



# Financial development, bank discrimination and trade credit

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## Abstract

Non-state owned firms in China grow tremendously with limited support from banks. This provides a unique setting to test how firms in a country with poorly developed financial institutions fund their prosperous growth opportunities. This paper compares the use of an important non-formal financial channel, trade credit, between state and non-state owned firms in China. We find that, compared to state owned firms, non-state owned firms use more trade credit. We further show that this higher usage is primarily for financing rather than transactional purposes. The results suggest that, in a country with a poorly developed formal financial sector, firms can support their growth through non-formal financial channels that largely rely on implicit contractual relation.

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## 1. Introduction

The interaction between a country's financial development and growth is a central question in financial economics. The level of a country's financial development typically is measured by the services provided by financial intermediaries, e.g., the size of bank to GDP,

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the size of equity to GDP and credit issued to private firms. King and Levine (1993) show that the level of a country's financial development is positively associated with its economic growth, physical capital accumulation and the improvement of economic efficiency. Rajan and Zingales (1998) find that firms in industrial sectors with a greater need for external finance grow faster in countries with well-developed financial markets. These studies support the notion that a well-developed financial system can facilitate a country's economic growth. Yet, they also raise an important question: in countries with poorly developed financial system, how do firms finance their growth opportunities? Moreover, it is not clear to what extent non-formal financing channels can substitute for formal financial systems.

In this paper, we present a study on the use of an important non-formal financial channel – trade credits – for firms in China, the largest developing country with a fast growth economy but a poorly developed formal financial system. In particular, we compare the use of trade credit between non-state and state owned firms. On the one hand, the non-state sector has very limited access to bank loans. According to the World Bank Report (2000), in the late 1990s the non-state sector received less than one percent of total bank loans. On the other hand, non-state owned firms dominate state owned firms in growth. Between 1995 and 2000, the industrial output of the non-state sector grew at 19% annually, while that of the state sector grew only at 4.6% annually (China Statistical Yearbook, 2000). Thus, the sharp differences in the availability of bank loans and growth rate between state and non-state owned firms in China provide a unique opportunity to analyze how firms with prosperous growth opportunities exploit alternative financial channels in the presence of formal financial channel constraints.

To test the difference in the use of trade credit between the state and non-state sectors in China, we employ a unique survey data set prepared by the Chinese Academy of Social Sciences, which provides detailed financial information and survey questionnaires on state and non-state owned firms. Using the information in the firms' financial statements, we find that, compared to state owned firms, non-state owned firms tend to use more trade credit. Non-state owned firms on average have 4.3% more net trade credit (i.e., accounts payable – accounts receivable) than state owned firms, other things being equal. Moreover, non-state owned firms are more likely to have positive net trade credit than state owned firms.

We then distinguish between transactional and financing motives of trade credit by examining the overdue trade credit, i.e., trade credit that has expired but not repaid, and long-term trade credit, i.e., credit more than 30 days after the delivery of goods. We find that non-state firms are more likely to have overdue trade credit outstanding and long term trade credit, suggesting that non-state owned firms use higher trade credit for financing purpose. Thus, the results indicate that trade credit is used by non-state firms as an important alternative financing channel to solve the problem of scarce bank loans.

A common issue in the study of trade credit is that the observed trade credit is an equilibrium result of supply and demand. In other words, the difference in the use of trade credit could reflect the difference in demand or supply of trade credit. A recent paper by Love et al. (2005) examines the effect of financial crisis on trade credit in six merging economies. They found that firms with weaker financial conditions are more likely to reduce trade credit after the crisis. Love et al. (2005) argue that the results are in favor of the supply-driven story since it is quite unlikely that the decrease in demand for trade credit after the crisis would be related to a supplier's financial condition. In our sample,

state owned firms are larger, older and have more cash flow than non-state firms do. In addition, state firms are supported by the government (through government subsidy or state bank loan) and are less likely to go bankrupt. Consequently, it should be less risky to supply trade credit to state than non-state firms. Thus, the greater use of trade credit by non-state than state owned firms in our results is unlikely driven by the greater supply of trade credit to non-state firms. Though we cannot completely rule out the supply-effect, our results seem to be in favor of demand effect, i.e., higher demands for trade credit by non-state owned firms in response to the limited accessibility of bank loans.

Our study contributes to the extant literature in several important dimensions. How the non-state sector in China sustains its high growth has been an interesting but puzzling question. A recent study by Franklin et al. (2005) compares the growth rate and formal financing channels (e.g., bank loans and equity markets) of state owned firms and non-state owned firms in China. Franklin et al. (2005) conjectures that very effective non-formal financing channels exist to support the growth of the non-state owned sector in China. Using firm level data, our study directly tests such a conjecture and shows that the non-state owned sector in China actively exploits non-standard financing channels such as trade credits to finance its growth.

Our study, from a different angle, provides evidence on the use of trade credit as a substitute for bank loans in developing countries. Fisman and Love (2003) examine the use of trade credit in different countries and find that industries with higher dependence on trade credit financing grow faster in countries with weaker financial institutions. They argue that the results suggest that trade credit can substitute for bank loans in countries with poor financial institutions.<sup>1</sup> By focusing on firm level choices and exploiting the unique information from the survey data, we are able to separate the transactional from financing motives in the use of trade credit. Moreover, there is a clear difference in the availability of bank loans between state and non-state firms, which avoids the ambiguity in the measurement of financial constraint due to the banking relationship. The separation of transactional and financing motives and the clean measurement of the banking relationship allow us to draw a more direct conclusion that the use of trade credit is to relax the constraint in obtaining bank loans.

The remainder of the paper proceeds as follows: Section 2 describes the data source and presents some summary statistics. Section 3 examines the difference in the use of trade credit between state and non-state owned firms. Section 4 examines the motives of the use of trade credit. Section 5 summarizes and concludes the paper.

## 2. Data and summary statistics

Our data set comes from the enterprise surveys conducted by the Chinese Academy of Social Sciences (CASS) in the year 2000. This survey provides annual data on 442 state owned firms from 1994 to 1999, which is the third part of a continuing survey of Chinese state-owned enterprises since 1980. These surveys have been used in various studies of the Chinese economy (e.g., Aivazian et al., 2005a,b; Groves et al., 1994, 1995; Li, 1997).

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<sup>1</sup> In a study on the use of trade credit by the U.S. small businesses, Petersen and Rajan (1997) find that those small businesses with limited access to credit from financial institution (measured by longest relationship with lenders, previous history of loan rejection) held significantly higher levels of accounts payable. They suggest that the results imply that trade credit is used as an important alternative financing source by constrained firms.

Table 1  
Industry composition of sample firms

Industry name	Industry code	All firms	State firms	Non-state firms
Food	10	37	17	20
Textile	14	85	62	23
Wood products	17	3	2	1
Paper	19	22	5	17
Printing	20	8	6	2
Coking, gas production and supply	25	19	2	17
Chemicals	26	67	48	19
Pharmaceuticals	27	39	22	17
Synthetic fiber	28	23	3	20
Plastics	30	22	6	16
Construction materials	31	48	24	24
Ferrous metals smelting and rolling	32	34	14	20
Non-electric machinery	35	113	91	22
Electronics	38	50	30	20
Total number		570	332	238

This table provides the sample distribution of state and no-state firms across 2-digit industries. The sample is from the enterprise surveys conducted by the Chinese Academy of Social Sciences (CASS) in the year 2000.

Different from previous surveys, the year 2000 survey also provides annual information on 358 non-state enterprises. The questionnaire was divided into two parts; the first, directed at the factory managers, includes qualitative questions about the firm's incentive and governance system. The second part is directed at the enterprise accountants and includes quantitative questions that ask for details of a firm's real and financial accounts.

Among 800 enterprises in our sample, around 55% of the firms are state-owned; 31% of the firms are non-state owned; 11% of the firms are publicly traded companies; 3% of the firms are joint ventures. We exclude 123 publicly traded companies or joint ventures since these firms could finance through the stock market or access to foreign capital.<sup>2</sup> Fisman and Love (2003) shows that industries vary widely with respect to their use of trade, suggesting that the difference in product and market characteristics is an important factor in determining the use of trade credit. Thus it is crucial to control for industry effect in our study. We exclude those industries (based on 2-digit industry code) with only state firms or only non-state firms.<sup>3</sup> The final sample includes annual data for 570 firms in fourteen 2-digit industries from 1994 to 1999. The detail distributions of state and non-state firms across different industries are reported in Table 1.

We use four measures to assess the use of trade credit: accounts payable scaled by total asset or by total sales; (accounts payable – accounts receivable) scaled by total assets or total sales. The first two measure the total trade credit while the other two measure the net trade credit. Rows 1 and 2 in Table 2 show the summary statistics of total trade credit. The sample mean of accounts payable to total asset ratio is about 13%, with a standard deviation of 10%. The sample mean of accounts payable to sales ratio is about 27%, with a standard deviation of 63%. The high variation of this ratio is due to the high variation in

<sup>2</sup> Four state owned firms changed to stock-limited companies and five state owned firms changed to joint ventures during the sample period. We also exclude these nine firms in our sample.

<sup>3</sup> All our results still hold when we use the full sample of 677 firms.

Table 2  
Summary statistics of sample firms

	Mean	S.D.	Min	Median	Max
<i>Panel A: Trade credit</i>					
Accounts payable/total assets	0.13	0.10	0.00	0.11	0.77
Accounts payable/sales	0.27	0.63	0.00	0.14	13.20
(Accounts payable – accounts receivable)/total assets	–0.01	0.12	–0.74	–0.01	0.61
(Accounts payable – accounts receivable)/sales	0.04	0.55	–3.70	–0.01	12.54
<i>Panel B: Firm characteristics</i>					
Age	25.39	18.27	0.00	25.00	93.00
Ln (sales)	10.81	1.32	5.40	10.84	16.68
Ln (total assets)	11.15	1.10	6.69	7.58	10.72
Capital/labor	38.87	86.20	1.06	26.09	1863.81
Ln (number of employees)	6.99	0.98	2.71	6.99	10.72
Cash flow	0.05	0.06	–0.46	0.04	0.43
Sale growth	0.16	0.51	–0.89	0.12	12.40
Sale profit/sale revenue	0.17	0.13	–0.55	0.15	0.96
Fixed investment/total investment	0.77	0.30	0.00	0.89	1.00
	Non-state firms		State firms		Diff.
	Mean	S.D.	Mean	S.D.	
<i>Panel C: Non-state firms vs. state firms</i>					
Age	7.96	3.79	37.89	13.74	–29.93***
Ln (sales)	9.93	1.23	11.45	0.97	–1.52***
Ln (total assets)	10.69	1.21	11.48	0.87	–0.79***
Capital/labor	43.17	108.65	35.80	65.38	7.37**
Ln (number of employees)	6.54	1.03	7.31	0.81	–0.77***
Cash flow	0.03	0.05	0.05	0.07	–0.02***
Sale growth	0.11	0.60	0.20	0.43	–0.09***
Sale profit/sale revenue	0.19	0.16	0.15	0.10	0.04***
Fixed investment/total investment	0.77	0.36	0.77	0.26	–0.004

This table presents summary statistics of sample firms. The sample is from the enterprise surveys conducted by the Chinese Academy of Social Sciences (CASS) in the year 2000. Panel A provides summary statistics for different measures of trade credit. Panel B provides summary statistics for firm characteristics. Panel C provide the differences in the means of firm characteristics for non-state and state firms. \*\*\*, \*\* and \* represent coefficient significant at the 1%, 5% and 10% level, respectively.

sales across firms. Rows 5 and 6 of Table 2 show the summary statistics of net trade credit. If scaled by total asset, net trade credit has a sample mean of –1%. If scaled by sales, net trade credit has a sample mean of 4%.

Panel B in Table 2 reports the summary statistics of various firm characteristics. The average firm age is about 25 years, indicating that the sampled firms were well established ones with long histories. The capital-to-labor ratio is defined as total fixed assets divided by the total number of employees (1000 Yuan per employee). The sample mean of capital-to-labor ratio is about 39, and the standard deviation is about 86. The average number of employees in our sample is 1774. The average sale growth rate is 16% suggesting relatively good growth opportunities for our sample firms. The average sale profit rate is 17%. The average fixed investments-to-total investment ratio is 0.77 indicating the majority of investments are spent on fixed assets, e.g., land, buildings, equipment.

Panel C in Table 2 also compares the firm characteristics of state and non-state firms. The mean difference tests show that, compared to non-state firms, state firms are larger

and older and have more cash flow and a higher sale growth rate. Non-state firms, however, have a higher sale-profit margin (profit/sales) than state firms, due to the higher sale costs of state firms. Non-state firms are more capital intensive than state firms, possibly due to the large employment in state firms. There is no significant difference in the fixed investment-to-total investment ratio between these two groups of firms.

One possible reason for the sample differences between state and non-state firms is that the survey tended to sample large state firms with better growth opportunities to avoid a large attrition rate in a sample period during which a large percentage of state firms are shut down or privatized.<sup>4</sup> If we find that non-state firms use more trade credit than the state firms in our sample, the results could be strengthened if more state firms with poor growth opportunities were included in the sample. Previous studies have shown that state firms are supported by state banks and that performance is not a primary consideration in banks' lending to state firms. For example, [Brandt and Zhu \(2000\)](#) showed that the Chinese government supported inefficient state enterprises through cheap bank credits. [Cull and Xu \(2003\)](#) studied the determinants of credit allocation among the state firms. They found that the association between bank finance and profitability weakened in the 1990s as the government increasingly used bank credits instead of direct subsidies to support poorly performing state firms. Given that performance is not a significant factor in banks' lending to state firms and that the responsibility of state banks to bail out poorly performing state enterprises, state firms with poor growth opportunities may have less need for trade credit when compared to state firms with good growth opportunities. Also, the supply of trade credit for a state firm with poor growth opportunities should be lower, given its higher credit risk compared to that of a state firm with good growth opportunities. Thus, the difference in the use of trade credit between non-state and state firms could be even more dramatic if more state firms with poor growth opportunities were sampled.

### 3. The use of trade credit: State vs. non-state firms

#### 3.1. *Some tabulated facts*

We start with a simple mean difference test to look at the difference in the use of trade credit between state and non-state firms. We first compare the use of trade credit between state and non-state firms within each industry. The result is reported in [Table 3](#).<sup>5</sup> An inspection of the results reveals that, for almost every industry, non-state firms have significantly higher average accounts payable to total assets ratio, accounts payable to sale ratio and net trade credit-to-total assets ratio. The difference in net trade credit-to-sales is somewhat weaker but still reflect similar pattern. The results clearly indicate that within each industry non-state owned firms on average tend to use more trade credit than state owned firms do.

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<sup>4</sup> Note that this is not to say that state firms with poor growth opportunities are not sampled. There are still large variations of sale growth and cash flow among state firms. The standard deviation of sales growth for state firms is 0.43 with minimum and maximum values of  $-0.86$  and  $1.57$ . As a comparison, the standard deviation of sales growth for non-state firms is 0.60 with minimum and maximum values of  $-0.89$  and  $1.49$ .

<sup>5</sup> We group Wood, paper and printing industries into one industry due to too few observations in these industries.

Table 3  
Mean difference test on the use of trade credit across industries: State versus non-state owned firms

Industry	Accounts payable/total assets			Accounts payable/sales			(Accounts payable – accounts receivable)/total assets			(Accounts payable – accounts receivable)/sales		
	Non-state	State	Diff.	Non-state	State	Diff.	Non-state	State	Diff.	Non-state	State	Diff.
Food	0.203	0.126	0.077*** (4.22)	0.574	0.146	0.378*** (5.29)	0.015	−0.013	0.028 (1.61)	0.014	0.018	−0.04 (−0.08)
Textile	0.159	0.088	0.070*** (6.28)	0.578	0.088	0.490*** (5.16)	0.054	−0.061	0.115*** (8.84)	0.268	−0.051	0.319*** (4.66)
Wood, Paper Products and Printing	0.190	0.098	0.092*** (5.80)	0.588	0.130	0.458*** (4.90)	0.072	−0.024	0.096*** (5.57)	0.313	−0.005	0.318*** (4.27)
Coking, Gas Production and Supply	0.100	0.167	−0.067*** (−2.96)	0.246	0.150	0.096** (2.50)	0.015	0.023	−0.008 (−0.27)	−0.013	0.038	−0.051 (−1.22)
Chemicals	0.132	0.109	0.023** (1.91)	0.440	0.140	0.300*** (5.19)	0.025	−0.023	0.048*** (3.64)	0.049	0.001	0.048 (0.72)
Pharmaceuticals	0.153	0.121	0.032** (2.21)	0.466	0.112	0.354*** (4.26)	0.020	−0.037	0.057*** (4.38)	0.139	−0.028	0.167** (2.63)
Synthetic Fiber	0.135	0.083	0.051*** (4.36)	0.383	0.151	0.231*** (4.75)	0.002	−0.004	0.006 (0.40)	0.010	0.020	−0.10 (−0.21)
Plastics	0.133	0.159	−0.026 (−1.04)	0.438	0.148	0.290*** (4.55)	−0.035	0.016	−0.05** (−2.21)	−0.053	0.012	−0.065 (−1.30)
Construction Materials	0.133	0.118	0.015* (1.75)	0.289	0.143	0.146*** (5.47)	0.020	−0.009	0.029*** (2.73)	0.021	−0.005	0.026 (0.82)
Ferrous Metals Smelting and Rolling	0.194	0.115	0.079*** (4.51)	0.826	0.112	0.714*** (3.53)	0.060	−0.047	0.107*** (5.50)	0.505	−0.044	0.549*** (2.77)
Non-electric Machinery	0.169	0.126	0.043*** (4.34)	0.392	0.154	0.238*** (6.09)	0.024	−0.008	0.032** (2.58)	0.058	0.005	0.053 (1.48)
Electronics	0.140	0.130	0.010 (0.079)	0.393	0.129	0.263*** (6.08)	−0.021	−0.034	0.013 (0.86)	−0.026	−0.013	−0.013 (−0.30)

This table reports the mean difference test on the use of trade credit between state and non-state owned firms across different industries. Four measures are used to assess the use of trade credit: Accounts payable scaled by total asset or by total sales (accounts payable – accounts receivable) scaled by total assets or total sales. For each measure, first and second columns report the sample mean for non-state and state firms respectively; the third column reports the differences. *t* values are reported in parentheses. \*\*\*, \*\* and \* represent coefficient significant at the 1%, 5% and 10% level, respectively.

Table 4  
Mean difference test on the use of trade credit across years: State versus non-state owned firms

Year	Accounts payable/total assets			Accounts payable/sales			(Accounts payable – accounts receivable)/total assets			(Accounts payable – accounts receivable)/sales		
	Non-state	State	Diff.	Non-state	State	Diff.	Non-state	State	Diff.	Non-state	State	Diff.
All	0.154	0.115	0.039*** (10.58)	0.469	0.131	0.338*** (13.67)	0.022	–0.026	0.048*** (11.65)	0.111	–0.012	0.123*** (5.51)
1994	0.155	0.105	0.050*** (5.54)	0.369	0.153	0.216*** (6.23)	0.018	–0.025	0.043*** (4.18)	0.060	–0.020	0.080** (2.09)
1995	0.153	0.114	0.039*** (4.25)	0.363	0.152	0.211*** (6.32)	0.023	–0.010	0.033*** (3.19)	0.064	0.006	0.058* (1.77)
1996	0.153	0.116	0.037*** (4.14)	0.415	0.128	0.287*** (5.09)	0.025	–0.017	0.042*** (4.31)	0.099	–0.004	0.103* (1.90)
1997	0.152	0.116	0.036*** (4.07)	0.450	0.119	0.331*** (5.36)	0.026	–0.029	0.055*** (5.50)	0.118	–0.011	0.129** (2.26)
1998	0.156	0.119	0.037*** (3.97)	0.545	0.121	0.424*** (6.58)	0.023	–0.034	0.057*** (5.53)	0.125	–0.019	0.144** (2.45)
1999	0.157	0.119	0.038*** (3.96)	0.672	0.112	0.560*** (6.13)	0.019	–0.043	0.062*** (5.80)	0.200	–0.024	0.224*** (2.95)

This table reports the mean difference test on the use of trade credit between state and non-state owned firms. Row 3 reports the results for the whole sample period. Rows 3–9 report the results for each sample year. Four measures are used to assess the use of trade credit: Accounts payable scaled by total asset or by total sales (accounts payable – accounts receivable) scaled by total assets or total sales. For each measure, first and second columns report the sample mean for non-state and state firms respectively; the third column reports the difference. *t* values are reported in parentheses. \*\*\*, \*\* and \* represent coefficient significant at the 1%, 5% and 10% level, respectively.

We then compare the use of trade credit between state and non-state owned firms across years and the results are reported in Table 4. Row 1 reports the difference for the whole sample period. Columns 2 and 3 in row 1 show that, for the whole sample period, the average ratio of accounts payable/total assets is 15.4% for non-state firms, compared to 11.5% for state firms. Non-state firms on average own 3.9% more accounts payable/total assets than state firms; this difference is statistically significant at the 5% level. The difference is even larger if we look at the difference in accounts payable/sales ratio. Columns 5–7 in row 1 show that the average ratios of accounts payable/sales are 46.9% and 13.1% for non-state and state owned firms respectively; the difference is 33.8% and is significant at the 5% level.

Columns 8–13 present the difference in the net trade credit. The results show that average ratios of net trade credit are positive for non-state firms but negative for state firms. To check the consistency of this pattern across different sample years, rows 2–7 further report the mean difference test for each sample year. The results show that the observation that non-state owned firms use more trade credit than state owned firms is quite consistent and significant across different sample years.

### 3.2. Regression analysis

The mean difference tests show a significant difference in the use of trade credit between state and non-state owned firms. Of course, state and non-state owned firms could differ in various aspects, e.g., firm size, age and investment pattern, which might affect the use of trade credit. In this section, we test the effect of ownership (state vs. non-state) on the use of trade credit but control for various firm characteristics that could potentially affect a firm's use of trade credit. The regression specification is following:

$$\begin{aligned} TC_{i,t} = & b_1 \text{Ownership}_{i,t} + b_2 \text{Size}_{i,t-1} + b_3 \text{Age}_{i,t} + b_4 \text{Capital/labor}_{i,t-1} + b_5 \text{Cashflow}_{i,t} \\ & + b_6 \text{Salegrowth}_{i,t-1} + b_7 \text{FixedInv/TotalInv}_{i,t-1} + b_8 \text{Industry}_{i,t} \\ & + b_9 \text{Location}_{i,t} + V_i + \lambda_t + \varepsilon_{i,t}, \end{aligned}$$

where the dependent variable,  $TC_{i,t}$ , is firm  $i$ 's trade credit at time  $t$ . Five measures are employed to assess the use of trade credit: accounts payable/total assets, accounts payable/sales, (accounts payable – accounts receivable)/total assets, (accounts payable – accounts receivable)/sales, a positive net trade credit indicator which is equal to 1 if a firm has positive net trade credit, i.e., accounts payable is greater than accounts receivable, and 0 otherwise.

The independent variable of central interest,  $\text{Ownership}_{i,t}$ , is a dummy variable indicating a firm's ownership, which is equal to 1 if the firm is state-owned and 0 otherwise. Other controlling variables are conventional and include:  $\text{Size}_{i,t-1}$  is the lagged firm's size measured by the logarithm of the number of employees;<sup>6</sup>  $\text{Age}_{i,t}$  is the firm's age measured by the length of time a firm has existed. In the absence of effective legal enforcement, the use of trade credit relies on implicit contractual relations such as trust and reputation. Larger and older firms usually have better established records and may be easier to finance

<sup>6</sup> The variable is lagged one year to mitigate the endogenous issue. Using the logarithm transformation is to make the data more normal distributed.

Table 5  
The determinants of the use of trade credit in China

	Accounts payable/ total assets	Accounts payable/ sales	(Accounts payable – accounts receivable)/total assets	(Accounts payable – accounts receivable)/sales	Net trade credit demander dummy
Ownership	–0.022* (1.58)	–0.595*** (–6.03)	–0.043*** (–2.56)	–0.321*** (–3.60)	–2.501*** (–3.20)
Size	–0.011*** (–2.49)	–0.017 (–0.55)	0.002 (0.32)	–0.008 (–0.30)	0.092 (0.53)
Age	–0.011 (–1.38)	0.174*** (3.28)	–0.009 (–0.96)	0.130*** (2.77)	–0.291 (–0.66)
Capital/labor	–0.0002*** (–3.75)	–0.0002 (–0.73)	–0.00001 (–0.16)	–0.0004 (–0.02)	–0.004* (1.50)
Cash flow/total asset	0.018 (0.78)	–0.065** (–2.02)	–0.087*** (–2.83)	–0.453 (–3.21)	–3.788** (–2.52)
Sales Growth	0.004 (0.25)	–0.001 (–0.07)	–0.005 (–0.23)	0.002 (0.19)	0.014 (0.08)
Fixed Investment/ Total Investment	–0.004 (–1.15)	0.013 (0.50)	–0.003 (–0.54)	0.038* (1.76)	–0.194 (–0.60)
2-Digit Industry dummies	Yes	Yes	Yes	Yes	Yes

Location dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
$R^2$	0.12	0.10	0.11	0.03	–
Observations (# of firms)	2225 (570)	2225 (570)	2225 (570)	2225 (570)	2225 (570)

This table reports the determinants of the use of trade credit. The regression specification is

$$TC_{i,t} = b_1 \text{Ownership}_{i,t} + b_2 \text{Size}_{i,t-1} + b_3 \text{Age}_{i,t} + b_4 \text{Capital/labor}_{i,t-1} + b_5 \text{CashFlow}_{i,t} + b_6 \text{Salegrowth}_{i,t-1} + b_7 \text{FixedInv/TotalInv}_{i,t-1} + b_8 \text{Industry}_{i,t} + b_9 \text{Location}_{i,t} + V_i + \lambda_t + \varepsilon_{i,t}$$

where the dependent variable,  $TC_{i,t}$ , is firm  $i$ 's trade credit at time  $t$ . Five measures are employed to assess the use of trade credit: accounts payable/total assets, accounts payable/sales, (accounts payable – accounts receivable)/total assets, (accounts payable – accounts receivable)/sales, a net trade credit indicator which is equal to 1 if a firm has positive net trade credit, i.e., accounts payable is greater than accounts receivable, and 0 otherwise.  $\text{Ownership}_{i,t}$  is a dummy variable indicating a firm's ownership, which is equal to 1 if the firm is state-owned and 0 otherwise.  $\text{Size}_{i,t-1}$  is the lagged firm's size measured by the logarithm of the number of employees.  $\text{Age}_{i,t}$  is the firm's age measured by the length of time a firm has existed.  $\text{Capital/labor}_{i,t-1}$  is the capital labor ratio, which is measured by a firm's total fixed assets divided by the number of employees.  $\text{Cash Flow}_{i,t-1}$  is measured by the cash flow divided by total assets, which is a standard proxy of liquidity position of the firm.  $\text{Sale growth}_{i,t-1}$  is the growth in sales in year  $t - 1$ .  $\text{Fixed Inv/Total Inv}_{i,t-1}$  is the ratio of fixed investment to total investment.  $\text{Industry}_{i,t}$  is the 2-digit industry dummies.  $\text{Location}_{i,t}$  is a firm's location, indicating the province in which a firm is located.  $V_i$  is a firm's unobservable individual effect;  $\lambda_t$  is year effect;  $\varepsilon_{i,t}$  is the error term. The model is estimated using random effect.  $t$ -statistics are reported in parentheses. \*\*\*, \*\* and \* represent coefficient significant at the 1%, 5% and 10% level, respectively.

through trade credit. Yet larger and older firms might have better banking relationships and have less need for trade credit. Thus, the effect of firm size and age on the use of trade credit may be ambiguous. Capital/labor $_{i,t-1}$  is the capital labor ratio, which is measured by a firm's total fixed assets divided by the number of employees. Since firms with more internal cash flow may be able to sustain their growth with less need for trade credit, the variable Cash Flow $_{i,t-1}$  is measured by the cash flow divided by total assets of firm, reflecting the liquidity position of the firm. The firm with high internal cash generation will tend to demand less external credit. Sale growth $_{i,t-1}$  is the growth rate in sales in year  $t - 1$ . We include this variable in the regression to control for the difference in growth opportunities between state and non-state owned firms. Trade credit is mainly a source to finance working capital and is rarely used to finance fixed investment (such as investment in machinery and equipment). Thus we use the ratio of fixed investment to total investment, Fixed Inv/Total Inv $_{i,t-1}$ , to control for the difference in investment patterns between state and non-state owned firms. Industry $_{i,t}$  are the 2-digit industry dummies. As we discussed earlier, Ng et al. (1999) and Fisman and Love (2003) document a large variation of trade credit across industries but little variation within an industry, which suggests that industry is one of the primary determinants in the use of trade credit. Location $_{i,t}$  are province dummies, indicating the province in which a firm is located. Our sample covers four provinces: Jiangshu, Sichuan, Shangxi and Jilin. These dummies are used to control for regional difference which may affect the use of trade credit. For example, there are significant difference in the effectiveness of legal enforcement among Chinese provinces which may affect the risk and the incentive of the use of trade credit for firms in different provinces.  $V_i$  is a firm's unobservable individual effect;  $\lambda_t$  is year effect;  $\varepsilon_{it}$  is the error term. We estimate the model using random effect.<sup>7</sup>

The determinants of the use of trade credit are shown in Table 5. Columns 2 and 3 report the results on the determinants of total trade credit. Columns 4 and 5 report results on the determinants of net trade credit. Inspection of the results in Table 5 reveals that the variables, Ownership $_{i,t}$ , is significantly negative and consistent across different measures of trade credit. For example, in column 4 on the determinants of the net trade credit/total assets ratio, the coefficient on Ownership $_{i,t}$  is  $-0.043$ , suggesting that state owned firms on average have 4.3% less net trade credit than non-state owned firms, other things being equal. Column 6 further investigates the likelihood of a firm having positive net trade credit, using a random effect Logit model. Again, the coefficient on the ownership dummy is significantly negative, implying that non-state owned firms are more likely to have positive net trade credit than state owned firms. In contrast, there are no consistent effects of other firm's characteristics on the use of trade credit. The effects of firm size, age and profitability are significant for some measures of trade credit but insignificant for others. As a robustness check, we remove observations with extreme values of sales growth, cash flow and capital labor ratio (outside of 1% tails in the distributions) and find the results remain very similar.<sup>8</sup> The results suggest that the ownership is a primary determinant of the use of trade credit for Chinese firms. Thus the regression analyses are consistent with the simple mean difference test and show that non-state owned firms use more trade credit than state owned firms, even after controlling for the various firm characteristics.

<sup>7</sup> For each regression, the Wald test indicates that dummy variables are jointly significant at 5% level.

<sup>8</sup> The results, not reported here, are available upon request.

#### 4. The motives of using trade credit

One limitation of using accounts payable as the measures of trade credit is that it cannot distinguish between transactional motives and financing motives of use of trade credit. Firms may use trade credit for various reasons, such as price discrimination by supplier, sales motives for quality guarantee or financial support by suppliers.<sup>9</sup> Following Nilsen (2002), we separate the use of trade credit into transactional motives, the use of trade credit related to transaction service, and the financing motives, the trade credit provided by suppliers which allows the financially constrained customers to delay the payments. Separation between these two motives is important, since our story is that non-state owned firms use trade credit as a means of external finance to circumvent the difficulty in financing through formal channels. In this section, we will take a closer look at firms' motives with the use of trade credit.

##### 4.1. Overdue trade credit

We first investigate the difference in the structure of overdue trade credit between state and non-state firms. Overdue trade credit refers to trade credit that has expired but is not repaid. Firms are usually reluctant to have overdue trade credit because they may face significant late payment penalties, including the explicit cost of pecuniary penalties as well as implicit costs of damaging long-term relationships with customers (Petersen and Rajan, 1997). Unless firms lack funds, they would not delay trade credit repayment because of the significant penalty. Thus, overdue trade credit tends to be used for financing purposes in the presence of constraint in bank loans.

The data provides information on the sources of overdue outstanding debt which allows us to investigate the overdue trade credit outstanding. In the survey questionnaire, managers are asked, does your firm currently have overdue debt from any source? If the answer is yes, managers are asked to indicate the sources of overdue debt. 183 firms in our sample, including 119 state owned firms and 64 non-state owned firms, have overdue debt at the end of 1999. The sources of overdue debt include bank loans, trade credit, credits from rural credit cooperatives, non-bank financial institutions and others. Bank loans and trade credit are two main sources of overdue debt, comprising 88% of overdue debt. The average shares of state bank loans and trade credit in the overdue debt are 74% and 15%, respectively. Though bank loans are the dominant source in the overdue debt, there is a clear difference in the structure of overdue debt between state and non-state firms. State bank loans comprise 86% of overdue debt for state firms, compared with only 51% for the non-state firms. In contrast, trade credit only comprises 7% of overdue debt for state firms, compared to 30% for non-state firms.

Table 6 examines the shares of bank loans and trade credit in overdue debt. Columns 2 and 3 report the OLS estimation of the determinants of the shares of bank loans and overdue trade credit in total overdue debt, respectively. In the equation of bank loan share, the coefficient on  $\text{Ownership}_{i,t}$  is positive and significant. In contrast, in the equation of trade credit share, the coefficient on  $\text{Ownership}_{i,t}$  is negative and significant. The results indicate that state owned firms have a larger proportion of bank loans in overdue debt than

<sup>9</sup> For a detailed discussion, see Petersen and Rajan (1997); Nilsen (2002) and Fisman and Love (2003).

Table 6  
The determinants of shares of banks loans and trade credit in overdue debt

	OLS		Probit model with selection	
	Bank loan share	Trade credit share	Trade credit vs. bank loans	Selection equation
Ownership	40.07*** (3.58)	-25.71*** (-3.11)	-2.065** (-2.91)	1.087*** (3.76)
Size	1.334 (0.44)	0.209 (0.09)	-0.074 (-0.33)	0.243*** (3.19)
Age	-3.123 (-0.48)	-1.212 (-0.22)	0.219 (0.52)	-0.390** (-2.06)
Capital/labor	-0.014 (-1.10)	0.015 (1.48)	-0.014 (-1.38)	-0.0005 (-0.71)
Cashflow	-43.97 (-1.04)	50.80*** (2.89)	9.292*** (4.66)	-5.625*** (-5.49)
Sales Growth	4.615 (0.72)	1.408 (0.59)	0.078 (0.23)	0.034 (0.22)
Fixed Investment/Total Investment	-7.425 (-1.24)	1.176 (0.23)	0.269 (0.67)	-0.237 (-1.29)
Constant	78.06*** (2.93)	24.52 (1.25)	-4.303 (-1.10)	-0.685 (-1.13)
Industry dummies	Yes	Yes	Yes	Yes
Location dummies	-	-	-	Yes
$R^2$	0.363	0.287	-	-
Observations	175	175	175	552

This table reports the regression analysis on the shares of bank loans and trade credit in overdue debt. Columns 2 and 3 report the OLS results on the shares of bank loans and trade credit in overdue debt. Columns 4 and 5 report the results of the Probit model with sample selection. In the Probit equation, the dependent variable is a dummy variable which is equal to 1 if the share of trade credit is larger than the share of state bank loans in a firm's debt outstanding, and 0 otherwise. In the selection equation, the dependent variable is a dummy variable indicating if a firm has debt outstanding.  $Ownership_{i,t}$  is a dummy variable indicating a firm's ownership, which is equal to 1 if the firm is state-owned and 0 otherwise.  $Size_{i,t-1}$  is the lagged firm's size measured by the logarithm of the number of employees.  $Age_{i,t}$  is the firm's age measured by the length of time a firm has existed.  $Capital/labor_{i,t-1}$  is the capital labor ratio, which is measured by a firm's total fixed assets divided by the number of employees.  $Cash\ Flow_{i,t-1}$  is measured by the cash flow divided by total assets, which is a standard proxy of liquidity position of the firm.  $Sale\ growth_{i,t-1}$  is the growth in sales in year  $t-1$ .  $Fixed\ Inv/Total\ Inv_{i,t-1}$  is the ratio of fixed investment to total investment.  $Industry_{i,t}$  is the 2-digit industry dummies.  $Location_{i,t}$  is a firm's location, indicating the province in which a firm is located.  $t$ -statistics are reported in parentheses. \*\*\*, \*\* and \* represent coefficient significant at the 1%, 5% and 10% level, respectively.

non-state owned firms, while the non-state owned firms have a larger proportion of trade credit in overdue debt than state owned firms.

One issue with the above regression is that a firm's ownership may also affect the likelihood of a firm having overdue debt, and thus a cross section regression on firms with overdue debt may be subjected to a potential selection bias. Another issue is that the above regressions cannot tell whether trade credit or bank loan is the major source of overdue debt. For example, if a state owned firm has a 70% bank loans and 20% trade credit in their overdue debt and a non-state owned firm has a 60% bank loans and 30% trade credit, the non-state firm has a larger share of trade credit and lower share of bank loans in overdue debt. But bank loans are still the major source of overdue debt for non-state firms.

To deal with the above two issues, we estimate the relative importance of trade credit versus bank loans in overdue debt using the Probit model with sample selection. In the Probit equation, the dependent variable is the dummy variable indicating the relative importance of trade credit which is equal to 1 if the share of trade credit is larger than the share of bank loans in a firm's overdue debt, and 0 otherwise. In the sample selection equation, the dependent variable is a dummy variable which is equal to 1 if a firm has overdue debt and 0 otherwise. The model is estimated using the method by Van de Ven and Van Pragg (1981). In the selection equation, we use location dummies as instrumental variable since there are significant variations in the effectiveness of legal enforcement among Chinese provinces which may affect the incentive of having overdue debt. For example, in a province with weaker enforcement system, firms may expect lower likelihood of being sued for overdue debt and tend to defer the payments. A preliminary test shows that location dummies are significantly related to the likelihood of having overdue debt but insignificantly related to the relative importance of bank loan versus trade credit in overdue debt. Thus we include locations dummies in the selection equation but not in the structure of overdue debt equation.

The results of the Probit model with sample selection are reported in Columns 4 and 5 in Table 6. In the selection equation, the coefficient on  $\text{Ownership}_{i,t}$  is positive and significant suggesting that state owned firms are more likely to have overdue debt. This result is reasonable given that state firms have good banking relationships that allow them to extend debt payment easily. Conversely, in the Probit equation, the coefficient on  $\text{Ownership}_{i,t}$  is negative and significant indicating that trade credit is more likely to be the dominant source of debt outstanding for non-state firms.

#### 4.2. Long term trade credit

Another approach to distinguish between the transactional motive and external financing motive is to investigate the maturity structure of trade credit. Compared to bank loans, trade credit is usually repaid within a short term. As Ng et al. (1999) describe, the most common repayment plan is "2/10, net 30": a supplier offers a 2% discount on the purchase price if the customer can repay within 10 days; otherwise full repayment is required within 30 days. The short term trade credit generally provides transactional service for firms. If the repayment term of trade credit is unusually long, then it's likely that trade credit is used by suppliers as a financial support to customers.

The survey questionnaire provides unique information to differentiate the long- and short-term trade credit. In the survey, managers are asked, what proportion of your company's payments to the supplier is made at the following times (in percent)? There are six

schedules: (1) when the order is placed; (2) on delivery; (3) 1–7 days after delivery; (4) 8–30 days after delivery; (5) more than 30 days after delivery; and (6) other schedule.<sup>10</sup> We thus define the payments made more than 30 days after delivery as long-term trade credit. Twenty percent of firms report that they have made payments more than 30 days after delivery.

We then perform two tests on the determinants of a firm's use of long term trade credit: one is the determinants of the access to long term trade credit using the Logit model. The dependent variable is a dummy variable indicating if a firm has long term trade credit; the other is the determinants of the share of long term credit in the trade credit. The dependent variable is the share of long term trade credit in total payments. The results are reported in Table 7. Column 2 shows the determinants of the availability of long term trade credit. The coefficient on  $\text{Ownership}_{i,t}$  is negative and significant at the 5% level, indicating that the state owned firms are less likely to use long term trade credit. The Tobit estimation of

Table 7  
The determinants of long term trade credit

	Long term trade credit dummy	Long term trade credit share
Ownership	-1.354** (-2.45)	-0.155** (-2.22)
Size	-0.051 (-0.36)	0.007 (0.37)
Age	0.984*** (2.72)	0.117** (2.50)
Capital/labor	-0.001 (-0.29)	-0.0001 (-0.13)
Cash flow	0.820 (0.54)	0.068 (0.35)
Sales Growth	0.241 (0.77)	0.011 (0.27)
Fixed Investment/Total Investment	0.668 (1.63)	0.086* (1.68)
Constant	-3.27*** (-2.74)	-0.595*** (-3.21)
2-Digit Industry dummies	Yes	Yes
Location dummies	Yes	Yes
$R^2$	0.070	0.116
Uncensored observations	-	106
Observations	552	552

This table reports the regression analysis on the determinants of long term trade credit. Column 2 report the results on the likelihood of having long term trade credit using the Logit estimation. Column 3 report the results on share of long term trade credit in total trade credit using Tobit model.  $\text{Ownership}_{i,t}$  is a dummy variable indicating a firm's ownership, which is equal to 1 if the firm is state-owned and 0 otherwise.  $\text{Size}_{i,t-1}$  is the lagged firm's size measured by the logarithm of the number of employees.  $\text{Age}_{i,t}$  is the firm's age measured by the length of time a firm has existed.  $\text{Capital/labor}_{i,t-1}$  is the capital labor ratio, which is measured by a firm's total fixed assets divided by the number of employees.  $\text{Cash flow}_{i,t-1}$  is measured by the cash flow divided by total assets, which is a standard proxy of liquidity position of the firm.  $\text{Sale growth}_{i,t-1}$  is the growth in sales in year  $t-1$ .  $\text{Fixed Inv/Total Inv}_{i,t-1}$  is the ratio of fixed investment to total investment.  $\text{Industry}_{i,t}$  is the 2-digit industry dummies.  $\text{Location}_{i,t}$  is a firm's location, indicating the province in which a firm is located.  $t$ -statistics are reported in parentheses. \*\*\*, \*\* and \* represent coefficient significant at the 1%, 5% and 10% level, respectively.

the determinants of the share of long term credit is reported in Column 3. Again, the coefficient on  $\text{Ownership}_{i,t}$  is negative and significant at the 1% level, suggesting that state owned firms tend to have a lower share of long term trade credit. Thus, the results on the maturity structure of trade credit show that the non-state owned firms are more likely to use long term credit and have a greater share of long term trade credit. Taken together, the results on structure of overdue trade credit and maturity structure of trade credit indicate that the greater use of trade credit by non-state owned firms is primarily for financing purpose.

## 5. Summary and conclusion

How non-state owned firms in China finance their growth with limited access to bank lending is an interesting and puzzling question. In this paper, we study the use of an informal financing channel, trade credit, for firms in China. We find that, compared to state owned firms, non-state owned firms tend to use more trade credit. Non-state owned firms also have more overdue trade credit outstanding and long-term trade credit, suggesting that the greater use of trade credit by non-state owned firms is primarily driven by financing motives instead of transactional motives.

However, one should not interpret our results as informal financing channels could replace a well-functioning formal financial system. In fact, trade credit for finance is a highly unattractive substitution for bank loans. Petersen and Rajan (1997) estimate the cost of trade credit in U.S. small firms and find it is more expensive than 99.8 percent of the loans. Moreover, trade credit is tied to the purchase of goods which is less flexible than bank loans. Thus, even though trade credit could play a significant role in providing external finance to support the growth of firms, an effective formal financial system may be necessary to sustain a country's long run growth.

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