0.46 | 0.36 | -1.30 | 0.19 | -0.01 | 0.37 | -0.03 | 0.97 |
| dGP_C | 0.30 | 0.15 | 1.96 | 0.05 | 0.17 | 0.18 | 0.96 | 0.34 | -0.36 | 0.16 | -2.24 | 0.03 | -0.31 | 0.18 | -1.73 | 0.08 | 0.05 | 0.16 | 0.30 | 0.77 | 0.28 | 0.18 | 1.50 | 0.13 |
| dFF_C | 0.77 | 0.30 | 2.60 | 0.01 | 0.36 | 0.34 | 1.05 | 0.29 | -0.52 | 0.32 | -1.63 | 0.10 | -0.37 | 0.36 | -1.05 | 0.30 | -0.45 | 0.34 | -1.33 | 0.19 | -0.05 | 0.37 | -0.13 | 0.9 |
| dFG_C | -0.28 | 0.36 | -0.77 | 0.44 | -1.03 | 0.53 | -1.93 | 0.05 | -0.31 | 0.33 | -0.93 | 0.35 | -0.02 | 0.39 | -0.06 | 0.95 | 0.42 | 0.32 | 1.28 | 0.20 | 0.76 | 0.39 | 1.95 | 0.05 |
| dFP_C | 0.29 | 0.22 | 1.34 | 0.18 | -0.19 | 0.26 | -0.72 | 0.47 | 0.01 | 0.22 | 0.04 | 0.97 | 0.16 | 0.26 | 0.62 | 0.54 | -0.51 | 0.27 | -1.93 | 0.05 | 0.01 | 0.30 | 0.03 | 0.98 |
| dPG_C | 0.02 | 0.10 | 0.17 | 0.87 | -0.13 | 0.13 | -0.98 | 0.33 | -0.06 | 0.10 | -0.58 | 0.57 | 0.02 | 0.13 | 0.18 | 0.86 | -0.01 | 0.11 | -0.12 | 0.90 | 0.15 | 0.14 | 1.13 | 0.26 |
| dPF_C (dPP_C) | 0.00 | 0.23 | 0.01 | 1.00 | -0.46 | 0.30 | -1.54 | 0.12 | -0.08 | 0.23 | -0.35 | 0.73 | 0.07 | 0.26 | 0.28 | 0.78 | 0.00 | 0.24 | 0.01 | 1.00 | 0.37 | 0.27 | 1.35 | 0.18 |
| Ratio of cash on delivery | 0.52 | 0.12 | 4.44 | 0.00 | 0.65 | 0.14 | 4.51 | 0.00 | -0.45 | 0.12 | -3.80 | 0.00 | -0.55 | 0.14 | -3.98 | 0.00 | -0.18 | 0.12 | -1.51 | 0.13 | -0.15 | 0.15 | -1.01 | 0.31 |
| Administrative region (dummy) | | | | | | | | | | | | | | | | | | | | | | | | |
| Beijing | | | | | 0.47 | 0.15 | 3.09 | 0.00 | | | | | 0.80 | 0.11 | -1.55 | 0.12 | | | | | -0.26 | 0.15 | -1.73 | 0.08 |
| Dongguang | | | | | 0.23 | 0.17 | 1.35 | 0.18 | | | | | 0.56 | 0.09 | -3.50 | 0.00 | | | | | 0.41 | 0.17 | 2.46 | 0.01 |
| Xian (Yibn) | | | | | 0.43 | 0.15 | 2.81 | 0.01 | | | | | 0.86 | 0.12 | -1.04 | 0.30 | | | | | -0.25 | 0.15 | -1.67 | 0.1 |
| Share of market site (%) | | | | | | | | | | | | | | | | | | | | | | | | |
| Home city | | | | | 0.00 | 0.00 | 0.31 | 0.75 | | | | | 0.00 | 0.00 | 0.35 | 0.73 | | | | | 0.00 | 0.00 | -1.27 | 0.2 |
| Export | | | | | 0.00 | 0.00 | 0.15 | 0.88 | | | | | 0.00 | 0.00 | -1.34 | 0.18 | | | | | 0.00 | 0.00 | 0.01 | 0.99 |
| Competitiveness of goods | | | | | | | | | | | | | | | | | | | | | | | | |
| Unique(If goods is unique to customer=1, IF | | | | | 0.18 | 0.11 | 1.63 | 0.10 | | | | | 0.15 | 0.11 | 1.42 | 0.16 | | | | | -0.43 | 0.11 | -3.88 | 0 |
| # of rival(no rivalry=0, few rival=1, a few rival: | | | | | -0.12 | 0.06 | -2.10 | 0.04 | | | | | 0.05 | 0.06 | 0.95 | 0.34 | | | | | 0.08 | 0.06 | 1.33 | 0.18 |
| Length of transaction | | | | | | | | | | | | | | | | | | | | | | | | |
| start year of transaction | | | | | 0.00 | 0.00 | -0.47 | 0.64 | | | | | 0.00 | 0.00 | -1.34 | 0.18 | | | | | -0.15 | 0.15 | -1.01 | 0.31 |

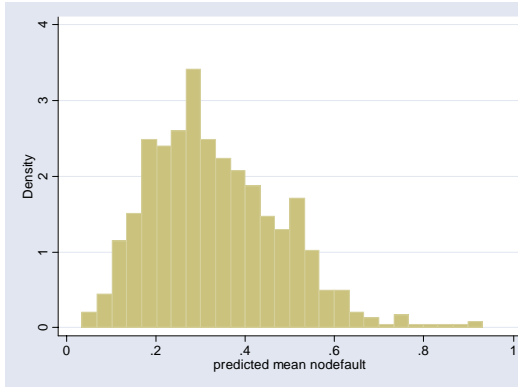
(Source) Author.

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

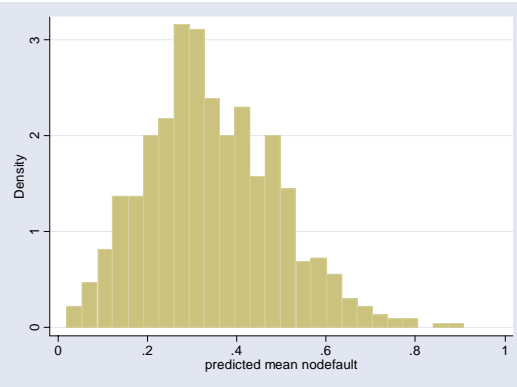
Figure 1 Predicted mean probability of enforcement

1. No default

From F to C

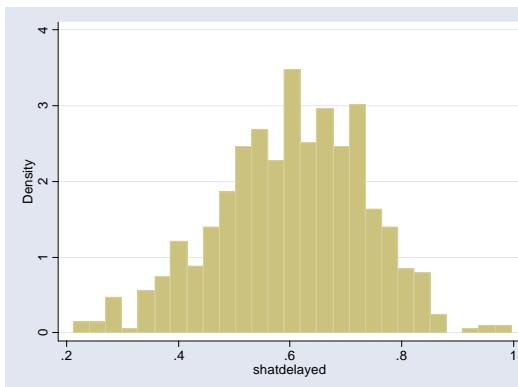


From S to F

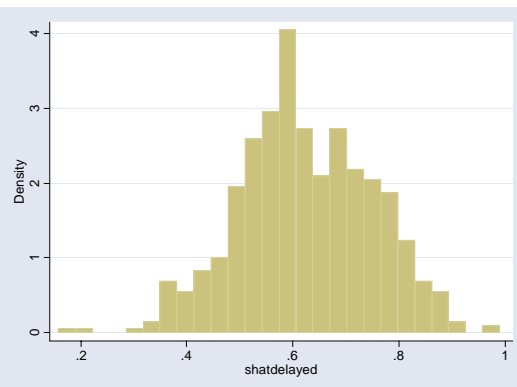


1. Not being delayed

From F to C

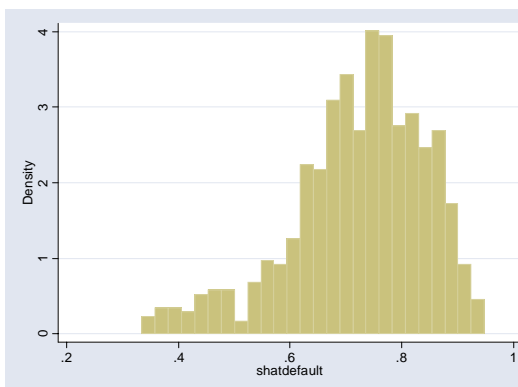


From S to F



2. Not being completely defaulted

From F to C



From S to F

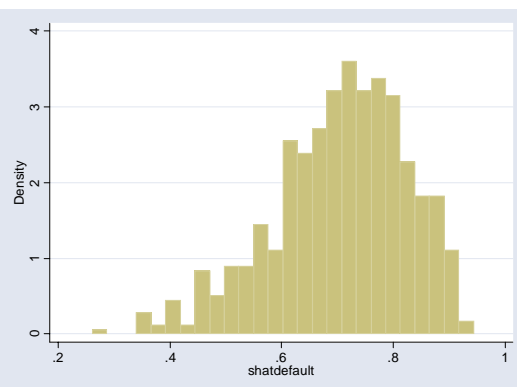


Table 4 Predicted probability of enforcement by ownership types, (1) in sales
From F to C

Probability of no default

| Borrower (Buyer) | Lender (Seller) | min | median | max | mean | s.d. | n |
|---------------------|--------------------|------|--------|------|------|------|-----|
| Total | Total | 0.04 | 0.31 | 0.93 | 0.33 | 0.15 | 741 |
| FDI | FDI | 0.24 | 0.52 | 0.81 | 0.49 | 0.13 | 18 |
| G | FDI | 0.04 | 0.09 | 0.24 | 0.11 | 0.07 | 11 |
| P | FDI | 0.17 | 0.42 | 0.90 | 0.42 | 0.15 | 29 |
| FDI | G | 0.08 | 0.15 | 0.39 | 0.16 | 0.07 | 19 |
| G | G | 0.09 | 0.23 | 0.87 | 0.26 | 0.13 | 51 |
| P | G | 0.18 | 0.39 | 0.72 | 0.41 | 0.12 | 71 |
| FDI | P | 0.07 | 0.20 | 0.42 | 0.23 | 0.09 | 27 |
| G | P | 0.07 | 0.28 | 0.74 | 0.29 | 0.12 | 212 |
| P | P | 0.08 | 0.36 | 0.93 | 0.37 | 0.14 | 303 |
| | | | | | | | 741 |

Probability of not payment delay

| Borrower (Buyer) | Lender (Seller) | min | median | max | mean | s.d. | n |
|---------------------|--------------------|------|--------|------|------|------|-----|
| Total | Total | 0.21 | 0.61 | 1.00 | 0.60 | 0.13 | 741 |
| FDI | FDI | 0.48 | 0.68 | 0.81 | 0.66 | 0.09 | 18 |
| G | FDI | 0.35 | 0.57 | 0.81 | 0.62 | 0.15 | 11 |
| P | FDI | 0.29 | 0.59 | 0.95 | 0.59 | 0.14 | 29 |
| FDI | G | 0.21 | 0.28 | 0.53 | 0.32 | 0.08 | 19 |
| G | G | 0.31 | 0.55 | 0.98 | 0.57 | 0.12 | 51 |
| P | G | 0.58 | 0.71 | 0.85 | 0.70 | 0.07 | 71 |
| FDI | P | 0.39 | 0.54 | 0.75 | 0.56 | 0.08 | 27 |
| G | P | 0.30 | 0.59 | 0.86 | 0.59 | 0.13 | 212 |
| P | P | 0.26 | 0.61 | 1.00 | 0.62 | 0.12 | 303 |
| | | | | | | | 741 |

Probability of not completely default

| Borrower (Buyer) | Lender (Seller) | min | median | max | mean | s.d. | n |
|---------------------|--------------------|------|--------|------|------|------|-----|
| Total | Total | 0.31 | 0.74 | 0.95 | 0.72 | 0.12 | 741 |
| FDI | FDI | 0.57 | 0.85 | 0.95 | 0.83 | 0.09 | 18 |
| G | FDI | 0.35 | 0.49 | 0.74 | 0.51 | 0.13 | 11 |
| P | FDI | 0.64 | 0.83 | 0.95 | 0.82 | 0.08 | 29 |
| FDI | G | 0.73 | 0.83 | 0.91 | 0.84 | 0.04 | 19 |
| G | G | 0.37 | 0.69 | 0.87 | 0.69 | 0.11 | 51 |
| P | G | 0.31 | 0.68 | 0.87 | 0.67 | 0.10 | 71 |
| FDI | P | 0.35 | 0.65 | 0.84 | 0.67 | 0.14 | 27 |
| G | P | 0.35 | 0.69 | 0.92 | 0.69 | 0.13 | 212 |
| P | P | 0.42 | 0.76 | 0.94 | 0.75 | 0.10 | 303 |
| | | | | | | | 741 |

Table 5 Predicted probability of enforcement by ownership, (2) in procurement
From S to F

Predicted mean probability of no default

| Borrower (Buyer) | Lender (Seller) | min | median | max | mean | s.d. | n |
|---------------------|--------------------|------|--------|------|------|------|-----|
| Total | Total | 0.02 | 0.32 | 0.91 | 0.34 | 0.15 | 687 |
| FDI | FDI | 0.31 | 0.49 | 0.72 | 0.51 | 0.09 | 14 |
| G | FDI | 0.02 | 0.08 | 0.16 | 0.08 | 0.04 | 20 |
| P | FDI | 0.08 | 0.26 | 0.64 | 0.27 | 0.11 | 98 |
| FDI | G | 0.07 | 0.13 | 0.26 | 0.14 | 0.06 | 9 |
| G | G | 0.09 | 0.26 | 0.61 | 0.29 | 0.14 | 55 |
| P | G | 0.09 | 0.40 | 0.91 | 0.41 | 0.15 | 210 |
| FDI | P | 0.10 | 0.27 | 0.64 | 0.26 | 0.12 | 31 |
| G | P | 0.14 | 0.32 | 0.55 | 0.33 | 0.10 | 43 |
| P | P | 0.11 | 0.35 | 0.68 | 0.36 | 0.12 | 207 |
| | | | | | | | 687 |

Predicted mean probability of being not delayed

| Borrower (Buyer) | Lender (Seller) | min | median | max | mean | s.d. | n |
|---------------------|--------------------|------|--------|------|------|------|-----|
| Total | Total | 0.16 | 0.61 | 0.99 | 0.62 | 0.13 | 687 |
| FDI | FDI | 0.61 | 0.72 | 0.89 | 0.71 | 0.07 | 14 |
| G | FDI | 0.39 | 0.53 | 0.80 | 0.58 | 0.13 | 20 |
| P | FDI | 0.32 | 0.56 | 0.80 | 0.55 | 0.12 | 98 |
| FDI | G | 0.16 | 0.35 | 0.55 | 0.34 | 0.14 | 9 |
| G | G | 0.37 | 0.57 | 0.87 | 0.60 | 0.11 | 55 |
| P | G | 0.41 | 0.70 | 0.99 | 0.70 | 0.11 | 210 |
| G | P | 0.37 | 0.56 | 0.80 | 0.58 | 0.10 | 43 |
| FDI | P | 0.34 | 0.56 | 0.85 | 0.57 | 0.12 | 31 |
| P | P | 0.36 | 0.60 | 0.86 | 0.62 | 0.10 | 207 |
| | | | | | | | 613 |

Predicted mean probability of being not completely defaulted

| Borrower (Buyer) | Lender (Seller) | min | median | max | mean | s.d. | n |
|---------------------|--------------------|------|--------|------|------|------|-----|
| Total | Total | 0.26 | 0.72 | 0.94 | 0.71 | 0.12 | 687 |
| FDI | FDI | 0.71 | 0.79 | 0.91 | 0.81 | 0.06 | 14 |
| G | FDI | 0.26 | 0.48 | 0.66 | 0.49 | 0.11 | 20 |
| P | FDI | 0.44 | 0.72 | 0.94 | 0.72 | 0.11 | 98 |
| FDI | G | 0.70 | 0.76 | 0.90 | 0.80 | 0.09 | 9 |
| G | G | 0.47 | 0.66 | 0.90 | 0.68 | 0.10 | 55 |
| P | G | 0.34 | 0.68 | 0.89 | 0.67 | 0.11 | 210 |
| FDI | P | 0.36 | 0.73 | 0.89 | 0.70 | 0.13 | 31 |
| G | P | 0.61 | 0.76 | 0.87 | 0.75 | 0.08 | 43 |
| P | P | 0.41 | 0.77 | 0.92 | 0.74 | 0.11 | 207 |
| | | | | | | | 687 |

(Source) Author

Table 6 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) | | | (9) | | | |
| Log Likelihood | -445 | | | -420 | | | -419 | | | -445 | | | -427 | | | -399 | | | -442 | | | -432 | | | -439 | | | |
| Pearson Residuals(1/df) | 0.64 | | | 0.61 | | | 1.16 | | | 0.64 | | | 0.62 | | | 0.67 | | | 0.64 | | | 0.63 | | | 0.63 | | | |
| AIC | 1.21 | | | 1.17 | | | 1.14 | | | 1.21 | | | 1.18 | | | 1.09 | | | 1.20 | | | 1.20 | | | 1.20 | | | |
| # of obs | 736 | | | 736 | | | 736 | | | 736 | | | 736 | | | 736 | | | 736 | | | 736 | | | 736 | | | |
| | 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 | Coef. | S.E. | P> z | Coef. | S.E. | P> z | Coef. | S.E. | P> z | |
| Probability of enforcement | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s on no default dummy | -0.193 | 0.16 | 0.24 | -1.39 | 0.23 | 0.00 | 4.75 | 1.08 | 0.00 | | | | | | | | | | | | | | | | | | | |
| s on delayed dummy | | | | | | | | | | 0.1 | 0.10 | 0.31 | -0.6 | 0.14 | 0.000 | 7.00 | 0.750 | 0.00 | | | | | | | | | | |
| s on complete default dummy | | | | | | | | | | | | | | | | | | | 0.25 | 0.08 | 0.002 | -0.1 | 0.12 | 0.26 | 2.11 | 0.60 | 0.00 | |
| Quadratics of probability of enforcement | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s^2 on no default dummy) | | | | | | | -11.3 | 2.707 | 0 | | | | | | | | | | | | | | | | | | | |
| s^2 on delayed dummy | | | | | | | | | | | | | | | | -10.6 | 1.177 | 0.00 | | | | | | | | | | |
| s^2 on complete default dummy | | | | | | | | | | | | | | | | | | | | | | | | | -2.45 | 0.78 | 0.00 | |
| Buyer-Seller Ownerships (dummy) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| dGG_C | | | | 0.78 | 0.25 | 0.00 | | | | | | | | | | 0.76 | 0.26 | 0.00 | | | | | | | 0.52 | 0.26 | 0.04 | |
| dGF_C | | | | 1.48 | 0.39 | 0.00 | | | | | | | | | | 1.44 | 0.41 | 0.00 | | | | | | | 1.36 | 0.42 | 0.00 | |
| dGP_C | | | | 1.03 | 0.20 | 0.00 | | | | | | | | | | 0.87 | 0.21 | 0.00 | | | | | | | 0.54 | 0.20 | 0.01 | |
| dFF_C | | | | 2.07 | 0.38 | 0.00 | | | | | | | | | | 1.76 | 0.39 | 0.00 | | | | | | | 1.48 | 0.39 | 0.00 | |
| dFG_C | | | | 0.69 | 0.52 | 0.19 | | | | | | | | | | 0.91 | 0.52 | 0.08 | | | | | | | 0.62 | 0.54 | 0.25 | |
| dFP_C | | | | 0.37 | 0.28 | 0.19 | | | | | | | | | | 0.14 | 0.28 | 0.62 | | | | | | | -0.10 | 0.29 | 0.73 | |
| dPG_C | | | | 0.73 | 0.12 | 0.00 | | | | | | | | | | 0.67 | 0.14 | 0.00 | | | | | | | 0.42 | 0.14 | 0.00 | |
| dPF_C | | | | 0.67 | 0.30 | 0.03 | | | | | | | | | | 0.69 | 0.31 | 0.03 | | | | | | | 0.45 | 0.32 | 0.16 | |
| (dPP_C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

(Source) Author. (Note) 1) Fractional logit estimator. Coefficients for dummy variables indicate marginal effect when x change from 0 to 1. 2)

Bold is coefficient with 5% significance.

Table 7 Trade credit ratio function (2) in procurement

| Trade credit ratio in procurement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------|------|------|--------------|-------|-------|-------------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|--|--|--|
| Dependent: Ratio of payment after delivery in sales transaction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (1) | | | (2) | | | (3) | | | (4) | | | (5) | | | (6) | | | (7) | | | (8) | | | (9) | | | | | |
| Log Likelihood | -417 | | | -413 | | | -372 | | | -417 | | | -411 | | | -365 | | | -412 | | | -413 | | | -411 | | | | | |
| Pearson Residuals(1/df) | 0.67 | | | 0.67 | | | 2.03 | | | 0.67 | | | 0.67 | | | 0.66 | | | 0.66 | | | 0.67 | | | 0.66 | | | | | |
| AIC | 1.23 | | | 1.24 | | | 1.10 | | | 1.23 | | | 1.23 | | | 1.08 | | | 1.21 | | | 1.24 | | | 1.21 | | | | | |
| # of obs | 682 | | | 682 | | | 682 | | | 682 | | | 682 | | | 682 | | | 682 | | | 682 | | | 682 | | | | | |
| | 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 | Coef. | S.E. | P> z | Coef. | S.E. | P> z | Coef. | S.E. | P> z | | | |
| Probability of enforcement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s on no default dummy | -0.67 | 0.16 | 0.00 | -1.72 | 0.281 | 0 | 6.47 | 1.01 | 0.00 | | | | | | | | | | | | | | | | | | | | | |
| s on delayed dummy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s on complete default dummy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quadratics of probability of enforcement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s^2 on no default dummy) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s^2 on delayed dummy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s^2 on complete default dummy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Buyer-Seller Ownerships (dummy) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| dGG_C | | | | 0.43 | 0.218 | 0.046 | | | | | | | | | | | | | | | | | | | | | | | | |
| dGF_C | | | | 0.83 | 0.377 | 0.028 | | | | | | | | | | | | | | | | | | | | | | | | |
| dGP_C | | | | 1.54 | 0.362 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| dFF_C | | | | 1.15 | 0.239 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| dFG_C | | | | 0.29 | 0.42 | 0.485 | | | | | | | | | | | | | | | | | | | | | | | | |
| dFP_C | | | | 0.67 | 0.282 | 0.017 | | | | | | | | | | | | | | | | | | | | | | | | |
| dPG_C | | | | 0.53 | 0.16 | 0.001 | | | | | | | | | | | | | | | | | | | | | | | | |
| dPF_C | | | | 0.41 | 0.179 | 0.021 | | | | | | | | | | | | | | | | | | | | | | | | |
| (dPP_C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

Table 8 Trade credit volume functions

Trade credit volume in procurement

Dependent: Trade credit volume from the supplier to the surveyed firm

| | (0) | | | (1) | | | (2) | | | (3) | | | (4) | | | (5) | | | (6) | | | | | | | | |
|-----------------------------|-----------------|------|------|--------------|------|------|--------------|-------|------|---------------|-------|------|--------------|------|------|--------------|------|------|----------------|------|------|--|--|--|----------------|------|------|
| Log Likelihood | -4767 | | | -5253 | | | -3681 | | | -6707 | | | -4431 | | | -10022 | | | -5577 | | | | | | | | |
| Pearson Residuals(1/df) | 7.8 | | | 30.2 | | | 32.2 | | | 701.2 | | | 163.3 | | | 1001.2 | | | 266.2 | | | | | | | | |
| AIC | 14.79 | | | 16.17 | | | 15.74 | | | 20.64 | | | 18.95 | | | 30.84 | | | 23.85 | | | | | | | | |
| # of obs | 645 | | | 650 | | | 468 | | | 650 | | | 468 | | | 650 | | | 468 | | | | | | | | |
| | 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 | Coef. | S.E. | P> z | | | | | | |
| Probability of enforcement | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| s on no default dummy | | | | | | | | | | | | | | | | 32.32 | 2.35 | 0.00 | 21.78 | 1.35 | 0.00 | | | | | | |
| s on delayed dummy | | | | | | | | | | 12.94 | 0.804 | 0.00 | 10.60 | 0.58 | 0.00 | | | | | | | | | | | | |
| s on complete default dummy | | | | 9.660 | 0.25 | 0.00 | 9.150 | 0.374 | 0.00 | | | | | | | | | | | | | | | | | | |
| Cash in hand of buyer | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| cashflow2001 | -0.00002 | 0.00 | 0.00 | | | | | | | 0.0000 | 0.00 | 0.00 | | | | | | | -0.0001 | 0.00 | 0.01 | | | | -0.0001 | 0.00 | 0.00 |
| cashstock2001 | 0.0006 | 0.00 | 0.00 | | | | | | | 0.0008 | 0.00 | 0.00 | | | | | | | 0.0026 | 0.00 | 0.01 | | | | 0.0045 | 0.00 | 0.00 |
| Constant | 6.14 | | | 0.13 | 0.00 | | | | | | | | | | | | | | | | | | | | | | |

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

Table 9 Transaction volume functions

Transaction volume in procurement

Dependent: Transaction volume from the supplier to the surveyed firm

| | (1) | | | (2) | | | (3) | | | (4) | | | (5) | | | (6) | | | | | |
|----------------------------|--------------|------|------|--------------|------|------|---------------|------|------|--------------|------|------|---------------|-------|------|--------------|------|------|----------------|------|------|
| Log Likelihood | -5821 | | | -4112 | | | -7023 | | | -4669 | | | -10345 | | | -5837 | | | | | |
| Pearson Residuals(1/df) | 28 | | | 38 | | | 532 | | | 130 | | | 831 | | | 226 | | | | | |
| AIC | 18 | | | 17 | | | 22 | | | 20 | | | 32 | | | 25 | | | | | |
| # of obs | 652 | | | 473 | | | 652 | | | 473 | | | 652 | | | 473 | | | | | |
| | 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 | | | |
| Probability of enforcement | | | | | | | | | | | | | | | | | | | | | |
| s on no default dummy | | | | | | | | | | | | | 34.02 | 2.026 | 0 | 23.04 | 1.21 | 0.00 | | | |
| s on delayed dummy | | | | | | | 13.82 | 0.67 | 0.00 | 11.27 | 0.52 | 0.00 | | | | | | | | | |
| s on complete default dumr | 10.88 | 0.24 | 0.00 | 10.29 | 0.43 | 0.00 | | | | | | | | | | | | | | | |
| Cash in hand of buyer | | | | | | | | | | | | | | | | | | | | | |
| cashflow2001 | | | | | | | -3E-05 | 0.00 | 0.00 | | | | -8E-05 | 0.00 | 0.00 | | | | -0.0001 | 0.00 | 0.00 |
| cashstock2001 | | | | | | | 9E-04 | 0.00 | 0.00 | | | | 0.0027 | 0.00 | 0.00 | | | | 0.0047 | 0.00 | 0.00 |

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

Table 10 Positive external effect of “buyer’s enforcement technology”
External effect of enforcement

| Dependent | Ratio of trade credit from the supplier to the firm | | | | | | | | |
|-------------------------|---|------|------|-------|------|------|-------|------|------|
| | (1) | | | (2) | | | (3) | | |
| Log Likelihood | -406 | | | -407 | | | -407 | | |
| Pearson Residuals(1/df) | 0.67 | | | 0.67 | | | 0.67 | | |
| AIC | 1.22 | | | 1.23 | | | 1.23 | | |
| # of obs | 665 | | | 665 | | | 665 | | |
| | Coef. | S.E. | P> z | Coef. | S.E. | P> z | Coef. | S.E. | P> z |

Probability of enforcement from the firm to the customer

| | | | | | | | | | |
|-----------------------------|------|------|------|------|------|-------|-------|------|------|
| s on no default dummy | | | | | | | -0.09 | 0.17 | 0.60 |
| s on delayed dummy | | | | 0.06 | 0.10 | 0.558 | | | |
| s on complete default dumnr | 0.11 | 0.09 | 0.20 | | | | | | |

| Dependent | Trade credit volume | | | | | | | | |
|-------------------------|---------------------|------|------|-------|------|------|--------|------|------|
| | (4) | | | (5) | | | (6) | | |
| Log Likelihood | -4859 | | | -5816 | | | -7591 | | |
| Pearson Residuals(1/df) | 15.7 | | | 229.2 | | | 1225.3 | | |
| AIC | 15.6 | | | 18.7 | | | 24.4 | | |
| # of obs | 622 | | | 622 | | | 622 | | |
| | Coef. | S.E. | P> z | Coef. | S.E. | P> z | Coef. | S.E. | P> z |

Probability of enforcement from the firm to the customer

| | | | | | | | | | |
|-----------------------------|-------------|------|------|--------------|-----|-----|--------------|------|------|
| s on no default dummy | | | | | | | 27.50 | 1.97 | 0.00 |
| s on delayed dummy | | | | 12.73 | 0.7 | 0.0 | | | |
| s on complete default dumnr | 9.21 | 0.20 | 0.00 | | | | | | |

| Dependent | Transaction volume | | | | | | | | |
|-------------------------|--------------------|------|------|-------|------|------|-------|------|------|
| | (7) | | | (8) | | | (9) | | |
| Log Likelihood | -5661 | | | -5992 | | | -8256 | | |
| Pearson Residuals(1/df) | 74.9 | | | 68.7 | | | 304.9 | | |
| AIC | 19.3 | | | 20.5 | | | 28.2 | | |
| # of obs | 586 | | | 586 | | | 586 | | |
| | Coef. | S.E. | P> z | Coef. | S.E. | P> z | Coef. | S.E. | P> z |

Probability of enforcement from the firm to the customer

| | | | | | | | | | |
|-----------------------------|--------------|------|------|--------------|------|------|--------------|------|------|
| s on no default dummy | | | | | | | 33.70 | 1.83 | 0.00 |
| s on delayed dummy | | | | 14.34 | 0.58 | 0.00 | | | |
| s on complete default dumnr | 11.71 | 0.52 | 0.00 | | | | | | |

(Source) Author. (Note) 1) Fractional logit estimator for trade credit ratio. Exponential quasi maximum likelihood for trade credit volume. Coefficients for dummy variables indicate marginal effect when x change 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 | FDI | 0 | 10 | 100 | 23.86 | 30.00 | 22 |
| G | FDI | 0 | 0 | 10 | 0.79 | 2.51 | 19 |
| P | FDI | 0 | 0 | 100 | 22.30 | 35.97 | 40 |
| FDI | G | 0 | 20 | 100 | 32.83 | 40.42 | 23 |
| G | G | 0 | 0 | 100 | 9.72 | 21.61 | 88 |
| P | G | 0 | 10 | 100 | 32.93 | 36.99 | 92 |
| G | P | 0 | 0 | 100 | 8.69 | 20.94 | 312 |
| FDI | P | 0 | 10 | 100 | 27.92 | 36.00 | 36 |
| P | P | 0 | 10 | 100 | 23.93 | 31.64 | 410 |

1042

*cheque

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

1044

*bank note

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

1046

*bank draft

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

*commercial draft

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

*credit card

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

Appendix 2 Marketing areas

*Share of main market (1) export (in sales)

*Total

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

911

*Share of main market (1) export (in procurement)

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

861

*Share of main market (2) home city (in sales)

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

1039

*Share of main market (2) home city (in procurement)

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

(Source) JICA PBOC Survey and DRC-IDE Survey

1003

Appendix 3 Competitiveness and bargaining power

*Competitiveness of goods if the good is unique=1, if the good is commodity=0 (in sales)

*Total

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

1056

*Share of the products in the supplier's input (in procurement)

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

906

*Rivalry if no rival=0, one rivals=1, a few rival=2, numerous rivals=3 (in sales)

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

1052

* Do you have potential substitute supplier? Yes=1 No=0 (in procurement)

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

(Source) JICA PBOC Survey and DRC-IDE Survey

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 | FDI | 0 | 0 | 1 | 0.26 | 0.45 | 19 |
| P | FDI | 0 | 1 | 1 | 0.51 | 0.51 | 39 |
| FDI | G | 0 | 0 | 1 | 0.17 | 0.39 | 23 |
| G | G | 0 | 0 | 1 | 0.38 | 0.49 | 93 |
| P | G | 0 | 0 | 1 | 0.43 | 0.50 | 93 |
| FDI | P | 0 | 0 | 1 | 0.32 | 0.47 | 38 |
| G | P | 0 | 0 | 1 | 0.35 | 0.48 | 319 |
| P | 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 | FDI | 0 | 0 | 1 | 0.37 | 0.50 | 19 |
| P | FDI | 0 | 0 | 1 | 0.13 | 0.34 | 39 |
| FDI | G | 0 | 0 | 1 | 0.26 | 0.45 | 23 |
| G | G | 0 | 0 | 1 | 0.30 | 0.46 | 93 |
| P | G | 0 | 0 | 1 | 0.30 | 0.46 | 93 |
| FDI | P | 0 | 0 | 1 | 0.29 | 0.46 | 38 |
| G | P | 0 | 0 | 1 | 0.29 | 0.45 | 318 |
| P | P | 0 | 0 | 1 | 0.27 | 0.45 | 424 |

1070

*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 | FDI | 0 | 0 | 1 | 0.14 | 0.36 | 14 |
| P | FDI | 0 | 0 | 1 | 0.39 | 0.50 | 23 |
| FDI | G | 0 | 1 | 1 | 0.58 | 0.51 | 19 |
| G | G | 0 | 0 | 1 | 0.46 | 0.50 | 61 |
| P | G | 0 | 0 | 1 | 0.47 | 0.50 | 58 |
| FDI | P | 0 | 0 | 1 | 0.43 | 0.50 | 28 |
| G | P | 0 | 0 | 1 | 0.32 | 0.47 | 214 |
| P | P | 0 | 0 | 1 | 0.43 | 0.50 | 289 |

715

*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 | FDI | 0 | 0 | 1 | 0.29 | 0.47 | 14 |
| P | FDI | 0 | 0 | 1 | 0.30 | 0.47 | 23 |
| FDI | G | 0 | 0 | 1 | 0.26 | 0.45 | 19 |
| G | G | 0 | 0 | 1 | 0.30 | 0.46 | 61 |
| P | G | 0 | 0 | 1 | 0.28 | 0.45 | 58 |
| FDI | P | 0 | 0 | 1 | 0.14 | 0.36 | 28 |
| G | P | 0 | 0 | 1 | 0.28 | 0.45 | 214 |
| P | P | 0 | 0 | 1 | 0.25 | 0.44 | 289 |

(Source) JICA PBOC survey and DRC-IDE Survey

Appendix 5 Predicted probability of enforcement, by region

From F to C

Predicted mean probability of no default

| | min | median | max | mean | s.d. | n |
|----------|------|--------|------|------|------|-----|
| Total | 0.04 | 0.31 | 0.93 | 0.33 | 0.15 | 741 |
| Beijing | 0.04 | 0.38 | 0.90 | 0.39 | 0.15 | 226 |
| Dongguan | 0.07 | 0.28 | 0.93 | 0.29 | 0.11 | 136 |
| Xian | 0.05 | 0.36 | 0.74 | 0.36 | 0.14 | 195 |
| Yibin | 0.07 | 0.23 | 0.84 | 0.26 | 0.13 | 184 |
| | | | | | | 741 |

Predicted mean probability of not being delayed

| | min | median | max | mean | s.d. | n |
|----------|------|--------|------|------|------|-----|
| Total | 0.21 | 0.61 | 1.00 | 0.60 | 0.13 | 741 |
| Beijing | 0.21 | 0.60 | 0.98 | 0.60 | 0.13 | 226 |
| Dongguan | 0.42 | 0.68 | 1.00 | 0.70 | 0.08 | 136 |
| Xian | 0.25 | 0.58 | 0.82 | 0.58 | 0.12 | 195 |
| Yibin | 0.26 | 0.54 | 0.97 | 0.55 | 0.14 | 184 |
| | | | | | | 741 |

Predicted mean probability of not being completely default

| | min | median | max | mean | s.d. | n |
|----------|------|--------|------|------|------|-----|
| Total | 0.31 | 0.74 | 0.95 | 0.72 | 0.12 | 741 |
| Beijing | 0.54 | 0.78 | 0.95 | 0.78 | 0.09 | 226 |
| Dongguan | 0.31 | 0.61 | 0.79 | 0.58 | 0.12 | 136 |
| Xian | 0.38 | 0.77 | 0.94 | 0.77 | 0.09 | 195 |
| Yibin | 0.46 | 0.71 | 0.92 | 0.71 | 0.09 | 184 |
| | | | | | | 741 |

From S to F

Predicted mean probability of no default

| | min | median | max | mean | s.d. | n |
|----------|------|--------|------|------|------|-----|
| Total | 0.02 | 0.32 | 0.91 | 0.34 | 0.15 | 687 |
| Beijing | 0.06 | 0.37 | 0.78 | 0.38 | 0.14 | 200 |
| Dongguan | 0.08 | 0.30 | 0.72 | 0.31 | 0.13 | 116 |
| Xian | 0.05 | 0.37 | 0.77 | 0.38 | 0.14 | 194 |
| Yibin | 0.02 | 0.26 | 0.91 | 0.29 | 0.15 | 177 |
| | | | | | | 687 |

Predicted mean probability of not being delayed

| | min | median | max | mean | s.d. | n |
|----------|------|--------|------|------|------|-----|
| Total | 0.16 | 0.61 | 0.99 | 0.62 | 0.13 | 687 |
| Beijing | 0.16 | 0.59 | 0.89 | 0.61 | 0.12 | 200 |
| Dongguan | 0.50 | 0.71 | 0.91 | 0.71 | 0.10 | 116 |
| Xian | 0.32 | 0.61 | 0.86 | 0.61 | 0.12 | 194 |
| Yibin | 0.32 | 0.59 | 0.99 | 0.60 | 0.13 | 177 |
| | | | | | | 687 |

Predicted mean probability of not being completely defaulted

| | min | median | max | mean | s.d. | n |
|----------|------|--------|------|------|------|-----|
| Total | 0.26 | 0.72 | 0.94 | 0.71 | 0.12 | 687 |
| Beijing | 0.41 | 0.77 | 0.92 | 0.76 | 0.09 | 200 |
| Dongguan | 0.26 | 0.60 | 0.82 | 0.59 | 0.11 | 116 |
| Xian | 0.48 | 0.76 | 0.94 | 0.76 | 0.09 | 194 |
| Yibin | 0.35 | 0.66 | 0.88 | 0.66 | 0.11 | 177 |
| | | | | | | 687 |

(Source) Author

