Does Trade Credit Help? Evidence from China

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Abstract

A counterexample to the findings in the finance and development literature is that firms have achieved good performance in many developing economies where the financial sector is far from established. One widely suggested mechanism in the literature is that firms in these developing economies use a high ratio of informal financing, i.e., trade credit. This paper, by using a survey of firms in China conducted by the World Bank in early 2003, examined the impact of trade credit on firm performance. The ordinary least squares estimations showed that trade credit was significantly and positively correlated with firm performance. However, after we used the instrumental variable approach to tackle the potential endogeneity issues, trade credit no long had any impact on firm performance. The results were robust with a series of robustness checks. Our study suggested that the role of trade credit in promoting firm performance was limited.

Keywords: Trade Credit, Firm Performance, Informal Financing, Financial Institutions

JEL Codes: G30, L20, D53, O16

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1 Introduction

It is widely acknowledged that financial institutions play an important role in promoting firm growth and firm performance (e.g., Demirgüç-Kunt and Maksimovic, 1996, 1998; Beck, Demirgüç-Kunt and Maksimovic, 2004; Dyck and Zingales, 2004).[1] However, in many developing economies where the financial sector is far from established, firms have achieved good performance over the past decades, especially private firms who are often discriminated against accessing bank loans. China provides an illustrative example (Allen, Qian, and Qian, 2005; Ayyagari, Demirgüç-Kunt, and Maksimovic, 2007). It is also found that in these developing economies firms use a disproportionate ratio of informal finance such as trade credit (McMillan and Woodruff, 1999; Cull, Xu, and Zhu, 2007), which implicitly suggests that firms may achieve good performance through trade credit (Ge and Qiu, 2007). The question is: does trade credit really help?

It is surprising that studies on this important issue are limited, whereas voluminous papers have investigated the determinants of trade credit (e.g., Ferris, 1981; Mian and Smith, 1992; Biais and Gollier, 1997; Petersen and Rajan, 1997; McMillan and Woodruff, 1999; Ng, Smith, and Smith, 1999; and Cuñat, 2007). To the best of our knowledge, Fisman and Love (2003) is the only one that has studied the impacts of trade credit on industry growth and they have found that industries with higher dependence on trade credit exhibited higher rates of growth in countries with weaker financial institutions. This paper, by using a survey of firms in China conducted by World Bank in early 2003, studied the impacts of trade credit on firm performance.

China offers us a good setting to study the impacts of trade credit. On the one hand, China lacks well-developed financial institutions and fast-growing firms in China instead rely on informal financing channels rather than formal financial institutions (Allen, Qian, and Qian, 2005). On the other hand, China is a large country with substantial variations in the development of financial institutions across regions, and firms differ in their financing patterns across regions (Ayyagari, Demirgüç-Kunt, and Maksimovic, 2007). These allow us to exploit the effects of trade credit on performance at both firm-level and region-level.

[1] There is a large body of literature regarding the impacts of the financial market on the level and the rate of growth at country level (e.g., Goldsmith, 1969; King and Levine, 1993; Levine and Zervos, 1998; Levine, 1998, 1999; Levine, Loayza, and Beck, 2000; La Porta, Lopez-de-Silanes, and Shleifer, 2002), and at industry-level (e.g., Rajan and Zingales, 1998; Wurgler, 2000; Cetorelli and Gambera, 2001; Claeseens and Laeven, 2005). Levine (2005) provides an excellent review of this literature.

We used two variables to measure firm performance, labor productivity (measured as the logarithm of output per worker) and ROA (measured as the return on fixed assets calculated at book value). The key explanatory variable, trade credit, was measured as the average portion of a firm's two major inputs that the firm did not pay right after the delivery.

The ordinary least squares (OLS) estimations showed that trade credit was positively and significantly correlated with both labor productivity and ROA. However, the OLS estimates could be biased due to the omitted variables and reversed causality, and might not capture the causal impacts of trade credit on firm performance. To address these potential endogeneity issues, we used the instrumental variable approach. Specifically, we used the number of a firm's two main inputs were supplied by the relatives of the firm owner and the average days it took for the firm to obtain replacements if the main suppliers of the firm's two major inputs failed to deliver as instruments for trade credit. As shown by McMillan and Woodruff (1999) and Cuñat (2007), suppliers are more likely to offer trade credit to their customers when they belong to the same networks such as families and are locked in the relationship with their suppliers. This is because any default by the customers leads to the spread of bad words among members of the same networks and the termination of further delivery of the tailor-made inputs, subsequently causing severe damage to the customers.

The first stage results of the two-stage-least-squares (TSLS) regressions showed that the instrumental variables were positively and significantly correlated with the endogenous variable, which confirmed the above argument. Surprisingly, the second stage results of the TSLS estimations showed that trade credit did not cast any significant impacts on firm performance.

The validity of the instrumental variable estimation hinges upon two conditions, the relevance condition and the exclusion restriction. The relevance condition means that the instrumental variable should be significantly correlated with the endogenous variable (or called the *relevant instrument*) and the correlation could not be weak (or called the *strong instrument*). The significant correlation between the instrument variables and the endogenous variable found in the first stage of the TSLS estimations, and the Anderson canonical correlations LR statistic and the Cragg-Donald Wald Statistic confirmed that our instrumental variables were relevant. Meanwhile, the Shea partial R-square had values above 0.01, suggesting that there were not small correlations between our instrumental variables and the endogenous variable. However, despite the statistical significance at 1% level, the F-test of excluded instrument was around 7.30, which was below the critical value 10 for the "safety zone" for the strong instrument as suggested by Straiger and Stock (1997). To further deal with the concern of weak instrument, we conducted

three robustness checks as suggested by Angrist and Pischke (2009): the limited information maximum likelihood (LIML) estimations, the reduced-form regressions of our outcome variables on the instrumental variables, and the just-identified TSLS estimations. Our findings were robust to these exercises, implying that our instrumental variables were strong instruments.

The exclusion restriction requires that the instrumental variable could not affect the outcome variables through channels other than trade credit. The Hansen J statistic, which is a standard test of the exclusion restriction in the overidentification scenario, could not reject the default hypothesis that our instrumental variables were valid. Next, the reduced-form regressions found no significant impacts of our instrumental variables on firm performance, implying that the exclusion restriction was satisfied. Finally, we directly controlled for some potential channels through which the instrumental variable might have affected firm performance other than trade credit. Specifically, five possible channels were identified: the quality, the specificity and the delivery of inputs, the terms of trade credit, and the ratio of inputs purchased by using the credit from the supplier. Our findings were robust to the inclusion of these additional channel variables, suggesting that our instrumental variables were valid.

For robustness checks, we used an alternative estimation strategy, excluded outlying observations, and focused on a subsample of the financially constrained firms. Our main findings that trade credit did not have any significant causal impacts on firm performance remained robust in all these exercises.

To understand why trade credit did not affect firm performance, we investigated several possible explanations. It could be possible that firms with the access to trade credit also enjoy alternative sources of financing such as bank loans; that firms may have access to the credit from the buyer side in addition to trade credit from the supplier side; that only firms with great growth potential are offered with trade credit; and that trade credit as an informal financing channel is by nature limited in amount (or size) and thus cannot meet firms' financing needs. The empirical results suggested that only the size of trade credit argument could partially explain our findings.

The rest of the paper is organized as follows. Data and variables are described in Section 2. Section 3 presents the empirical results. The paper concludes with Section 4.

2 Data and Variables

Our data came from a survey of firms on the investment climate in China conducted by the World Bank jointly with the Enterprise Survey Organization of China in early 2003.[2] For balanced representation, the survey covered 18 cities from five regions in China: Northeast: Benxi, Changchun, Dalian, and Haerbin; Coastal: Hangzhou, Jiangmen, Shenzhen, and Wenzhou; Central: Changsha, Nanchang, Wuhan, and Zhengzhou; Southwest: Chongqing, Guiyang, Kunming, and Nanning; Northwest: Lanzhou and Xi'an. In each city, 100 or 150 firms were randomly sampled from nine manufacturing industries (garment and leather products, electronic equipment, electronic parts making, household electronics, auto and auto parts, food processing, chemical products and medicine, biotech products and Chinese medicine, and metallurgical products), and five service industries (transportation service, information technology, accounting and non-banking financial services, advertisement and marketing, and business services). The total number of firms surveyed was 2,400. However, since only manufacturing firms were required to answer the question regarding the use of trade credit, we were limited to a final sample with 1,566 observations.

The *Survey* comprised two parts. One was a general questionnaire directed at senior management seeking information about the firm, innovation, product certification, marketing, relations with suppliers and customers, access to markets and technology, relations with government, labor, infrastructure, international trade, finance and taxation, and the GM and board of directors. The other questionnaire was directed at the accountant and personnel manager, and it covered ownership, various financial measures, and labor and training. The *Survey* was basically a cross-section dataset, with most of the variables measured in 2002; however, some financial variables, such as output, employment, and fixed assets, contained information from the past three years.

Two variables were used to measure firm performance: *Labor Productivity* (measured as the logarithm of output per worker in 2002) and *ROA* (measured as the return on fixed assets calculated at book value in 2002). Summary statistics was provided in Table 1a.

The key explanatory variable, *Trade Credit*, was measured as the average portion of a firm's two major inputs that the firm did not pay right after the delivery in 2002. The responses varied substantially across firms, with a mean value of 0.357 and a standard deviation of 0.373. Meanwhile, these numbers

[2] The data set has recently been used by Cull and Xu [2005], Ayyagari, Demirgüç-Kunt, and Maksimovic [2007], and Lu, Png, and Tao [2008].

were comparable with other found in the literature, suggesting a reliable measure of trade credit in our analysis. First, in the case of China, Cull, Xu, and Zhu (2004) found that the amount of trade credit ranged from 21.5% of total sales to 27.2% in the dataset of industrial firms collected by the National Bureau of Statistics of China for the period of 1998-2003, while Ge and Qiu (2007) documented a mean value of 27% trade credit of total sales from the enterprise surveys conducted by the Chinese Academy of Social Sciences (CASS) in the year 2000. Second, in studying the interfirm relationships in Vietnam, McMillan and Woodruff (1999) reported an average of 30% of the bills not paid after the suppliers delivered the goods. Finally, our measure of trade credit was positively and statistically significantly correlated with the measure of trade credit intensity at the industry level in Fisman and Love (2003).[3] Table 1b-1c further decomposed the use of trade credit by firms into cities and industries, respectively. It was found that firms in coastal areas (i.e., Shenzhen, Hangzhou, and Jiangmen) and in electronics manufacturing industries (i.e., household electronics, electronic equipment, and electronic parts making) were more likely to use trade credit, while those in inland areas (i.e., Zhengzhou, Lanzhou, and Changsha) were less likely.

To deal with the omitted variables bias, we controlled for other factors that might affect firm growth and firm performance. Variables related to firm characteristics included *Percentage of Private Ownership*, *Firm Size* (measured as the logarithm of employment in 2001), *Firm Age* (measured as the logarithm of years of establishment by the end of 2002), *Bank Loan* (a dummy variable indicating whether the firm had bank loans in 2002), and *Government Representative in the Board* (a dummy variable indicating whether there was government representative in the board in 2002). Next, we included variables related to GM characteristics: his/her human capital, *Education* (years of schooling by the end of 2002), *Tenure* (years of being GM by the end of 2002), and *Deputy GM Before* (a dummy variable indicating whether the GM was firm's deputy GM before he became GM); and his/her political capital, *Government Cadre* (a dummy variable indicating whether the GM was a government official before he became GM), *Party Membership* (a dummy variable indicating whether the GM was a member of the Chinese Communist Party in 2002), and *Government Appointment* (a dummy variable indicating whether the GM was appointed by the government). Finally, two variables were used to control for city differences: *Logarithm of GDP per capita* and *Logarithm of Population*, which measured the richness and the size of the cities.

To further address the potential endogeneity problems associated trade

[3]The coefficient was 1.905 with a t-statistic of 2.28.

credit, we used the instrumental variable estimation. Specifically, the instrumental variables were *Relationship* (a category variable that took value 0, 0.5 and 1 when none of, one of and both of a firm's two main inputs were supplied by relatives of the firm owner in 2002 respectively) and *Delay* (measured as the average days it took for firms to obtain replacements if the main suppliers of the firms' two major inputs failed to deliver in 2002). Details were provided in Section 3.2.

The correlations among the key variables were reported in Table 2.

3 Empirical Analysis

3.1 Benchmark

To study the impacts of trade credit on firm performance, we estimated the following equation:

$$y_{eic} = \alpha + \beta \cdot Trade\ Credit_{eic} + X'_{eic}\gamma + \varepsilon_{eic} \tag{1}$$

where y_{eic} was the outcome variables for firm e in industry i and city c (i.e. , *Labor Productivity* and *ROA*), $Trade\ Credit_{eic}$ was the key explanatory variable, X'_{eic} was a vector of control variables (i.e., firm characteristics, GM characteristics and city characteristics), and ε_{eic} was the error term. Standard errors were clustered at the city level, allowing for the arbitrary correlation within the city.

Regression results were reported in Table 3. Columns 1-2 showed that trade credit was positively and significantly correlated with firm performance.[4] Quantitatively, one standard deviation increase in *Trade Credit* would increase labor productivity and ROA by a 0.22-standard-deviation and a 0.04-standard-deviation, respectively.[5]

3.2 Main Results

The OLS estimates might be significantly biased due to the endogeneity problems, such as missing variables that we had not exhausted in controls and reversed causality. To address these endogeneity issues and detect the causal impacts of trade credit on firm performance, we adopted the instrumental

[4]In the analysis, we stepwisely add the control variables, and the results are similar in these estimations with just a few sets of these controls. To save space, we henceforce only report the results with full controls. Our results with a few sets of controls can be offered upon request.

[5]In the calculation of magnitudes throughout the paper, we use standard deviation.

variable approach. Specifically, we re-estimated the equation (1) using the two-stage-least-squares (TSLS) regression with the first stage regression as follows:

$$Trade\ Credit_{eic} = \alpha_1 + \beta_1 \cdot R_{eic} + X'_{eic}\gamma_1 + \varepsilon_{eic1} \tag{2}$$

where R_{eic} were the instrumental variables we were going to discuss next.

The first instrumental variable of *Trade Credit* we used was *Relationship*, which was a indicator of the number of a firm's two main inputs that were supplied by the relatives of the firm owner in 2002.[6] As shown by McMillan and Woodruff (1999), suppliers were more likely to offer trade credit to their customers when they belonged to the same networks, such as families and friends, and business associations. This is because any default by the customers would lead to the spread of bad word among members of the same networks causing severe damage to the customers.

The second instrumental variable we used was *Delay*, which were the average days it took for firms to obtain replacements if the main suppliers of the firms' two major inputs failed to deliver in 2002. McMillan and Woodruff (1999) argued that when clients were locked in a relationship with their suppliers, the suppliers could threaten not to deliver further inputs if credit was not paid back. Thus suppliers were more willing to provide credit to their clients when it was less easy for the clients to find replacements in the market. Recently, Cuñat (2007) built a model showing that suppliers would increase the amount of trade credit to their clients when the transaction had tailor-made products, learning by doing, or other sunk costs that would generate a surplus within the relationship. The results were then tested and confirmed by a panel of U.K. firms.

Regression results were presented in Table 4. The first stage results of TSLS reported in Panel B showed that the instrument variables (i.e., *Relationship* and *Delay*) had positive and significant impacts on *Trade Credit*, which was consistent with the above arguments. Interestingly, the second stage results of TSLS reported in Panel A showed that trade credit did not have any significant impacts on either labor productivity or profitability.

3.2.1 Relevance Condition

The validity of the instrumental variable estimation hinges upon two conditions, the relevance condition and the exclusion restriction.

[6] As shown in the Appendix, most of the key variables differed significantly between firms supplied by the relatives of the firm owners and those not supplied by the relatives of the firm owners.

The relevance condition means that the instrumental variable should be significantly correlated with the endogenous variable (or called the *relevant instrument*) and the correlation could not be weak (or called the *strong instrument*). For the check on the relevant instrument, we reported the Anderson canonical correlations LR statistic and the Cragg-Donald Wald Statistic in Panel C. In addition to the significant correlation between the instrument variables and the endogenous variable found in the Panel B, these two tests further confirmed that our instrumental variables were relevant.

For the check on the strong instrument, we reported two statistic tests, the Shea partial R-square and the F-test of excluded instrument. The Shea partial R-square, with values above 0.01, suggested that there were not small correlations between our instrumental variables and the endogenous variable. However, despite the statistical significance at 1% level, the F-test of excluded instrument was around 7.30, which was below the critical value 10 for the "safety zone" for the strong instrument as suggested by Straiger and Stock (1997). This might raise the concern of weak instrument for our analysis though the bias of the TSLS estimates leans toward the probability limit of the corresponding OLS estimates (Murray, 2006).

To deal with the concern of weak instrument, we further conducted three robustness checks as suggested by Angrist and Pischke (2009). First, we used the limited information maximum likelihood (LIML) estimation as it was approximately median-unbiased with the overidentification estimation (e.g., Davidson and MacKinnon, 1993; Mariano, 2001; Flores-Lagunes, 2007). Panel D of Table 4 reported the LIML estimation results, in which only the estimated coefficients for *Trade Credit* were reported to save space. It is clear that the LIML estimates were very similar to the TSLS estimates, suggesting that our instrumental variables were not weak.[7] Second, we conducted reduced-form regressions of our outcome variables (i.e., *Labor Productivity* and *ROA*) on our instrumental variables. As noted by Angrist and Krueger (2001) and Chernozhukov and Hansen (2008), if no correlation between the outcome variable and the instrumental variables are found in the reduced-form regression, it is probably that there is no causal impact of the endogenous variable on the outcome variables. As shown in Table 5, neither *Relationship* nor *Delay* had a statistical significant estimated coefficient, suggesting that our findings in Table 4 were robust. Finally, instead of using two instruments together, we conducted the just-identified TSLS estimations, i.e., using one instrument each time. This is because the just-identified TSLS estimation is median-unbiased and the bias in the TSLS estimation increases with the number of instruments. Regression results were reported in Table

[7]Henceforth, we also reported the LIML estimation results when they were applicable.

6. Clearly, none of these regression found any significant impacts of trade credit on firm performance and the F-test of excluded instrument rose to above 9.5 sometime, close to the "safety zone" for the strong instrument, suggesting that our findings reported in Table 4 were not biased due to the weak instrument.

3.2.2 Exclusion Restriction

The exclusion restriction of the instrumental variable estimation requires that our instrumental variables cannot affect the outcome variables through channels other than the endogenous variable (i.e., *Trade Credit*). In Panel C of Table 4, we reported the Hansen J statistic, which is a standard test of the exclusion restriction in the overidentification scenario. The Hansen J statistic could not reject the default hypothesis that our instrumental variables were valid.

Another way to check the exclusion restriction was the reduced-form regressions of the outcome variables on the instrumental variable instead of the endogenous variable. The rationale behind this strategy is as follows. Note that trade credit did not have any significant impacts on firm performance; thus if our instrumental variables were found to have significant impacts on firm performance in the reduced-form regressions, this might suggest that there are other channels through which the instrument variables could affect firm performance. As shown in Table 5, there were no significant impacts of our instrumental variables on firm performance in the reduced-form regressions, implying that the exclusion restriction was satisfied.

The last check on the exclusion restriction was to explicitly controlled for those potential channels through which our instrumental variables may affect our outcome variables other than the endogenous variable.

First, our instrumental variables might have affected firm performance through the quality of inputs. In the Survey, there was a question regarding the percentage of supplies the firm purchased having lower than expected quality, and a variable called *Quality* was constructed accordingly. As a robustness check, we included *Quality* as an additional control variable in the TSLS estimations and the results are shown in Column 1 and Column 6 of Table 7. The main results regarding the impact of *Trade Credit* on firm performance remained robust to this control.

Second, our instrumental variables might have affected firm performance through the specificity of inputs. In the Survey, there was a question asking whether the inputs were made to the firm's unique specification, and a variable called *Specificity* was constructed accordingly.[8] As a robustness check,

[8]The sourcing of inputs from relatives was found to be correlated with the specificity

we included *Specificity* as an additional control variable in the TSLS estimations and the results were shown in Column 2 and Column 7 of Table 7. The main results regarding the impact of *Trade Credit* on firm performance remained robust to this control.

Third, our instrumental variables might have affected firm performance through the delivery of inputs. In the Survey, there was a question regarding the percentage of sales lost in the previous year due to delivery delays from suppliers, and a variable called *Delivery* was constructed accordingly. As a robustness check, we included *Delivery* as an additional control variable in the TSLS estimations and the results were shown in Column 3 and Column 8 of Table 7. The main results regarding the impact of *Trade Credit* on firm performance remained robust to this control.

Fourth, our instrumental variables might have affected firm performance through the terms of trade credit, e.g., benefits accruing to the supplier in exchange for more generous credit terms. In the Survey, there was a question regarding the average days that the firm was required to pay back trade credit, which could be used to proxy the terms of trade credit. A variable called *Credit Term* was constructed accordingly, and included as an additional control variable in the TSLS estimations. Regression results reported in Column 4 and Column 9 of Table 7 showed that the impact of *Trade Credit* on firm performance remained robust to this control.

Finally, our instrumental variables might have affected firm performance through the price of the inputs. Though in the Survey there was no question related to the price of the inputs, there was a question regarding the ratio of inputs purchased by using trade credit from the supplier, and a variable called *Inputs Purchase Ratio* was constructed accordingly. The inclusion of this variable in the regression can allow us to investigate whether our findings were biased due to that the instrumental variable may affect firm performance through the price of the inputs. This is because if a firm did not use the suppliers' trade credit to buy their inputs, the firm might not be affected by the price of the inputs. Regression results reported in Column 5 and Column 10 of Table 7 showed that the impact of *Trade Credit* on firm performance remained robust to this control.

Overall, regression results reported in Tables 4-7 implied that our instrumental variable estimation was valid, and trade credit was found to have no statistically significant causal impacts on firm performance. These findings were contrary to those obtained from OLS estimations, suggesting that OLS results were indeed biased due to the endogeneity problems and should be

of inputs and more prevalent in industries that are more intensive in relationship-specific investments à la Nunn (2007).

interpreted with caution.

3.3 Robustness Checks

3.3.1 Alternative Identification Strategy[9]

An alternative identification strategy is to combine the variation of the use of trade credit across firms and the variation in the external finance dependence across industries. To measure the external finance dependence in a industry, we used the simple average of the percentage of new investment financed from the external side (such as loans from banks, loans from relatives, trade credit and equity) by firms located in that industry. A variable called *External Finance Dependence* was constructed accordingly. Regression results reported in Table 8 showed that there was no evidence that firms with more access to trade credit achieved better performance in industries that required more external capital.

3.3.2 Outliers

One possible concern is that our main findings might be mainly driven by the outliers since there were large variations in the outcome variables. To address this concern, we followed Hadi (1992, 1994)'s methodology in identifying the outliers in the multivariate data and excluded these outliers in the analysis. The results reported in Table 9 were consistent with our previous findings that trade credit did not cast any significant impacts on firm performance. This implied that the concern for outliers was not relevant in our case.

3.3.3 Subsample

Our last robustness check was to see whether trade credit had any impact on firms with financial constraints. To define whether a firm was financially constrained or not, we used the following procedures. First, in the survey, there was a question asking the reasons why the firm did not have bank loans. There were two answers: one was that the firm did not apply for a bank loan and the other was that the application for a bank loan was turned down. We thus classified the firms corresponding to the second answer as the financially constrained firms. Next, for those firms corresponding to the first answer, there was a further question asking the firm why it had not applied for bank loans. There were six answers: (i) did not need loans; (ii) application procedures for bank loans were too cumbersome; (iii) collateral

[9] We thank the referee for the suggestion of using this identification strategy.

requirements of bank loans were too stringent; (iv) interest rates were too high; (v) corruption in the allocation of bank loans; and (vi) did not expect to be approved. Answers (ii)-(vi) showed that firm had intention to apply a bank loan but was deterred from doing so due to the costs associated while answer (i) showed that firm might have been capital abundant. Thus we further classified those firms corresponding to answers (ii)-(vi) as the financially constrained firms. Finally, we also included those firms with bank loans as the financially constrained firms.[10] Regression results were reported in Table 10 and were consistent with our main findings.

3.4 Discussion

In this subsection, we discussed several possible explanations why trade credit did not have any significant causal impacts on firm performance.[11]

The first possible explanation of why trade credit did not help is that firms may have access to other sources of financing. For example, banks may grant loans to firms with good reputation and these firms could also be more likely to have trade credit. Thus, bank loans construct an substitute to trade credit and resolve firm's needs for the external finance. However, in all our regressions we already included a variable related to banks loans. Moreover, in one of the robustness checks, we focused on a subsample of firms that were financially constrained and found our results were robust to this subsample. These results suggested that the access to alternative sources of financing might not be the explanation.

Second, in addition to trade credit from the supplier side, firms may have access to the credit from the buyer side. In the Survey, there was a question regarding the percentage of cash payment by the clients, and a variable called *Buyer Credit* was constructed accordingly. To investigate whether the access to buyer credit could explain our results, we included *Buyer Credit* as an additional control variable in the TSLS estimations and the results were shown in Table 11. Clearly, our results regarding the impact of *Trade Credit* on firm performance remained robust to this control, implying that the explanation of the access to buyer credit is not relevant.

Third, it could be possible that suppliers offer credit to firms with great growth potential, which leads to the estimation bias in the OLS estimations and explains why the TSLS failed to find the positive impacts of trade credit on firm performance. To investigate this possibility, we used the average labor

[10] The results were similar if these firms with bank loans were excluded from the sample of the financially constrainted firms.

[11] We thank the referee for inspiring the discussion on the possible explanations for our findings.

productivity in the last three years as a proxy for the firm's growth potential, and included it as an additional control variable in the OLS estimation to see whether this caused the change of the estimated coefficients of trade credit.[12] Regression results were reported in Table 12. It is clear that the inclusion of the proxy for the firm's growth potential did not change the significance of the estimated coefficients of trade credit, suggesting that the argument of trade credit to firms with growth potential is less likely to explain our results.

The last possible explanation is that trade credit as an informal financing channel is by nature limited in amount (or size). It may be able to satisfy the financial needs of startup and relatively small firms, but could be ill-equipped to scale up and meet the financing needs of large and fast-growing non-state-owned firms. To investigate this possibility, we divided the sample into two subsamples, one with large firms and the other with small firms, and checked whether trade credit had positive and significant estimated coefficients in the small firms sample but not in the large firms sample.[13] OLS regression results were reported in Table 13. As shown in Columns 1-2, there was no much difference of the estimated coefficient of trade credit on labor productivity in terms of both significance and magnitude between the large firm sample and the small firm sample. However, the impacts of trade credit on profitability did differ across the samples: it had a positive and statistically significant impact on profitability in the small firm sample but not in the large firm sample. These results suggest that the size of trade credit may partially explain why trade credit was found to not have causal impacts on firm performance.

4 Conclusion

A counterexample to the findings in the finance and development literature is that in many developing economies firms have achieved good performance over the past decades despite the weaknesses in the financial sectors. One widely suggested mechanism is that these firms may have access to alternative financing, such as trade credit, to support their performance. However, the direct evidence pointing towards this argument is limited. To fill in the gap, this paper, by using a survey of firms in China conducted by the World Bank in early 2003, empirically investigated the impacts of trade credit on firm

[12] We also experimented with the average growth rate in terms of both employment and sales in the past two years as the proxies for the growth potential, and the results were similar.

[13] The definition of whether a firm is large or small is that whether its size is above the sample mean or not.

performance.

The OLS estimates showed that trade credit was positively and significantly correlated with firm performance. However, when we used the instrumental variable approach to address the concern of the potential endogeneity issue associated with trade credit, the results from the TSLS regressions found no significant impacts of trade credit on firm performance. Our findings were robust to a set of checks on the validity of the instrumental variable estimation, an alternative estimation strategy, exclusion of outlying observations, and a subsample of the financially constrained firms. We then investigated several possible explanations for our findings and found that the ineffectiveness of trade credit in supporting firm performance could be partially due to the small size of trade credit, which might not satisfy firms' financial needs.

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Table 1a: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Labor Productivity	1557	4.322	1.562	-3.989	11.893
ROA	1544	0.106	2.727	-49.000	83.640
Trade Credit	1368	0.357	0.373	0.000	1.000
Relationship	1442	0.021	0.123	0.000	1.000
Delay	1500	10.477	19.899	0.000	210.000
Percentage of Private Ownership	1566	0.813	0.376	0.000	1.000
Firm Size	1563	5.040	1.453	0.000	9.899
Firm Age	1566	2.494	0.777	1.099	3.970
Bank Loan	1540	0.273	0.446	0.000	1.000
Government Representative in the Board	1566	0.156	0.363	0.000	1.000
Education	1553	14.361	2.503	0.000	18.000
Years of Being GM	1548	6.240	4.580	1.000	33.000
Depute GM Before	1566	0.277	0.448	0.000	1.000
Government Cadre	1566	0.035	0.184	0.000	1.000
Party Membership	1566	0.658	0.475	0.000	1.000
Government Appointment	1566	0.239	0.427	0.000	1.000
Quality	1541	0.033	0.085	0.000	1.000
Specificity	1444	0.068	0.221	0.000	1.000
Delivery	1524	0.021	0.050	0.000	0.500
Credit Term	1011	21.707	43.427	0.000	720.000
Inputs Purchase Ratio	1488	0.124	0.239	0.000	1.000
External Finance Dependence	1566	0.853	0.030	0.808	0.925
Trade Credit * External Finance Dependence	1368	0.304	0.318	0.000	0.925

Table 1b: Trade Credit across Cities

Region	Number	Trade Credit
Shenzhen	61	0.582
Hangzhou	64	0.527
Jiangmen	60	0.474
Chongqing	96	0.471
Nanchang	88	0.409
Xian	87	0.404
Guiyang	67	0.390
Changchun	87	0.388
Nanning	53	0.379
Wenzhou	47	0.370
Dalian	58	0.325
Wuhan	94	0.321
Kunming	89	0.283
Haerbin	93	0.266
Changsha	90	0.264
Lanzhou	74	0.247
Benxi	61	0.233
Zhengzhou	99	0.215

Table 1c: Trade Credit across Industries

Industry	Number	Trade Credit
Biotech Products and Chinese Medicine	27	0.474
Household Electronics	55	0.420
Electronic Equipment	163	0.398
Electronic Parts Making	251	0.389
Food Processing	60	0.388
Auto and Auto Parts	318	0.385
Chemical Products and Medicine	54	0.331
Garment and Leather Products	310	0.304
Metallurgical Products	130	0.243

Table 2: Correlation

	Labor Productivity	ROA	Trade Credit	Relationship	Delay
Labor Productivity	1.0000				
ROA	0.2022	1.0000			
Trade Credit	0.2231	0.0679	1.0000		
Relationship	0.0330	0.0119	0.0820	1.0000	
Delay	0.0992	0.0120	0.0912	0.0183	1.0000

Number of observation is 1,286.

Table 3: OLS Estimates

	1	2
Dependent Variable	Labor Productivity	ROA
Trade Credit	0.520***	0.200*
	(0.119)	(0.105)
Firm Characteristics		
Percentage of Private Ownership	0.149	0.441
	(0.122)	(0.321)
Firm Size	0.097**	0.043
	(0.039)	(0.062)
Firm Age	-0.451***	-0.055*
	(0.058)	(0.031)
Bank Loan	0.509***	0.100
	(0.071)	(0.107)
Government Representative in the Board	0.478***	0.296**
	(0.119)	(0.106)
GM Characteristics		
Human Capital		
Education	0.084***	0.038
	(0.019)	(0.023)
Years of Being GM	0.000	-0.000
	(0.010)	(0.006)
Deputy GM Before	0.025	-0.164
	(0.080)	(0.155)
Political Capital		
Government Cadre	0.223	0.020
	(0.131)	(0.061)
Party Membership	-0.155*	-0.211*
	(0.084)	(0.100)
Government Appointment	-0.231**	0.164
	(0.096)	(0.168)
City Characteristics		
Logarithm of GDP per Capita	0.593***	-0.114
	(0.123)	(0.093)
Logarithm of Population	0.376**	-0.086
	(0.131)	(0.128)
Number of Observations	1,326	1,313
R-squared	0.3027	0.0277
F-test	87.91	5.34
p-value for F-test	0.0000	0.0008

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but not reported to save space (available upon request).

Table 4: Main Results

	1	2
Panel A, Second Stage of TSLS		
Dependent Variable	Labor Productivity	ROA
Trade Credit	1.319	0.059
	(1.176)	(0.724)
Firm Characteristics		
Percentage of Private Ownership	0.154	0.453
	(0.117)	(0.324)
Firm Size	0.082	0.048
	(0.053)	(0.054)
Firm Age	-0.413***	-0.056*
	(0.053)	(0.032)
Bank Loan	0.466***	0.101
	(0.085)	(0.116)
Government Representative in the Board	0.412**	0.319**
	(0.177)	(0.143)
GM Characteristics		
Human Capital		
Education	0.067**	0.040
	(0.026)	(0.024)
Years of Being GM	0.003	-0.001
	(0.011)	(0.006)
Deputy GM Before	0.052	-0.169
	(0.082)	(0.144)
Political Capital		
Government Cadre	0.154	0.004
	(0.142)	(0.057)
Party Membership	-0.116	-0.239**
	(0.111)	(0.115)
Government Appointment	-0.274***	0.171
	(0.093)	(0.164)
City Characteristics		
Logarithm of GDP per Capita	0.550***	-0.112
	(0.123)	(0.105)
Logarithm of Population	0.364***	-0.088
	(0.118)	(0.136)
Panel B, First Stage of TSLS: Dependent Variable is Trade Credit		
Relationship	0.227**	0.225**
	(0.091)	(0.091)
Delay	0.001***	0.001**
	(0.001)	(0.001)
Firm Characteristics		
Percentage of Private Ownership	-0.019	-0.013
	(0.033)	(0.033)
Firm Size	0.025***	0.025***
	(0.008)	(0.008)
Firm Age	-0.015	-0.015
	(0.017)	(0.017)

Bank Loan	0.026	0.024
	(0.024)	(0.024)
Government Representative in the Board	0.092***	0.090***
	(0.033)	(0.033)
GM Characteristics		
Human Capital		
Education	0.011***	0.012***
	(0.004)	(0.004)
Years of Being GM	-0.001	-0.001
	(0.002)	(0.002)
Deputy GM Before	-0.036	-0.041*
	(0.024)	(0.024)
Political Capital		
Government Cadre	-0.022	-0.035
	(0.063)	(0.062)
Party Membership	-0.060**	-0.057**
	(0.024)	(0.024)
Government Appointment	0.025	0.030
	(0.028)	(0.028)
City Characteristics		
Logarithm of GDP per Capita	0.049**	0.050**
	(0.021)	(0.021)
Logarithm of Population	0.015	0.018
	(0.018)	(0.019)
Panel C, Various First-Stage Statistic Tests		
Relevance Test		
Anderson Canonical Correlations LR Statistic	[10.57]***	[10.36]***
Cragg-Donald Wald Statistic	[13.38]***	[13.11]***
Weak Instrument Test		
Shea Partial	0.0107	0.0105
F Test of Excluded Instrument	[7.28]***	[7.32]***
Overidentification Test		
Hansen J statistic	0.408	0.063
Panel D, Second Stage of LIML		
Trade Credit	1.347	0.059
	(1.216)	(0.725)
Number of Observations	1,265	1,252

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). In Panel D, the limited information maximum likelihood (LIML) regressions include the same control variables as those in the corresponding two-stage-least-squares (TSLS) regressions but results of these control variables are not reported to save space (available upon request).

Table 5: Mean Results, Counter Check I

	1	2
Dependent Variable	Labor Productivity	ROA
Relationship	0.150	0.045
	(0.334)	(0.102)
Delay	0.003	-0.000
	(0.002)	(0.002)
Included Control Variables		
Firm Characteristics	Yes	Yes
Gm Characteristics	Yes	Yes
City Characteristics	Yes	Yes
Number of Observations	1,265	1,252
R-squared	0.2805	0.0265
F-test	40.33	51.41
p-value for F-test	0.0000	0.0000

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variables are not reported to save space (available upon request).

Table 6: Mean Results, Counter Check II

	1	2	3	4
Panel A, Second Stage of TSLS				
Dependent Variable	Labor Productivity		ROA	
Trade Credit	0.724	1.920	0.180	-0.012
	(1.311)	(1.532)	(0.435)	(1.160)
Panel B, First Stage of TSLS: Dependent Variable is Trade Credit				
Relationship	0.240**		0.237**	
	(0.084)		(0.083)	
Delay		0.001***		0.001***
		(0.000)		(0.000)
Panel C, Various First-Stage Statistics Tests				
Relevance Test				
Anderson Canonical Correlations LR Statistic	[5.64]**	[6.52]**	[5.58]**	[6.33]**
Cragg-Donald Wald Statistic	[6.64]***	[7.59]***	[6.57]**	[7.39]***
Weak Instrument Test				
Shea Partial	0.0059	0.0059	0.0058	0.0058
F Test of Excluded Instrument	[8.20]**	[9.72]***	[8.23]***	[9.55]***
Included Control Variables				
Firm Characteristics	Yes	Yes	Yes	Yes
Gm Characteristics	Yes	Yes	Yes	Yes
City Characteristics	Yes	Yes	Yes	Yes
Number of Observations	1,296	1,291	1,283	1,278

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variables are not reported to save space (available upon request). The first Stage of TSLS contains same controls as the second stage but results of these control variables are not reported to save space (available upon request).

Table 7: Main Results, Counter Check III

	1	2	3	4	5	6	7	8	9	10
Panel A, Second Stage of TSLS										
Dependent Variable	Labor Productivity					ROA				
Trade Credit	1.382	1.287	1.157	1.219	1.364	0.022	0.164	0.015	0.022	0.060
	(1.210)	(1.205)	(1.305)	(1.656)	(1.134)	(0.713)	(1.101)	(0.844)	(1.292)	(0.626)
Quality	-0.897					0.369				
	(0.723)					(0.319)				
Specificity		0.118					-0.164			
		(0.102)					(0.525)			
Delivery			-0.018					0.864		
			(0.733)					(0.804)		
Credit Term				-0.002					0.001	
				(0.007)					(0.004)	
Inputs Purchase Ratio					-0.203					0.243
					(0.461)					(0.304)
Panel B, First Stage of TSLS: Dependent Variable is Trade Credit										
Relationship	0.231**	0.230**	0.206**	0.183*	0.253**	0.228**	0.226**	0.204**	0.181*	0.251***
	(0.085)	(0.083)	(0.095)	(0.088)	(0.088)	(0.084)	(0.083)	(0.094)	(0.088)	(0.086)
Delay	0.001**	0.001***	0.001***	0.001	0.001**	0.001**	0.001**	0.001***	0.001	0.001**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Panel C, Various First-Stage Statistics Tests										
Relevance Test										
Anderson Canonical Correlations LR Statistic	[10.06]***	[10.31]***	[9.55]***	[5.98]*	[10.56]***	[9.91]***	[10.53]***	[9.37]***	[5.82]*	[10.46]***
Cragg-Donald Wald Statistic	[12.50]***	[13.40]***	[11.80]***	[7.02]**	[13.82]***	[12.83]***	[14.04]***	[11.58]***	[6.81]**	[13.70]***
Weak Instrument Test										
Shea Partial	0.0099	0.0105	0.0095	0.0089	0.0115	0.0098	0.0101	0.0094	0.0087	0.0114
F Test of Excluded Instrument	[6.32]***	[7.71]***	[5.83]**	[2.89]*	[6.69]***	[6.42]***	[7.60]***	[5.89]**	[2.83]*	[6.81]***
Overidentification Test										
Hansen J statistic	0.768	0.480	0.698	0.319	0.669	0.146	0.042	0.075	0.123	0.085
Panel D, Second Stage of LIML										

Trade Credit	1.435	1.321	1.207	1.236	1.384	0.021	0.164	0.015	0.022	0.060
	(1.283)	(1.257)	(1.398)	(1.690)	(1.159)	(0.715)	(1.101)	(0.844)	(1.296)	(0.627)
Included Control Variables										
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,263	1,252	1,249	870	1,225	1,250	1,240	1,236	859	1,213

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variable are not reported to save space (available upon request). The first Stage of TSLS contains same controls as the second stage but results of these control variables are not reported to save space (available upon request). In Panel D, the limited information maximum likelihood (LIML) regressions include the same control variables as those in the corresponding two-stage-least-squares (TSLS) regressions but results of these control variables are not reported to save space (available upon request).

Table 8: Robustness Check I, Alternative Identification Strategy

	1	2
Dependent Variable	Labor Productivity	ROA
Trade Credit	3.845	3.924
	(2.281)	(4.745)
External Finance Dependence	-2.269	-4.362
	(1.867)	(5.469)
Trade Credit * External Finance Dependence	-3.906	3.383
	(2.696)	(4.104)
Included Control Variables		
Firm Characteristics	Yes	Yes
Gm Characteristics	Yes	Yes
City Characteristics	Yes	Yes
Number of Observations	1,265	1,252
R-squared	0.3015	0.0299
F-test	62.28	27.01
p-value for F-test	0.0000	0.0000

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variable are not reported to save space (available upon request).

Table 9: Robustness Check II, Outliers

	1	2
Panel A, Second Stage of TSLS		
Dependent Variable	Labor Productivity	ROA
Trade Credit	0.969	0.195
	(1.132)	(0.172)
Panel B, First Stage of TSLS: Dependent Variable is Trade Credit		
Relationship	0.248**	0.233**
	(0.090)	(0.092)
Delay	0.001***	0.001***
	(0.000)	(0.000)
Panel C, Various First-Stage Statistics Tests		
Relevance Test		
Anderson Canonical Correlations LR Statistic	[11.48]***	[9.77]***
Cragg-Donald Wald Statistic	[14.51]***	[12.33]***
Weak Instrument Test		
Shea Partial	0.0126	0.0112
F Test of Excluded Instrument	[8.89]***	[7.54]***
Overidentification Test		
Hansen J statistic	0.249	0.186
Panel D, Second Stage of LIML		
Trade Credit	0.976	0.196
	(1.152)	(0.173)
Included Control Variables		
Firm Characteristics	Yes	Yes
Gm Characteristics	Yes	Yes
City Characteristics	Yes	Yes
Number of Observations	1,170	1,111

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variables are not reported to save space (available upon request). The first Stage of TSLS contains same controls as the second stage but results of these control variables are not reported to save space (available upon request). In Panel D, the limited information maximum likelihood (LIML) regressions include the same control variables as those in the corresponding two-stage-least-squares (TSLS) regressions but results of these control variables are not reported to save space (available upon request).

Table 10: Robustness Check III, Subsample

	1	2
Panel A, Second Stage of TSLS		
Dependent Variable	Labor Productivity	ROA
Trade Credit	-0.108	0.425
	(0.710)	(0.549)
Panel B, First Stage of TSLS: Dependent Variable is Trade Credit		
Relationship	0.372***	0.370***
	(0.129)	(0.128)
Delay	0.001	0.001
	(0.001)	(0.001)
Panel C, Various First-Stage Statistics Tests		
Relevance Test		
Anderson Canonical Correlations LR Statistic	[6.86]**	[6.82]***
Cragg-Donald Wald Statistic	[12.06]***	[12.09]***
Weak Instrument Test		
Shea Partial	0.0140	0.0141
F Test of Excluded Instrument	[5.74]**	[5.69]**
Overidentification Test		
Hansen J statistic	0.619	0.199
Panel D, Second Stage of LIML		
Trade Credit	-0.132	0.426
	(0.736)	(0.550)
Included Control Variables		
Firm Characteristics	Yes	Yes
Gm Characteristics	Yes	Yes
City Characteristics	Yes	Yes
Number of Observations	665	660

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variables are not reported to save space (available upon request). The first Stage of TSLS contains same controls as the second stage but results of these control variables are not reported to save space (available upon request). In Panel D, the limited information maximum likelihood (LIML) regressions include the same control variables as those in the corresponding two-stage-least-squares (TSLS) regressions but results of these control variables are not reported to save space (available upon request).

Table 11: Explanation I, Buyer Credit Effect

	1	2
Panel A, Second Stage of TSLS		
Dependent Variable	Labor Productivity	ROA
Trade Credit	1.252	-0.001
	(1.131)	(0.687)
Buyer Credit	-0.048	-0.045
	(0.146)	(0.098)
Panel B, First Stage of TSLS: Dependent Variable is Trade Credit		
Relationship	0.222**	0.220**
	(0.085)	(0.084)
Delay	0.001***	0.001***
	(0.000)	(0.000)
Panel C, Various First-Stage Statistics Tests		
Relevance Test		
Anderson Canonical Correlations LR Statistic	[11.04]***	[10.82]***
Cragg-Donald Wald Statistic	[13.90]***	[13.64]***
Weak Instrument Test		
Shea Partial	0.0110	0.0109
F Test of Excluded Instrument	[7.19]***	[7.20]**
Overidentification Test		
Hansen J statistic	0.299	0.097
Panel D, Second Stage of LIML		
Trade Credit	1.269	-0.001
	(1.156)	(0.688)
Included Control Variables		
Firm Characteristics	Yes	Yes
Gm Characteristics	Yes	Yes
City Characteristics	Yes	Yes
Number of Observations	1,254	1,241

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variables are not reported to save space (available upon request). The first Stage of TSLS contains same controls as the second stage but results of these control variables are not reported to save space (available upon request). In Panel D, the limited information maximum likelihood (LIML) regressions include the same control variables as those in the corresponding two-stage-least-squares (TSLS) regressions but results of these control variables are not reported to save space (available upon request).

Table 12: Explanation II, Growth Potential Effect

	1	2
Dependent Variable	Labor Productivity	ROA
Trade Credit	0.480***	0.196*
	(0.128)	(0.108)
Average Labor Productivity in the past Three years	0.000	0.000
	(0.000)	(0.000)
Included Control Variables		
Firm Characteristics	Yes	Yes
Gm Characteristics	Yes	Yes
City Characteristics	Yes	Yes
Number of Observations	1,284	1,272
R-squared	0.3267	0.0302
F-test	108.85	10.32
p-value for F-test	0.0000	0.0000

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variable are not reported to save space (available upon request).

Table 13: Explanation III, Size Effect

	1	2	3	4
Sample	Large Firm	Small Firm	Large Firm	Small Firm
Dependent Variable	Labor Productivity		ROA	
Trade Credit	0.524***	0.528***	-0.019	0.427**
	(0.133)	(0.169)	(0.060)	(0.190)
Included Control Variables				
Firm Characteristics	Yes	Yes	Yes	Yes
Gm Characteristics	Yes	Yes	Yes	Yes
City Characteristics	Yes	Yes	Yes	Yes
Number of Observations	641	685	636	677
R-squared	0.3462	0.2516	0.0335	0.0494
F-test	146.03	58.42	69.18	2.18
p-value for F-test	0.0000	0.0000	0.0000	0.0648

Robust standard errors, clustered at city level, are presented in the round bracket. *, **, *** represent significance at 10%, 5%, 1% level respectively. Constant terms are included in the regressions but results are not reported to save space (available upon request). All regressions include the control variables related to firm characteristics, GM characteristics and city characteristics as in Table 4 but results of these control variable are not reported to save space (available upon request).

Appendix: Comparison of Key Variables between Firms Supplied By the Relatives of the Firm Owners and Those not Supplied

	1 Firms not supplied by the relatives of the firm owners	2 Firms supplied by the relatives of the firm owners	3 Difference
Labor Productivity	4.360	4.002	0.359***
	(0.040)	(0.151)	(2.79)
	[1392]	[165]	
ROA	0.050	0.574	-0.524***
	(0.046)	(0.520)	(-2.34)
	[1378]	[166]	
Trade Credit	0.353	0.418	-0.064*
	(0.010)	(0.048)	(-1.41)
	[1297]	[71]	
Percentage of Private Ownership	0.818	0.774	0.043*
	(0.010)	(0.031)	(1.41)
	[1397]	[169]	
Firm Size	5.076	4.742	0.335***
	(0.038)	(0.122)	(2.82)
	[1395]	[168]	
Firm Age	2.495	2.487	0.008
	(0.021)	(0.062)	(0.13)
	[1397]	[169]	
Loan	0.283	0.187	0.096***
	(0.012)	(0.030)	(2.64)
	[1374]	[166]	
Government Representative in the Board	0.160	0.130	0.029
	(0.010)	(0.026)	(1.00)
	[1397]	[169]	
Education	14.37	14.28	0.091
	(0.068)	(0.175)	(0.44)
	[1385]	[168]	
Years of Being GM	6.180	6.744	-0.564*
	(0.122)	(0.376)	(-1.49)
	[1384]	[164]	
Depute GM Before	0.281	0.249	0.032
	(0.012)	(0.033)	(0.88)

	[1397]	[169]	
Government Cadre	0.033	0.053	-0.020*
	(0.004)	(0.017)	(-1.36)
	[1397]	[169]	
Party Membership	0.238	0.249	-0.010
	(0.011)	(0.033)	(-0.29)
	[1397]	[169]	
Government Appointment	0.657	0.663	-0.006
	(0.013)	(0.036)	(-0.14)
	[1397]	[169]	

In Columns 1-2, standard deviation and number of observations are reported in the round bracket and square bracket respectively below the mean. In Column 3, t-statistic is reported in the round bracket below the mean difference. *, **, *** represent significance at 10%, 5%, 1% level respectively.