Discussion Papers In Economics And Business

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Evidence from Japan

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February 2010

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Abstract

This paper examines whether trade credit as a credible signal about firm's creditworthiness to banks facilitates provision of bank credit to the firms receiving trade credit. Using data on Japanese manufacturing firms over the period 1990-1995, we find that firms receiving trade credit are provided short-term credit by less-informed banks. Consequently, in the firms that have arm's-length relations with banks, trade credit plays an important role in mitigating asymmetric information problems between firms and banks, thereby facilitating extension of bank credit.

Keywords: Trade Credit; Bank Credit

JEL classification: G32

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1. Introduction

Trade credit is considered an important short-term source of funding, and there are theoretical and empirical explanations for the roles played by trade credit. In particular, some previous studies show that firms facing the difficulty in raising bank credit use trade credit as a substitute (Nilsen, 2002; Mateut et al. 2006).

On the other hand, trade credit plays a role in offering information about firm's creditworthiness to banks. Suppliers accumulate information about financial health of buyers through frequent selling activities, and then are likely to provide credit to the solvent buyers through trade credit. Moreover, suppliers have a comparative advantage over banks in gathering financial information about buyers (Petersen and Rajan, 1997). Thus, provision of trade credit is a credible signal about firm's creditworthiness to banks, and then provides banks with incentives to extend credit to the firms receiving trade credit. Indeed, Biais and Gollier (1997) argue that banks observing the provision of trade credit by suppliers have incentives to extend credit to the buyers about which they would otherwise have limited information. In addition, Giannetti et al. (2008) show that firms previously receiving trade credit are affiliated with a large number of distant banks for short-term periods and are offered lower fees for obtaining bank loans. However, these studies present no evidence of direct linkage between trade credit and bank credit.

This paper examines whether trade credit as a credible signal about firm's creditworthiness to banks facilitates provision of bank credit to the firms receiving trade credit. As previous studies suggest, the role played by trade credit as a credible signal about firm's creditworthiness could be associated with relations between banks and borrowers, and borrowing terms. If trade credit is a credible signal about borrower's creditworthiness, such information is more valuable for banks that have arm's-length relations with borrowers because the banks are less informed about borrower's creditworthiness. Moreover, extension of trade credit on a short-term basis could signify borrower's creditworthiness in the short-term. Given the discussion above, we propose the hypothesis that if trade credit is a credible signal about firm's creditworthiness to banks, banks provide short-term credit to the firms receiving trade credit when the firms have arm's-length relations with banks.

Using data on Japanese manufacturing firms over the period 1990-1995, we find that when firms having arm's-length relations with banks receive trade credit, banks provide short-term credit to the firms receiving trade credit. Moreover, we find no significant relations between trade credit and short-term bank credit in the firms that have strong relations with banks. The results are consistent with the view that the extension of trade credit by suppliers is considered a credible signal about borrower's creditworthiness by

less-informed banks, and then banks offer short-term credit to the borrowers receiving trade credit. Consequently, in the firms that have arm's-length relations with banks, trade credit plays an important role in mitigating asymmetric information problems between firms and banks, thereby facilitating extension of bank credit.

2. Data

Our sample includes 747 Japanese manufacturing firms listed on the stock exchange over the period 1990-1995 and with fiscal years ending in March. Data on financial statements for sample firms come from the Nikkei Needs dataset.

We use data on Japanese firms in the early 1990s because a distinction is easily made between firms that develop strong relations with banks and firms that do not: keiretsu group firms and independent firms. Keiretsu groups are bank-centered groups in which member firms have strong relations with banks centered at groups and with other same group banks. These strong connections reduce asymmetric information problems between firms and banks. In contrast, independent firms that are not affiliated with bank-centered groups have arm's-length relations with banks. Thus, asymmetric information problems between firms and banks are more severe in independent firms than keiretsu group firms.[1] However, in the late 1990s and the early 2000s, bankruptcy of banks, and mergers and acquisitions (M&A) among unhealthy banks resulted into the weakening of bank-firm ties among keiretsu groups. Therefore, data on Japanese firms in the early 1990s are suitable for distinguishing between keiretsu group firms and independent firms. Our focus here is on the keiretsu group firms that are associated with one of eight keiretsu groups (Mitsubishi, Mitsui, Sumitomo, Fuyo, Dai-ichi Kangyo, Sanwa, IBJ, and Tokai) and independent firms that are not affiliated with eight keiretsu groups. Sample firms include 298 keiretsu group firms and 449 independent firms. Identification of keiretsu group membership comes from *Industrial Groupings in Japan*.

Our dependent variable is Short-term bank loans. This is defined as the change in short-term loans to the firm by private banks from year t-1 to year t relative to total assets in year t-1. Data on loans by private banks are obtained from the Nikkei Needs Bank Loan Data. A list of private banks includes city banks, trust banks, long-term credit banks, first-tier regional banks, and second-tier regional banks.

Among independent variables, our key variable is Trade payables. If trade payables act as a credible signal about firm's creditworthiness, and provide less-informed banks with incentives to lend to the firms receiving trade credit, we expect the coefficient on this

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[1] For detailed discussions about keiretsu groups in Japan, see, e.g., Hoshi et al. (1991).

variable for independent firms to be positive. This is defined as the ratio of accounts and notes payable to total assets. We need to control for other firm characteristics. Return on Assets (ROA) is intended to control for profit performance and loan demand, and is defined as the ratio of pre-tax income to total assets. Trade receivables is included to capture the firm's ability to extend credit to the buyers, and is defined as the ratio of accounts and notes receivable to total assets. Debt is intended to control for dependence on external funds, and is defined as the ratio of loans (short- and long-term loans) and corporate bonds (straight, convertible, and warrant bonds) to total assets. Tangible assets is intended to capture the effects of collateralizable assets on bank lending, and is defined as the ratio of tangible assets to total assets. Firm size is included to help control for the difference in firm size, and is measured by the logarithm of total assets. Cash is intended to control for internal funds, and is defined as the ratio of cash and deposits to total assets. Sales is intended to control for loan demand and growth opportunity. This is measured as the change in sales from year t-1 to year t relative to sales in year t-1.

Table 1 presents the means and standard deviations for the sets of observations of keiretsu group firms and independent firms. To ensure the robustness of our results, we remove observations with extreme values from our sample.[2]

3. Results

Table 2 reports regression estimates for keiretsu group firms and independent firms. To avoid endogeneity problems, our specifications include one period lagged values of the independent variables except for Firm size. The coefficients are estimated using the fixed effects model. Because of the removal of observations with extreme values, number of observations varies with equations.

In first column, Trade payables have no significant coefficient, suggesting that trade payables play no role in inducing bank credit to keiretsu group firms. Banks centered at keiretsu groups are well informed about member firm's creditworthiness through monitoring activities. Information about creditworthiness may not be important for such well-informed banks. In contrast, in second column, the coefficient on Trade payables is significantly positive. The result is consistent with the notion that the extension of trade credit by suppliers is considered a credible signal about borrower's creditworthiness by less-informed banks, and then banks offer short-term credit to the borrowers receiving trade credit in the subsequent year.

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[2] Extreme observations are defined as those for which any one of the variables has a value that is more than four standard deviations away from the mean value.

Results in Table 2 support the view that trade credit as a credible signal about firm's creditworthiness to banks facilitates provision of short-term bank credit to the firms receiving trade credit when the firms have arm's-length relations with banks. However, if the error terms are serially correlated, our specification faces endogeneity problems. Furthermore, we need to examine whether the coefficient on Trade payables is larger for independent firms than for keiretsu group firms.

To address the problems, Table 3 shows additional results. Keiretsu group is a dummy variable that have a value of 1 if the firms are associated with one of eight keiretsu groups, and 0 otherwise. Independent group is a dummy variable that have a value of 1 if the firms are not associated with the keiretsu groups, and 0 otherwise. The estimated coefficients in first column are identical to those in Table 1. Although the coefficient on interaction term of Trade payables with Keiretsu group is not significant, the coefficient on interaction term of Trade payables with Independent group is significantly positive. Test discussed by Wooldridge (2002) indicates that the null hypothesis that there is no serial correlation in the error term is not rejected at the conventional levels, suggesting that our specification overcome endogeneity problems. When we compare the coefficients on Trade payables, the difference in the coefficients is significant at the 5% level. This indicates that the coefficient on Trade payables is larger for independent firms than for keiretsu group firms. To check the robustness of our results, second column contains the results with different specification. This yields similar results to those in first column. The null hypothesis of equality of the coefficients on Trade payables is rejected at the 10% level. In unreported results, we find no significant relations between trade credit and long-term bank credit in both keiretsu group firms and independent firms. Trade credit as short-term credit could indicate short-term creditworthiness of borrowers, but may be an inadequate signal for long-term creditworthiness. As a consequence, our results provide support for the view that when firms having arm's-length relations with banks receive trade credit, banks provide short-term credit to the firms receiving trade credit.

4. Conclusion

This paper investigates whether trade credit as a credible signal about firm's creditworthiness to banks facilitates provision of bank credit to the firms receiving trade credit. Using data on Japanese manufacturing firms over the period 1990-1995, empirical analyses reveal that when firms having arm's-length relations with banks receive trade credit, banks provide short-term credit to the firms receiving trade credit. Consequently, in the firms that have arm's-length relations with banks, trade credit plays an essential role in mitigating

asymmetric information problems between firms and banks, thereby inducing provision of bank credit.

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Table 1. Descriptive Statistics

Variable	Keiretsu group firms		Independent firms	
	Mean	Std.dev.	Mean	Std.dev.
Short-term bank loans	0.002	0.032	0.002	0.032
Trade payables	0.177	0.090	0.170	0.095
ROA	0.029	0.036	0.033	0.044
Trade receivables	0.260	0.094	0.253	0.098
Debt	0.299	0.148	0.250	0.165
Tangible assets	0.279	0.111	0.272	0.119
Firm size	11.307	1.387	10.871	1.253
Cash	0.106	0.074	0.129	0.088
Sales	0.010	0.097	0.006	0.115

Table 2. Trade Credit and Bank Lending

Independent variable	Dependent variable: Short-term bank loans	
	Keiretsu group firms	Independent firms
Trade payables $_{t-1}$	0.012	0.141***
	(0.054)	(0.036)
ROA $_{t-1}$	$-$0.087*	$-$0.036
	(0.045)	(0.028)
Trade receivables $_{t-1}$	$-$0.043	$-$0.094***
	(0.040)	(0.028)
Debt $_{t-1}$	$-$0.172***	$-$0.099***
	(0.026)	(0.017)
Tangible assets $_{t-1}$	$-$0.092***	0.037
	(0.034)	(0.023)
Firm size $_t$	0.021*	0.016*
	(0.011)	(0.008)
Hausman test	59.24	83.27
R^2	0.059	0.056
No. of observations	1485	2233

Note

The table reports regression estimates for 298 keiretsu group firms and 449 independent firms over the period 1990-1995. Hausman test is a specification test of the fixed effects model versus the variance components model. The coefficients are estimated using the fixed effects model. All equations include year dummy variables. Standard errors are in parentheses. ***, **, * Significant at the 1%, 5%, and 10% levels, respectively.

<p align="center">**Table 3. Trade Credit and Bank Lending: Additional Results**</p>

Independent variable	Dependent variable: Short-term bank loans	
	1	2
Trade payables $_{t-1}$	0.012	0.046
×Keiretsu group	(0.051)	(0.053)
ROA $_{t-1}$	−0.087**	−0.076*
×Keiretsu group	(0.042)	(0.043)
Trade receivables $_{t-1}$	−0.043	−0.030
×Keiretsu group	(0.038)	(0.041)
Debt $_{t-1}$	−0.172***	−0.171***
×Keiretsu group	(0.024)	(0.024)
Tangible assets $_{t-1}$	−0.092***	−0.085**
×Keiretsu group	(0.032)	(0.035)
Firm size $_t$	0.021*	0.026**
×Keiretsu group	(0.011)	(0.011)
Cash $_{t-1}$		0.029
×Keiretsu group		(0.031)
Sales $_{t-1}$		−0.019
×Keiretsu group		(0.012)
Trade payables $_{t-1}$	0.141***	0.155***
×Independent group	(0.038)	(0.040)
ROA $_{t-1}$	−0.036	−0.031
×Independent group	(0.029)	(0.031)
Trade receivables $_{t-1}$	−0.094***	−0.094***
×Independent group	(0.029)	(0.032)
Debt $_{t-1}$	−0.099***	−0.101***
×Independent group	(0.018)	(0.018)
Tangible assets $_{t-1}$	0.037	0.039
×Independent group	(0.024)	(0.026)
Firm size $_t$	0.016*	0.015*
×Independent group	(0.008)	(0.009)
Cash $_{t-1}$		0.006
×Independent group		(0.021)
Sales $_{t-1}$		−0.006
×Independent group		(0.009)
Hausman test	311.78	155.64
Wooldridge test (p-value)	0.181	0.116
R^2	0.101	0.061
No. of observations	3718	3680

Note

The table reports regression estimates for 298 keiretsu group firms and 449 independent firms over the period 1990-1995. Hausman test is a specification test of the fixed effects model versus the variance components model. The coefficients are estimated using the fixed effects model. Wooldridge test is a test of serial correlation in the error terms. All equations include interaction terms of year dummy variables with group dummy variables. Standard errors are in parentheses. ***, **, * Significant at the 1%, 5%, and 10% levels, respectively.