Customer Relationships and the Provision of Trade Credit during a Recession

TSURUTA Daisuke

National Graduate Institute for Policy Studies

RIETI

Research Institute of Economy, Trade & Industry, IAA

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Daisuke Tsuruta[*]

National Graduate Institute for Policy Studies

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Abstract

We investigate the effect of close customer relationships on small firms' provision of trade credit during the 2001–2003 recession in Japan. Many studies argue that close customer relationships are costly for suppliers because when their main customer has a high proportion of the firm's total sales, suppliers cannot easily find alternative customers. As a result, the supplier's bargaining position is weaker. Then suppliers that depend largely on their main customer cannot easily reduce their provision of trade credit, despite the need to do so during a recession. The results in our paper indicate that close customer relationships are not costly for suppliers in trade credit contracts. First, small businesses offer less trade credit, even if the proportion of sales to their main customers is high. Second, suppliers offer less trade credit if they are in financial distress and charged higher interest rates by banks, even when they are dependent on their main customers. Third, highly leveraged dependent suppliers reduce trade credit, unlike highly leveraged independent suppliers. This implies that dependent suppliers can cut back on trade credit in the presence of leverage. These findings imply that close customer relationships are beneficial for suppliers.

JEL classification : G32, L22.
Keywords : Trade Credit; Customer–Supplier Relationship; Bargaining Power; Small Business.

1. Introduction

We investigate whether small businesses can reduce their provision of trade credit if they face a liquidity shortage or severe financial stress. We focus on the effect of close customer relationships on small firms' provision of trade credit. Trade credit is one of the largest sources of finance for firms that are customers of the firms supplying credit. In general, trade partners offer unsecured credit to their customers, so they incur large losses if their customers default. As a result, many nonfinancial firms offer trade credit and monitor the credit standing of their customers accordingly. The provision of trade credit is then costly for firms as it reduces the availability of working capital. Therefore, it is natural that creditworthy firms offer more credit than smaller less creditworthy firms. However, many studies suggest that not only creditworthy firms but also small and credit-constrained firms offer large amounts of trade credit (Marotta (2005)). There are several reasons for firms to continue to offer trade credit, even when they face financial constraints. For instance, several studies focus on the closer relationships between suppliers and customers (Wilson and Summers (2002), Fisman and Raturi (2004), and Burkart et al. (2009)). Importantly, where small businesses are highly dependent on a single main customer, they cannot easily find other customers. Therefore, these businesses depend heavily on their main customers and some of these customers may have bargaining power. Large customers especially have bargaining power, so they may delay repayment to suppliers, particularly during periods of severe financial distress ((Wilner (2000), Cunat (2007)). Furthermore, if suppliers require cash payments and reduce trade credit to their main customers, these customers may switch their transactions to other suppliers who offer more credit. Suppliers then have an

incentive to maintain the customer–supplier relationships. As a result, they do not cut back on credit, even if they are credit constrained or suffering from a liquidity crisis. Alternatively, if the main customers have an incentive to maintain a relationship with their dependent suppliers, they pay more promptly so as to create cash flow for the suppliers (Banerjee et al. (2004)). Similarly, where the main customers also face difficulties finding alternative suppliers, they help their suppliers by cutting off trade credit. These imply that customer relationships are beneficial for suppliers. As a result, dependent suppliers can cut back on trade receivables when they face a liquidity shortage or severe financial stress.

Many studies also investigate whether small businesses use trade payables when they face liquidity shocks (Cunat (2007)) or a deterioration in the availability of bank loans (Petersen and Rajan (1994)). However, few of these investigate whether small businesses can reduce their trade receivables when they have severe financial constraints. Additionally, although many papers argue that comparative bargaining strength matters in trade credit contracts, they focus on the cost of the customer–supplier relationship. We use Japanese small business data to investigate the provision of trade credit during the recession running from 2001 to 2003. In this period, the real growth rate of GDP in Japan dropped to around 0.2% in 2001 and 0.3% in 2002, althoughthe growth rate in 2001 was 2.9%. After 2003, the real GDP growth rate was enhanced to around 2%.

In periods of recession, financial constraints in many firms are severe because cash flow decreases and the availability of bank loans falls. In these periods, suppliers attempt to reduce the provision of trade credit, but customers seek to retain their present level of credit. If close customer–supplier relationships are costly for suppliers in trade

credit contracts, dependent suppliers in a weak bargaining position cannot reduce their provision of trade credit, despite their need to do so. If close customer–supplier relationships are beneficial for suppliers, dependent suppliers can reduce the provision of trade credit to mitigate the liquidity shortage. Our empirical questions are then as follows. First, can suppliers reduce credit provision if they face liquidity shocks? Second, do suppliers that depend more on their main customers offer more trade credit during a recession? Finally, do dependent suppliers maintain the provision of trade credit to their main customers, even when they face severe financial stress themselves? Our findings are as follows. First, suppliers offer less trade credit to customers if they are in financial distress and their banks charge higher interest rates. Suppliers also reduce their provision of trade credit if they have lower cash holdings. These results suggest that small businesses can alter their provision of trade credit if they face a liquidity shortage or severe financial stress. Second, the results are similar if we limit the sample to highly dependent suppliers, though this is inconsistent with the usual theory of bargaining power. In addition, small businesses offer less trade credit if the proportion of their sales to their main customers to total sales is higher in more severe recessions. Third, highly leveraged dependent firms reduce their trade credit, unlike highly leveraged independent firms. This implies that dependent firms can cut back on trade credit in the presence of high leverage. Our results thereby support the contention that closer customer–supplier relationships are beneficial.

Many previous papers have investigated the effects of close customer–supplier relationships and the provision of trade credit. For example, Wilson and Summers (2002), Fisman and Raturi (2004), Van Horen (2004), Fabbri and Klapper (2008), and Burkart et al. (2009) argue that suppliers offer more trade credit because their main

customers have bargaining power. Also, Cunat (2007) found that suppliers offer more trade credit to maintain their relationships if customers struggle with liquidity shocks. Conversely, Banerjee et al. (2004) found that the provision of trade credit for customers decreases with the proportion of sales accounted for by principal customers. This is inconsistent with the theory of bargaining power in trade credit contracts. Our analysis also does not support this theory. Instead, our findings support the argument of a benefit of close relationships between suppliers and customers. Given that we use data on small business credit behavior during a severe recession, our results are also robust. Our study suggests that dependent suppliers are not in a weak bargaining position. This is because if it is also costly for customers to find alternative suppliers, dependent suppliers can reduce trade credit to their customers. The results imply that the main customers cut back on trade credit from dependent suppliers that face a liquidity shortage or severe financial stress because they need to retain their close relationship.

This paper is organized as follows. In section 2, we review the theoretical and empirical literature on trade credit. In section 3, we explain our hypothesis about the provision of trade credit. We describe our dataset in section 4 and discuss the empirical results in sections 5 and 6. Section 7 concludes the paper.

2. Previous Studies

Many studies investigate whether nonfinancial firms use trade credit if they have limited access to other sources of finance. Cunat (2007) found that suppliers offer more trade credit to maintain their relationships if customers struggle with liquidity shocks. Conversely, Banerjee et al. (2004) investigate the effect of financial crises on trade credit in emerging economies. They find that bank credit moves from financially

stronger firms to weaker firms by using trade credit. Ono (2001), Uesugi (2005), and Tsuruta (2008) use Japanese data to investigate whether trade credit increases when bank loans fall. Cunat (2007) argue that firms in the UK use more trade credit when they face a liquidity shortage.

As Miwa and Ramseyer (2008) argue, firms have a variety of ways of adjusting to financial shocks apart from using trade credit. One way is cutting trade receivables. As previous work has indicated, however, suppliers with weak bargaining power do not cut back on credit in order to maintain relationships with their customers. For example, Wilner (2000) suggests that when customers fall into financial distress, suppliers that depend on these customers make more concessions in their debt renegotiations.[1] Furthermore, Cunat (2007) shows that suppliers offer more trade credit in periods when customers face temporary liquidity shocks. They assert that suppliers are insurance providers given it is costly for them to lose their current customers. Together, these imply that small businesses increase trade debt instead of cutting trade credit to their customers. In addition, close relationships with customers are costly for small businesses.

Many studies investigate the relationship between bargaining strength and the provision of trade credit. Wilson and Summers (2002) show that firms in a sufficiently strong bargaining position (for example, larger firms, and buyers that dominate markets) are offered discounted credit terms. Also, the results of Summers and Wilson (2003) show that firms offer more credit to customers with a strong bargaining position. Using data from 42 developing countries, Van Horen (2004) shows that suppliers sell more on

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[1]Alternatively, Tsuruta and Xu (2007) show that suppliers reduce the amount of trade credit for financially distressed customers.

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credit if the percentage of domestic sales sold to multinationals and to large domestic firms is higher.

Fisman and Raturi (2004) use data from five African countries and shows that there is a positive relationship between monopoly power and credit provision. Van Horen (2007), using data from Eastern Europe and central Asia, found that if suppliers sell at least 20% of total sales to their three largest customers, they offer more credit. From these results, they insist that customer market power has a positive effect on trade credit provision. Burkart et al. (2009), using the National Survey of Small Businesses Finance (NSSBF) in the US, found that customers with bargaining power, which are large firms or firms in concentrated sectors, receive more trade credit on generally better terms. Fabbri and Klapper (2008) show that suppliers with relatively weaker market power offer more trade credit using firm-level data in China. Contrary to these studies, Banerjee et al. (2004) show that the provision of trade credit for customers decreases in proportion to the sales accounted for by principal customers, which is not consistent with the usual theory of bargaining power. Also, McMillan and Woodruff (1999) argue using Vietnamese data that customers that have difficulty finding alternative suppliers offer more credit. Molina and Preve (2009) investigate the trade receivables policy of distressed firms. They show that suppliers in financial distress seek to reduce trade receivables because of their cash flow problems.

Many studies insist that the cost of trade credit is extremely high, which is called the "2-10 net 30" contract (Ng et al. (1999)). Cunat (2007) and Wilner (2000) explain that as suppliers cannot reduce trade credit for their customers, even if they fail to pay because of financial distress, they offer higher interest rates to compensate for the cost of default. However, Miwa and Ramseyer (2008) show that suppliers do not only offer

the "2-10 net 30" contract and that the cost of trade credit is not extremely high. Marotta (2005) also does not support the higher cost of trade credit.

3. Hypothesis

The provision of trade credit to customers is costly for suppliers, as they must finance all trade receivables until maturity. If the borrowing constraint is binding for customers, they must reduce their working capital and may therefore reduce inventory investment. In addition, they carry default risk and so suppliers must frequently monitor their customers' creditworthiness, which suggests that they bear the monitoring costs. Therefore, as Petersen and Rajan (1997), Molina and Preve (2009), and Rodr´iguez-Rodr´iguez (2006) show, creditworthy firms offer more trade credit and firms in distress reduce trade credit for their customers. This suggests that if firms face liquidity shocks or a reduced supply of credit (for example, banks charge higher interest rates), they have every incentive to reduce trade credit to their customers.

However, customers also have to find alternative sources of finance if their suppliers reduce trade credit. Especially in periods of monetary tightening, it is difficult for customers to find alternative financing sources. Therefore, the reduction of trade credit depends on customer–supplier relationships, especially whether the suppliers have a stronger bargaining position. If suppliers have alternative customers and do not suffer large losses from losing some current customers, they can easily demand cash payment and reduce trade credit to their customers in the presence of a liquidity shortage. In particular, when customers have an incentive to retain their relationship with their supplier, they offer to cut back on trade credit from the supplier to ease the liquidity

shortage. On the other hand, if suppliers expect to make large losses if they were to cease transactions with their current customers, they cannot offer to reduce the provision of credit. If suppliers offer cash payment, customers that have alternative suppliers may switch to more creditworthy suppliers. In this case, the customers have a strong bargaining position. Many studies (for example, Wilner (2000)) show that the degree of dependence on sales to customers determines bargaining strength. If suppliers sell a large proportion of their products or services to their main customers, they suffer large losses if they lose these transactions. This suggests that customers with a larger share of total sales have relatively stronger bargaining power.

We consider several hypotheses. First, we investigate whether suppliers are less likely to reduce trade credit to their customers, even in recessionary periods. If close customer–supplier relationships are costly for suppliers, those that depend on their main customers reduce trade credit less in that period. Second, if close customer–supplier relationships are costly for suppliers, they reduce credit to customers without a close customer–supplier relationship, but less than in the presence of financial distress or a reduction in bank loans. Following earlier work (for example, Banerjee et al. (2004)), we use the ratio of sales for the largest customer to total sales as a proxy for the closeness of the customer–supplier relationship.

4. Data

We used data on small businesses from the "2001 Survey of Corporate Procurement," the "2002 Survey of the Financial Environment," and the "2003 Survey of the Corporate Financial Environment" (hereafter, SFE) conducted by the Small and Medium Enterprise Agency of Japan. These data include many "small and medium

enterprises" (SMEs) defined under the Small and Medium Enterprise Basic Law in Japan.[2] These surveys extract random samples from the Tokyo Shoko Research Database and send questionnaires to selected firms. There were 7,656 firms surveyed in 2001 and 8,446 in 2002. The median number of employees is 38, the first quartile is 17 employees, and the third quartile is 93 employees.

These surveys asked questions related to the transactions and financing of small businesses. One of the questions in the Survey of the Financial Environment asked the ratio of sales to the main customer to total sales. In this survey, respondents selected one of the following seven answers: less than 20%, between 20% and 40%, between 40% and 60%, between 60% and 80%, between 80% and 100%, and 100%. We use this ratio as the proxy for the closeness of the relationship. The number of firms which answered the question relating to the ratio of sales to the biggest customer to total sales was 7,381. In addition, we have data on about 3,754 firms in 2003 and 3,077 firms in 2001. These surveys also provide financial information on the small businesses. Nine industrial classifications are included: construction, manufacturing, transportation, information and communications, wholesale trade, retail trade, real estate, restaurants, and services. In table 1, we show the distribution of percentage of sales to the main customer. According to this table, many firms do not depend largely on their main customer. The share of sales to such customers was less than 20% in 47.85% of firms. If we limit the study to firms that employ five workers or less, that percentage is 29.41%. On the other hand, the number of firms with a high dependence ratio is not significant. The share of sales is 60% or more in 16.32% of firms, and 2.34% of firms are completely dependent on a single customer so that the percentage of such sales is 100In table 2, we show the

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[2]About 10% of the combined sample are large firms and the rest are SMEs.

median ratios of trade receivables, cash holdings, trade payables, and short-term borrowings to total assets. According to this table, the ratio of trade receivables to total assets is about 21% to 24%, which is larger than the ratio of cash holdings. Also, this ratio is larger than the ratios of trade payables and short-term borrowings. These findings show that collecting trade receivables is a large financial source for small businesses.

5. The Determinants of Trade Receivables

5-1. Empirical Strategy

In this paper, we estimate the following regression.

$$\text{Trade Receivables}_{it} = \alpha_1 \text{Customer Relationships}_i + \alpha_2 \text{Creditworthiness}_{it} \tag{1}$$

$$+ \alpha_3 \text{Interest Rate}_{it} + X_{it} + \varepsilon_{it}$$

X = (Firm Scale, Firm Age, Firm Performance, Industrial Dummies, Year Dummies).

Following Petersen and Rajan (1997), we use the ratio of trade receivables to sales as a proxy for trade receivables, meaning the period of trade credit offered by the supplier. If suppliers with close relationships with their customers do not decrease trade credit during the recession, they offer credit for longer periods and the ratio will be larger. In addition, they do not shorten the period of trade credit if their bargaining position is weak.

We use the percentage of sales for the main customer (defined as those purchasing the largest share of total sales) as the proxy for customer relationships. Suppliers suffer

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large losses if the customer that purchases the largest share of the supplier's total sales stops buying. Therefore, such customers have strong bargaining power and suppliers make every effort to maintain relationships with their main customers. On the other hand, if the share of the main customer is smaller, the supplier incurs little loss if the relationship is broken. We predict that the percentage of sales has a positive effect for trade receivables if close relationships with suppliers are costly for suppliers. However, if dependent suppliers are not in a weak bargaining position and the close relationships with suppliers are beneficial for customers, the percentage of sales has a negative effect on trade receivables.

Petersen and Rajan (1997) show that creditworthy firms and firms with easy access to financing offer more trade credit. Similarly, we hypothesize that creditworthy firms offer more trade credit. Firms with low credit availability do not have an incentive to offer trade credit because provision is costly. Therefore, we predict that firms facing higher interest rates offer less trade credit. We use firm scale, firm age, and firm performance as control variables. For example, Long et al. (1993) show that younger firms offer more credit to allow customers to evaluate the quality of their product prior to payment. Following these results, we expect the coefficient of firm age to have a negative effect on trade credit. We also predict that better-performing firms offer more credit.

To investigate whether small businesses reduce their trade receivables, we also employ an estimation using the annual change in trade receivables.

$$\text{Annual Change in Trade Receivables}_{it} = \beta_1 \text{Customer Relationships}_i \qquad (2)$$

$$+\beta_2 \text{Creditworthiness}_{it} + \beta_3 \text{Interest Rate}_{it} + \beta_4 \text{Liquidity}_{it} + Z_{it} + \zeta_{it}$$

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Z = (Firm Scale, Firm Age, Firm Performance, Industrial Dummies, Year Dummies).

We use the annual change in the trade receivables to sales ratio as the dependent variable. If their customers' bargaining position matters, suppliers with close customer relationships do not shorten the period of trade credit. The proxy for customer relationships is the same as in equation (2). We predict that firms with lower liquidity reduce their provision of trade credit, as they need more cash holdings. Some variables are not available for all samples. In addition, when variables include outliers, we truncate them at the 0.5 or 99.5 percentiles of the sample. The sample size is 10,321 in equation (1) and 4,913 in equation (2). We provide summary statistics for each variable in table 3. The definition of each variable is in the appendix.

5-2. Results of Trade Receivables–Sales Ratio

We show the results of ordinary least squares (OLS) using the trade receivables–sales ratio as the dependent variable in table 4. We use capital deficiency and interest rates as proxies for creditworthiness, and return on assets (ROA) and sales growth as proxies for firm performance. In columns (1) and (2), we provide estimates of the dummy variables for the percentage of sales to the main customer. The reference category is when the percentage of sales to the main customer is "less than 20%." The effects of the dummy variables for "20%–40%" and "40%–60%" are negative, but not statistically significant. However, the effects of the dummy variables for "60%–80%," "80%–100%," and "100%" are negative and statistically significant at the 1% level. Moreover, the magnitudes of the dummy variables for the dependence on main customers are larger as suppliers depend more on sales to their main customers. In column (3) of table 4, we

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also estimate dummy variables with a value of 1 if the percentage of sales to the main customers is 40% or more; zero otherwise. The results are still statistically negative at the 1% level. In addition, the results are similar if we change the dummy variable to have a value of 1 if the percentage of sales to main customers is 60% or more (column (4)). If suppliers with close relationships offer more credit because of a weak bargaining position, the effects of dependence on the main customer must be statistically positive. However, our results show that suppliers that depend on the main customer offer less trade credit, suggesting that the cost of a close relationship with the main customers does not matter for suppliers. [3]

As discussed, we estimate the effects of several variables. The results are consistent with our argument in the absence of controls for firm performance. The effect of *ln*(asset) is positive while the effect of interest rates is negative; both are statistically significant at the 1% level. Generally, larger firms and firms that can borrow at lower interest rates are more creditworthy. In addition, capital deficiency has a negative effect and is statistically significant at either the 1% or 10% level. We interpret this as meaning that more financial distressed firms offer less trade credit. In addition, firm age has a negative effect on the trade receivables–sales ratio. This suggests that younger firms offer more credit to mitigate the problem of information asymmetry. The coefficients for ROA are negative and statistically significant at the 1% level. If we add sales growth as a proxy for firm performance, the coefficient for ROA becomes statistically significant at the 5% level and sales growth significantly negative at the 1% level (column (2)). Similar to Petersen and Rajan (1997),, our results suggest that firms

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[3]We also estimate the effects of the length of the relationship with main customers as a proxy for customer relationships, similar to Uchida et al. (2006). These effects are not statistically significant, suggesting that the length of the relationship has little effect on the provision of trade credit.

with declining sales extend credit to their customers to maintain sales. Moreover, firms with increasing sales reduce their provision of trade credit because they need the cash for inventory investment. [4]

5-3. Results of Trade Receivables–Sales Ratio Differences

In table 5, we specify the annual change in the trade receivables–sales ratio as the dependent variable. We use the annual change in the interest rate and leverage as proxies for firm creditworthiness. In addition, we add the cash–total assets ratio because cash-rich firms can better extend trade credit. Sales growth and the annual change in ROA are proxies for firm performance. We also include firm age and scale as control variables.

The variables representing dependence on the main customer are the same as in table 4. In column (1) of table 5, we regress the effects of each dummy variable for dependence. In columns (2) and (3), we change the dummies to "40% or more" or "60% or more". If suppliers with close relationships cannot reduce trade credit for their customers even during the recession, the effects of dependence on the main customer must be statistically positive. However, our empirical results do not support this view. The result of column (1) shows that the coefficients of dependence dummies are statistically insignificant. These results are similar if we change the dummy variables for dependence on the main customer (in columns (2) and (3)). These results suggest that suppliers with greater dependence on their main customer do not increase trade credit more during the recession, implying that suppliers with close relationships are not

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[4] Also, the trade receivable-sales ratio for firms with sales decline might be over-biased because of the lag between the decrease in trade receivables and the decrease in sales.

in a weaker bargaining position.[5]

The results for the control variables indicate that uncreditworthy firms reduce trade credit provision. Leverage has a statistically significant negative effect on the annual change in the trade receivables–sales ratio. This is because highly leveraged firms are more likely to default and cannot borrow easily, so they are in a tight financial condition. Thus, highly leveraged firms reduce trade credit provision for their customers. The coefficients for the annual change in interest rates are negative and statistically significant at the 5% level. This is consistent with our hypothesis that suppliers that pay higher interest rates reduce trade credit more. In addition, firms with lower cash holdings also reduce trade credit. This is because they do not have enough cash to pay off their current liabilities and so they have an incentive to reduce credit to increase their cash holdings. The annual change in ROA has a positive effect, suggesting that better-performing firms increase trade credit. However, similar to the result in table 4, sales growth has a negative effect on the increase in trade credit. This also shows that firms with declining sales extend trade credit to maintain relationships. The effects of *ln*(assets) and *ln*(1+age) are not statistically significant.

5-4. Robustness Check

In the previous subsection, we showed that suppliers with greater dependence on their main customer offer less trade credit. Given the regression includes the entire sample, many affiliated firms may be included. In this situation, affiliated firms may largely depend on their sales to the parent company, and so our results may be affected by the inclusion of these firms in the sample. Unfortunately, ownership data is unavailable so

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[5]Similar to the result in table 4, the length of the relationship has little effect on the annual change in trade

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we cannot identify which firms are affiliated. However, we can identify some firms as nonaffiliated firms. The 2003 SFE questions firms about the amount of capital from other firms in the establishment. Firms without financing from other firms are considered nonaffiliated and so we limit the analysis to these firms. We regress equation (1) and equation (2) using the subsample of nonaffiliated firms. The results are shown in tables 6 and 7

Table 6 shows the results for the trade receivables–sales ratio. The coefficients on the dummy variables for dependence are not statistically significant (columns (1) and (2)). If we change the definition of the dummy variables for dependence, the effects of dependence has a negative effect on the trade receivables–sales ratio, but it is not statistically significant (columns (3) and (4)). These results suggest that suppliers that depend on their main customers do not offer more trade credit, even if we limit our analysis to nonaffiliated firms. The results for the other variables are similar to those in table 4. The results in table 6 suggest that financially distressed firms, firms with higher interest rates, and smaller firms offer less trade credit to their customers. In contrast, poorly performing firms offer more credit.

Table 7 provides the results for the annual change in the trade receivables–sales ratio. The dummy variables indicating the percentage of sales to the main customer are statistically insignificant (column (1)). If we use dummy variables for when the percentage of sales to the main customer is 40% or 60% and more, the effects of dependence on the main customers are negative but statistically insignificant (columns (2) and (3)). These results also suggest that firms that depend on their main customers do not increase trade receivables more in the recession, even if we limit ourselves to

credit provision.

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nonaffiliated firms.

6. Customer Relationships and Economic Shocks

6-1. Empirical Strategy

We find that the size of the ratio of sales to main customers has a negative effect on the trade receivables–sales ratio. However, these results may be misleading because of omitted variable bias. First, we do not control for the effects of the characteristics of customers because such data are unavailable. If customers are creditworthy, they pay cash sooner than uncreditworthy customers. Therefore, the error term (ε_{it}) includes the effect of customer characteristics. If dependent suppliers have a relationship with more creditworthy customers, the error term may be correlated with the ratio of sales to main customers, implying that α is biased because of endogeneity. To mitigate the endogeneity problem, we use fixed effects estimation. The main customer does not change frequently and so we can assume that the time-invariant effects include customer characteristics. In our dataset, however, the ratio of sales for main customers is also time-invariant; thus, we cannot estimate the fixed effects model to estimate the coefficient of the ratio of sales to the main customer. We then have to adopt another empirical strategy to investigate the effects of bargaining power and mitigate the endogeneity problem.

   In the previous section, we find that uncreditworthy suppliers offer less trade credit to their customers. Suppliers that encounter financial distress and rising interest rates also reduce their provision of trade credit to their customers, as do firms with lower cash holdings. If suppliers with close customer relationships do not reduce the provision of

trade credit in order to maintain these relationships, they reduce their trade credit less than other suppliers. To check this hypothesis, we divide the sample into three groups according to the percentage of sales to the main suppliers and estimate equation (1) after excluding the proxies for customer relationships for each group using the fixed effects model. By dividing the sample and using the fixed effects model, we mitigate the problem of endogeneity.

6-2. Results

6-2-1. The level of trade receivables ratio

In table 8, we use the trade receivables–sales ratio as a dependent variable. In column (1), we use the sample of firms that depend on their main customers less than 20%: that is, those in a weak relationship with their customers. Similar to the results in table 4, larger firms and firms with a lower ROA offer more trade credit. These results suggest that firms with lower profitability offer more trade credit, but they do not suggest that uncreditworthy firms offer less trade credit because of financial constraints. In column (2), we use the sample of firms whose percentage of sales to their main customers is 20%–40%. The results suggest that suppliers with high interest rates and smaller suppliers offer less trade credit, whereas firms with a capital deficiency offer more credit.

Dependent and uncreditworthy firms offer less credit, whereas independent and uncreditworthy firms do not offer less credit. In column (3), we use the sample of firms that depend largely on their main customers, that is, the percentage of their sales to the main customer is 40% or more. The results of capital deficiency and interest rates are

significantly negative at the 1% or 10% level, suggesting that dependent and uncreditworthy firms offer less trade credit. Similar to column (1), the effect of ROA is negative. These suggest that firms with lower performance offer more credit to maintain relationships with their customers. *Ln*(asset) gives similar results to those in columns (1) and (2). If dependent suppliers offer credit to maintain relationships with their main customers, they offer more credit even though banks charge higher interest rates and they suffer a capital deficiency (column (3)). These results are inconsistent with the theory of bargaining power and consistent with the notion of a benefit from close customer relationships.

6-2-2. The annual change in the trade receivables ratio

The results for the annual change in the trade receivables–sales ratio for each group are shown in table 9. The F-test for individual effects is not statistically significant and so we use the OLS model in table 9. The coefficients for sales growth and cash holdings are similar to the results in table 5: this does not depend on the percentage of sales to the main customer. The result for leverage differs between each group. If we limit ourselves to dependent suppliers, the effects of leverage are negative and statistically significant. This indicates that dependent suppliers with decreasing sales increase the provision of trade credit for their customers. Although we do not have data about trade receivables and sales for all customers, total sales could be a proxy for sales to main customers where the percentage of sales is high. We conclude that if sales to the main customers are decreasing, suppliers offer more trade credit. This fits the account of Petersen and Rajan (1997). However, if dependent suppliers encounter financial distress, they reduce the provision of trade credit to their customers, whereas independent suppliers do not.

As mentioned in Molina and Preve (2009), the cost of the provision of trade credit is higherif suppliers face financial distress. Therefore, they reduce trade credit despite their dependence. These results support the existence of a benefit of close customer relationships for suppliers. [6]

7. Conclusion

We investigate whether close customer relationships are costly or beneficial in trade credit contracts. Our results do not support the usual theory of bargaining power and the cost of closeness in customer relationships. First, small businesses offer less trade credit if sales to their main customers represent a higher proportion of total sales during a severe recession. Second, highly dependent firms offer less trade credit if they are in financial distress and charged higher interest rates by their banks. Third, highly leveraged dependent firms reduce trade credit unlike highly leveraged dependent firms. This implies that independent firms cut back on trade credit when they have high leverage, suggesting that close customer relationships are beneficial for suppliers.

Appendix: Definition of Variables

- **Trade Receivables–Sales Ratio** = The ratio of a firm's trade receivables to sales.

- **Annual Change in Trade Receivables–Sales Ratio** = Trade receivables–sales ratio in t+1 to trade receivables–sales ratio in t.

- **Capital Deficiency** = 1 if a firm's capital is negative.

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[6]In addition, the coefficient of *ln*(asset) is significant if we limit the analysis to firms with high dependence (column (2)).

- **Leverage**　= The ratio of a firm's liabilities to total assets.

- **ROA**　= The ratio of a firm's operating income to total assets.

- **Annual Change in ROA**　= ROA in t+1 to ROA in t.

- **Sales Growth**　= The annual growth rate of a firm's sales (Δ sales/total sales).

- **Cash–Total Assets Ratio**　= The ratio of a firm's cash holdings to total assets.

- **Total Assets–Sales Ratio**　= The ratio of a firm's total sales to assets.

- **Interest Rates**　= The ratio of a firm's interest expenses to the sum of its short-term debt, long-term debt, and discounted notes receivable.

- *ln*(**Assets**)　= Natural log of assets.

- *ln*(**1+Firm Age**)　= Natural log of 1 plus firm age.

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Table 1. The Level of Dependence on the Main Customer

Dependence on the Main Customer	Firm Size: Number of Workers						Total
	–5	6–20	21–50	51–100	101–300	300–	
Less than 20%	120	824	983	650	621	334	3,532
	(29.41)	(42.02)	(49.87)	(51.59)	(52.49)	(55.85)	(47.85)
20%–40%	99	527	487	291	247	96	1,747
	(24.26)	(26.87)	(24.71)	(23.10)	(20.88)	(16.05)	(23.67)
40%–60%	70	290	206	133	131	67	897
	(17.16)	(14.79)	(10.45)	(10.56)	(11.07)	(11.20)	(12.15)
60%–80%	62	156	137	93	81	47	576
	(15.20)	(7.96)	(6.95)	(7.38)	(6.85)	(7.86)	(7.80)
80%–100%	37	116	116	66	76	45	456
	(9.07)	(5.92)	(5.89)	(5.24)	(6.42)	(7.53)	(6.18)
100%	20	48	42	27	27	9	173
	(4.90)	(2.45)	(2.13)	(2.14)	(2.28)	(1.51)	(2.34)
Total	408	1,961	1,971	1,260	1,183	598	7,381
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: "Dependence on the Main Customer" is (Sales for the Main Customer)/(Total Sales)

Table 2. Trade Credit, Cash Holding, and Short-term Borrowings

	Cash Holdings	Trade Receivables	Trade Payables	ST Borrowings
2001	0.1437	0.2292	0.1729	0.1095
2002	0.1450	0.2195	0.1636	0.1088
2003	0.1430	0.2425	0.1772	0.1009
Total	0.1440	0.2304	0.1710	0.1063

Note: We show the median ratio of each assets and debts normalized by total assets.

Table 3. Summary Statistics

A: Dependent Variable=Trade Receivables − Sales Ratio

Variable	N	mean	sd	min	p1	p50	p99	max
Trade Receivables − Sales Ratio	10,321	0.198	0.141	0.000	0.000	0.177	0.614	2.098
20%−40%	10,321	0.240	0.427	0.000	0.000	0.000	1.000	1.000
40%−60%	10,321	0.118	0.323	0.000	0.000	0.000	1.000	1.000
60%−80%	10,321	0.071	0.256	0.000	0.000	0.000	1.000	1.000
80%−100%	10,321	0.052	0.222	0.000	0.000	0.000	1.000	1.000
100%	10,321	0.023	0.149	0.000	0.000	0.000	1.000	1.000
Interest Rates	10,321	0.025	0.018	0.000	0.000	0.023	0.099	0.277
ROA	10,321	0.021	0.057	−0.556	−0.168	0.020	0.182	0.314
Sales Growth	4,246	−0.035	0.220	−1.000	−0.673	−0.037	0.669	2.343
Capital Deficiency	10,321	0.058	0.233	0.000	0.000	0.000	1.000	1.000
ln (Assets)	10,321	14.033	1.535	7.772	10.504	13.983	17.715	20.516
ln (1+Firm Age)	10,321	3.575	0.682	0.000	1.386	3.689	4.836	7.590

B: Dependent Variable=Annual Change in Trade Receivables − Sales Ratio

Variable	N	mean	sd	min	p1	p50	p99	max
Annual Change in Trade Receivables − Sales Ratio	4,913	−0.003	0.068	−0.700	−0.197	−0.002	0.188	1.090
20%−40%	4,913	0.244	0.429	0.000	0.000	0.000	1.000	1.000
40%−60%	4,913	0.112	0.315	0.000	0.000	0.000	1.000	1.000
60%−80%	4,913	0.068	0.252	0.000	0.000	0.000	1.000	1.000
80%−100%	4,913	0.048	0.213	0.000	0.000	0.000	1.000	1.000
100%	4,913	0.019	0.136	0.000	0.000	0.000	1.000	1.000
Annual Change in ROA	4,913	−0.004	0.052	−0.508	−0.177	−0.002	0.153	0.473
Sales Growth	4,913	−0.027	0.206	−0.999	−0.516	−0.036	0.669	2.343
Leverage	4,913	0.745	0.223	0.023	0.206	0.777	1.395	2.425
Cash−Total Assets Ratio	4,913	0.165	0.117	0.000	0.007	0.140	0.545	0.831
Annual Change in Interest Rate	4,913	0.000	0.015	−0.192	−0.031	0.000	0.044	0.238
ln (Assets)	4,913	14.158	1.407	9.079	11.081	14.110	17.622	18.357
ln (1+Firm Age)	4,913	3.698	0.561	0.000	1.946	3.761	4.836	7.590

Table 4. Dependence on the Main Customer and the Trade Receivables Ratio

Dependent Variable	Trade Receivables — Sales Ratio			
	(1)	(2)	(3)	(4)
Capital Deficiency	−0.012*	−0.027***	−0.012*	−0.012*
	(0.006)	(0.010)	(0.006)	(0.006)
ROA	−0.164***	−0.063**	−0.163***	−0.163***
	(0.027)	(0.031)	(0.027)	(0.027)
Sales Growth		−0.041***		
		(0.011)		
Interest Rates	−0.587***	−0.630***	−0.605***	−0.599***
	(0.101)	(0.129)	(0.101)	(0.101)
ln (Assets)	0.021***	0.020***	0.020***	0.021***
	(0.001)	(0.002)	(0.001)	(0.001)
ln (1+Firm Age)	−0.008***	−0.005*	−0.008***	−0.008***
	(0.002)	(0.003)	(0.002)	(0.002)
Percentage of Sales to the Top Customer				
20%–40%	−0.003	−0.004		
	(0.003)	(0.004)		
40%–60%	−0.003	−0.006		
	(0.005)	(0.007)		
60%–80%	−0.026***	−0.032***		
	(0.005)	(0.007)		
80%–100%	−0.031***	−0.031***		
	(0.006)	(0.009)		
100%	−0.069***	−0.062***		
	(0.010)	(0.016)		
40%–			−0.019***	
			(0.003)	
60%–				−0.033***
				(0.004)
Year Dummy (2001)	0.003	0.000	0.002	0.002
	(0.004)	(0.000)	(0.005)	(0.005)
Year Dummy (2002)	−0.006	−0.007	−0.006	−0.006
	(0.004)	(0.005)	(0.004)	(0.004)
Observations	10,321	4,246	10,321	10,321
R-squared	0.12	0.12	0.12	0.12

Note: Robust standard errors in parentheses. * represents significance at the 10% level, ** represents significance at the 5% level, and *** represents significance at the 1% level. Each regression includes nine industrial dummies recorded in the data set.

Table 5. Dependence on the Main Customer and the Annual Change in Trade Receivables Ratio

Dependent Variable	Annual Change in Trade Receivables -- Sales Ratio		
	(1)	(2)	(3)
Annual Change in ROA	0.063**	0.063**	0.064**
	(0.026)	(0.026)	(0.026)
Cash-Total Assets Ratio	0.038***	0.038***	0.038***
	(0.009)	(0.009)	(0.009)
Sales Growth	−0.066***	−0.066***	−0.066***
	(0.011)	(0.011)	(0.011)
Leverage	−0.009*	−0.009*	−0.009*
	(0.005)	(0.005)	(0.005)
Annual Change in Interest Rate	−0.192**	−0.190**	−0.189**
	(0.078)	(0.078)	(0.078)
ln (Assets)	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)
ln (1+Firm Age)	−0.003	−0.003	−0.003
	(0.002)	(0.002)	(0.002)
Percentage of Sales to the Top Customer			
20%–40%	−0.000		
	(0.003)		
40%–60%	−0.004		
	(0.004)		
60%–80%	−0.005		
	(0.004)		
80%–100%	−0.003		
	(0.004)		
100%	0.004		
	(0.006)		
40%–		−0.004	
		(0.002)	
60%–			−0.003
			(0.003)
Year Dummy (2001)	−0.009***	−0.009***	−0.009***
	(0.002)	(0.002)	(0.002)
Observations	4,913	4,913	4,913
R-squared	0.05	0.05	0.05

Note: Robust standard errors in parentheses. * represents significance at the 10% level, ** represents significance at the 5% level, and *** represents significance at the 1% level. Each regression includes nine industrial dummies recorded in the data set.

Table 6. Dependence on the Main Customer and the Trade Receivables Ratio

(Nonaffiliated Firms Only)

Dependent Variable	Trade Receivables — Sales Ratio			
	(1)	(2)	(3)	(4)
Capital Deficiency	−0.056***	−0.055***	−0.057***	−0.057***
	(0.013)	(0.016)	(0.013)	(0.013)
ROA	−0.115**	−0.005	−0.116**	−0.117**
	(0.052)	(0.060)	(0.052)	(0.052)
Sales Growth		−0.072***		
		(0.019)		
Interest Rates	−0.732***	−0.650***	−0.721***	−0.729***
	(0.218)	(0.236)	(0.216)	(0.217)
ln (Assets)	0.022***	0.021***	0.022***	0.022***
	(0.003)	(0.003)	(0.003)	(0.003)
ln (1+Firm Age)	−0.003	−0.003	−0.003	−0.003
	(0.005)	(0.005)	(0.005)	(0.005)
Percentage of Sales to the Top Customer				
20%–40%	−0.008	−0.007		
	(0.007)	(0.008)		
40%–60%	−0.002	−0.002		
	(0.008)	(0.010)		
60%–80%	−0.014	−0.006		
	(0.011)	(0.014)		
80%–100%	−0.004	−0.008		
	(0.015)	(0.017)		
100%	−0.006	−0.010		
	(0.036)	(0.040)		
40%–			−0.003	
			(0.007)	
60%–				−0.007
				(0.010)
Year Dummy (2001)	−0.001	0.000	−0.001	−0.001
	(0.009)	(0.000)	(0.009)	(0.009)
Year Dummy (2002)	−0.011	−0.006	−0.011	−0.011
	(0.008)	(0.008)	(0.008)	(0.008)
Observations	1,872	1,214	1,872	1,872
R-squared	0.12	0.12	0.12	0.12

Note: Robust standard errors in parentheses. * represents significance at the 10% level, ** represents significance at the 5% level, and *** represents significance at the 1% level. Each regression includes nine industrial dummies recorded in the data set.

Table 7. Dependence on the Main Customer and the Annual Change in Trade Receivables Ratio

(Nonaffiliated Firms Only)

Dependent Variable	Annual Change in Trade Receivables -- Sales Ratio		
	(1)	(2)	(3)
Annual Change in ROA	0.076	0.079	0.080
	(0.056)	(0.057)	(0.057)
Cash-Total Assets Ratio	0.034*	0.034*	0.034*
	(0.018)	(0.018)	(0.018)
Sales Growth	−0.090***	−0.090***	−0.090***
	(0.024)	(0.024)	(0.024)
Leverage	0.008	0.009	0.009
	(0.010)	(0.010)	(0.010)
Annual Change in Interest Rate	−0.045	−0.049	−0.044
	(0.185)	(0.186)	(0.184)
ln (Assets)	−0.001	−0.001	−0.001
	(0.002)	(0.002)	(0.002)
ln (1+Firm Age)	−0.001	−0.001	−0.001
	(0.004)	(0.004)	(0.004)
Percentage of Sales to the Top Customer			
20%-40%	0.001		
	(0.006)		
40%-60%	−0.005		
	(0.006)		
60%-80%	−0.000		
	(0.007)		
80%-100%	−0.017		
	(0.012)		
100%	0.002		
	(0.010)		
40%-		−0.005	
		(0.004)	
60%-			−0.004
			(0.006)
Year Dummy (2001)	−0.006	−0.006	−0.006
	(0.004)	(0.004)	(0.004)
Observations	1,180	1,180	1,180
R-squared	0.08	0.08	0.08

Note: Robust standard errors in parentheses. * represents significance at the 10% level, ** represents significance at the 5% level, and *** represents significance at the 1% level. Each regression includes nine industrial dummies recorded in the data set.

Table 8. Determinant of the Trade Receivables Ratio, by the Level of Dependence on the Main Customer

(Divided Samples by the Level of Dependence on the Main Customer)

Dependent Variable	Trade Receivables -- Sales Ratio		
	(1)	(2)	(3)
Sales to the Top Customer	less than 20%	20%–40%	40%–
Capital Deficiency	−0.019	0.053***	−0.091***
	(0.012)	(0.019)	(0.016)
ROA	−0.087**	−0.076	−0.137***
	(0.036)	(0.059)	(0.036)
Interest Rates	−0.139	−0.552***	−0.279*
	(0.114)	(0.187)	(0.156)
ln (Assets)	0.020***	0.013***	0.026***
	(0.003)	(0.005)	(0.006)
ln (1+Firm Age)	0.000	0.009**	0.001
	(0.002)	(0.004)	(0.003)
Year Dummy (2001)	0.005	0.000	0.009**
	(0.003)	(0.005)	(0.004)
Year Dummy (2002)	−0.002	−0.006	−0.001
	(0.003)	(0.005)	(0.004)
Observations	5,118	2,482	2,721
R-squared	0.04	0.04	0.07

Note: Robust standard errors in parentheses. * represents significance at the 10% level, ** represents significance at the 5% level, and *** represents significance at the 1% level. Each regression includes nine industrial dummies recorded in the data set.

Table 9. Determinants of the Annual Change in Trade Receivables Ratio

(Divided Samples by the Level of Dependence on the Main Customer)

Dependent Variable	Annual Change in Trade Receivables — Sales Ratio		
	(1)	(2)	(3)
Sales to the Top Customer	less than 20%	20%–40%	40%–
Annual Change in ROA	0.058	0.108	0.049
	(0.038)	(0.070)	(0.038)
Cash–Total Assets Ratio	0.044***	0.030*	0.031*
	(0.013)	(0.017)	(0.016)
Sales Growth	−0.047***	−0.100***	−0.071***
	(0.014)	(0.027)	(0.019)
Leverage	−0.005	−0.006	−0.017*
	(0.006)	(0.013)	(0.010)
Annual Change in Interest Rate	−0.069	−0.318	−0.235
	(0.083)	(0.197)	(0.159)
ln (Assets)	−0.002**	−0.001	−0.001
	(0.001)	(0.003)	(0.002)
ln (1+Firm Age)	−0.003	−0.005	0.001
	(0.002)	(0.005)	(0.005)
Year Dummy (2001)	−0.008***	−0.012***	−0.009**
	(0.002)	(0.004)	(0.004)
Observations	2,504	1,198	1,211
R-squared	0.04	0.07	0.07

Note: Robust standard errors in parentheses. * represents significance at the 10% level, ** represents significance at the 5% level, and *** represents significance at the 1% level. Each regression includes nine industrial dummies recorded in the data set.