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Trade Credit in Japan: Relationship with Bank Loans

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(Preliminary)

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1. Introduction

How do firms procure funds when they face an adverse shock such as tight monetary policy? Numerous papers have examined this issue, many of which have focused on bank loans. However, the flow of funds is not only through bank loans, but also through other financial instruments such as commercial paper, corporate bonds and funding from non-bank institutions. In addition, many small- and medium-sized businesses rely on trade credit. In daily commercial transactions many firms often prefer to pay later. In this case, accounts payable or notes payable show up on the liability side of the purchasing firm's balance sheet, and accounts receivable or notes receivable on the asset side of the supplier. Trade credit is particularly important for small- and medium-sized firm financing since these firms often do not have sufficient access to direct financing, and are often refused additional loans by banks. In this article, we discuss the issue of trade credit, and specifically its relationship with bank loans.

A definitive conclusion on the substitutability between trade credit and bank loans has yet to be offered by economists. In one of the earliest looks at this Meltzer (1960) found that during periods of tight money in the U.S., firms with relatively large cash balances tended to extend trade credit, thus, favoring firms against whom credit rationing was said to be applied. His conclusion is supportive of the view that trade credit and bank loans are substitutes. In contrast, Oliner and Rudebusch (1996) find little evidence that a monetary policy shock changes the ratio of bank loans to total short-term debt.[2] Their view is consistent with the hypothesis of no substitutability between trade credit and bank loans. While many other articles have provided empirical evidence on both sides of this issue, definitions of substitutability, specifications of shocks and degrees of data aggregation differ across all these studies and make comparison almost impossible. The purpose of this paper is not to settle the entire debate over substitutability, but to instead provide a useful perspective by investigating actual procurement behavior. Although based on the previous studies, the contributions of this paper are as follows:

- We employ a panel data set, collected by the research division of Small and Medium Enterprises Agency of Japan, with two periods, multiplied by approximately 4,000

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[2] Trade credit is included in the measure of short-term debt.

observations. Using the data we are able to analyze the effects of idiosyncratic shocks to firms, not the effects of aggregate shocks such as contractionary monetary policy. Also, the panel nature of the data allows us to eliminate firm-specific factors.

- The panel contains not only balance sheet data, but also non-balance sheet data such as the highest short-term interest rate in the current fiscal year, provision of collateral and changes in the length of payment terms.

- There are two main uses for trade credit: one is daily commercial transactions among non-financial firms, and the other is the need for short-term finance. We emphasize the importance of the distinction between them to discuss substitutability.

- As a result, we show with changes in firms' credit risk and their growth prospects the trade credit-total asset ratio and the loans-total asset ratio move quite differently with one another. However, once we adjust for the transactional motivation of trade credit, we find that these two ratios move in similar directions.

The paper is organized as follows. We summarize the theoretical explanations for the use of trade credit in Section 2. In Section 3 we document the previous empirical studies on the relationship between trade credit and bank loans. We discuss our data source, Survey of the Financial Environment by Small and Medium Enterprises Agency of Japan, in Section 4. Section 5 summarizes our empirical findings. Section 6 concludes.

2. Why Do Firms Use Trade Credit?

Trade credit is regarded as a short-term loan provided by a supplier to a purchaser upon transaction of goods and services. When the firms agree to make payments at a later date, the supplier side has accounts receivable or notes receivable on the asset side of its balance sheet, while the purchaser has accounts payable or notes payable on the liability side of its balance sheet. Almost all of these items are classified, on the balance sheet, as short-term assets/liabilities. In Japan, there is a large amount of outstanding trade credit. 13.7% and 16.6% of total corporation assets are trades payable (accounts payable + notes payable) and trades receivable, respectively. The share of trade credit as a part of total assets is comparable to other major sources of firm financing, such as loans (37.1% of total assets) and short-term loans (15.2%).

However, we still must understand why non-financial businesses supply funds to purchasers, without the borrowing firm's balance sheet information. Following Petersen and Rajan (1997), Ono (2001) and Schwartz (1974) we classify motivations for trade credit into demand side and supply side factors.

2.1. Incentives to Supply Trade Credit

Those who supply goods and services have an advantage over financial institutions when they issue trade credit. The reasons include reducing credit costs and increasing the demand for their goods and services.

- Retrieving updated information on a purchaser's credit risk: a supplier of goods and services can retrieve information about the purchaser's daily management through its day-to-day transactions. Even though the supplier lacks the purchaser's balance sheet data, information which financial institutions have, its day-to-day information is sometimes more useful in detecting fatal incidents of a company, e.g. bankruptcies.

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- Properly handling purchaser's inventories: the supplier has more detailed information on the purchaser's inventories through its daily business, and evaluates them more properly than financial institutions can. Provided that the supplier holds inventories, it will find appropriate markets to dispose of inventories upon a purchaser's bankruptcy.

- Applying pressure to assure payment: the supplier can use its goods and services that are indispensable to the purchaser as a means to assure payment. The purchaser will pay regularly if it needs the supplier to sell its necessities on schedule.

- Increasing demand from high-risk firms: firms with higher credit risk tend to be credit rationed, and, as a result, its demand elasticity is thought to be high in both the short and the long term. By extending trade credit, a supplier can expect higher sales to these credit rationed firms.

2.1 Incentives to Demand Trade Credit

On the other hand, the demanders of trade credit benefit from the reduction in transaction and opportunity costs.

- Reducing transaction costs: with cash flow uncertainties, a purchaser needs to hold a certain amount of cash, which may generate sizable opportunity costs. The use of trades payable significantly reduces the cost since the purchaser can determine when to pay by cash.

- Benefit from paying late: in the case of the amount of payment being invariant,[3] paying later is always preferred to paying now. This is especially true with a fixed payment scheme, as in Japan.[4]

2.2 Use of Trade Credit in Japan

First, in Figure 2-1, we see the use of trade credit by firm size using the Financial Statements Statistics collected by Japan's Ministry of Finance. Since our concern is on the substitutability of trade credit for loans, we focus on trade payable, which is on the liability side of a balance sheet. The share of trade payable to total asset is above 10% on average, which is comparable with other financial instruments. Among small and medium enterprises (SME) whose employment size is below 300, relatively large companies with 101 to 300 employees rely more on trade payable. In contrast, once firms become larger than SME, they depend less on trade payable. These are consistent with the observation that some SMEs are too small to be creditworthy for trade payable, especially accounts payable and that large-scale enterprises have an easy access to other financial instruments including commercial papers, corporate bonds and equities.

Trade credit use differs significantly also across industries. For example, wholesale businesses depend on trade payable since they do not have enough fixed assets for collateral. In contrast, retail

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[3] Sometimes the cash payment amount is less than the trade payable amount. Petersen and Rajan (1997) assumed that purchasers are always willing to pay later and that suppliers determine the ratio of credit on accounts.

[4] In the U.S., in addition to trades payable, whose payment is invariant until due, there is a kind of accounts payable that gives discounts for early payment. For example, 2/10 net 30 means that a firm gets a 2% discount if it pays by the tenth day. If not, the firm has to pay the full amount by the thirtieth day. For further information on the practices specific to each industry see Ng, Smith and Smith (1999).

stores with consumers usually making cash payment relies less on trade credit. Real estate and construction firms owe long-term trade payable to suppliers because of their long-term contract such as construction of buildings and purchase of real estates. Figure 2-2 summarizes the trade payable to asset ratio by industry and by firm size. The figure is based on the Survey of Financial Environment by SME agency of Japan. We observe that larger construction businesses rely more on trade credit while larger wholesale and retail firms do depend less on trade payable. The difference between these industries may be consistent with their difference in their payment terms length and in the creditworthiness required to obtain trade payable. Larger construction firms are possibly preferred for their creditworthiness to obtain long-term credit.

3. Previous Studies on the Relationship Between Trade Credit and Bank Loans

There has been a substantial amount of literature on the relationship between trade credit and bank loans. Using data aggregated by firm size, Meltzer (1960), in one of the pioneering works in the field, posited that during the tight monetary policy of the mid-fifties in the U.S., firms with relatively abundant cash balances extended trade credit, possibly alleviating the discrimination against credit rationed firms. Subsequent work supported the findings of Meltzer (1960) and presented further evidence of substitutability between trade credit and bank loans. For example, Herbst (1974) used data aggregated by industry and found evidence of a co-movement between the amount of loans near due, and trade credit, implying substitutability between the two methods of financing. Among the recent literature, Nilsen (2002) examined substitutability from a credit channel perspective. He specifically focused on trade credit as a possible alternative to bank loans to support the substitution hypothesis.

On the opposite end of the spectrum, many papers have also found evidence against any kind of substitutability between bank lending and trade credit. Based on the U.S. manufacturing data, Nadiri (1969) observed that trade credit dropped in the tight money periods. Oliner and Rudebusch (1996) and Gertler and Gilchrist (1993) both insisted that differences in the effect of tight monetary policy are propagated more by firm size than by differences between bank loans and non-bank loans. This implies no sizable substitution between bank loans and trade credit, one of the main components of non-bank loans.

Most of the articles in the literature simply used data aggregated by firm size or by industry. Economists have not really used firm-level micro data until quite recently. Nilsen (2002) used balance sheet data of large U.S. firms to claim that big companies, without bond ratings, used trade credit more intensively than those with ratings during periods of tight money. Blaiso (2003) employed a panel data of Italian firms for 18 years to estimate his inventory investment function. During the tight money period he found that net trade credit, not liquid assets such as cash, constrained inventory investment. Based on this finding, he insisted on the substitutability between trade credit and bank loans.

Smaller firms with limited access to direct finance are thought to rely more heavily on trade credit than larger firms. Petersen and Rajan (1997) implemented a cross-sectional analysis using a firm-level micro data set, the National Survey of Small Business Finances (NSSBF), jointly collected by the U.S. Small Business Administration and the Board of Governors of the Federal Reserve. Using this data Petersen and Rajan asserted that those firms with lower credit limits tended to have more accounts payable.

In Japan, there have been several intriguing articles about the relationship between these two procurement measures. Using aggregated data, Ono (2001) showed that the ratio of trades payable to trades receivable increases as banks become looser in lending, providing evidence for the complementarity of trade credit and bank loans. Takehisa and Ohkusa (1995) arrived at a similar empirical conclusion by using panel data of larger firms who annually report their balance sheets to

the Ministry of Finance. Tsuruta (2003) compiled his panel data set of as many as 80,000 firms for five years based on the information assembled by the government-backed credit guarantee corporation. He regressed differences in trades payable on differences in the interest rate and obtained a positive coefficient, implying substitutability between trade credit and bank loans.

The problem with the existing literature is that a direct comparison of articles is quite difficult as the papers differ quite a bit in terms of their methodology (under which environment do we see substitutability?), data sets (large firm vs. small firm, firm-level data vs. aggregate data) and in their definition of substitutability (examining the relationship between the amount of outstanding trade credit and bank loans, using qualitative data such as the lending attitude of banks, etc.). In this paper, our approach is to employ firm-level, panel data containing not only balance sheet information but also non-balance sheet information. Our focus will be on liabilities, analyzing the relationship between trade payable and bank loans.

4. Data

The Research Division of Small and Medium Enterprises Agency of Japan collected the Surveys of the Financial Environment (hereafter SFE) for the years 2001 and 2002. 15,000 sample firms, non-financial and non-agricultural, were extracted from the database collected by the Tokyo Shoko Research, Ltd. (hereafter TSR) and stratified by industry. The division sent questionnaires under the name of the director general of the agency and received 7,565 (year 2001) and 8,446 (year 2002) replies. Among them, 4,065 observations, comprising our sample, are common across the years. This data set is accompanied by balance sheet data collected independently by TSR. Among the respondents 85.1% are categorized as small- and medium-sized enterprises,[5] which is smaller than the figure of more than 99% for all of Japan. The original survey sample of 15,000 contains about 1,500 large firms. In addition, some sample firms may be too small to answer detailed questions about their financing. Thus, the share of small businesses amongst respondents is less than 90%. Descriptive statistics are shown in Table 4-1. Means and medians of employee number are about 90 and 40, respectively, which implies many in the sample are relatively large SMEs.

It should be noted that SFE contains numerous items about the financial environment faced by each firm. This data is normally impossible to obtain from a balance sheet. These variables include changes in terms of payment over the past year, the number of banks by type per firm, the type of main bank, if the firm was unable to obtain loans, if the firm was requested to accept an increase in the interest rate, the highest short-term rate paid over the past year, the supply of collateral, personal guarantees and government backed guarantees. These non-balance sheet variables are combined with the balance sheet data for analysis.

A predecessor to the Japanese survey of small and medium enterprises is the U.S.'s Survey of Small Business Finances (hereafter SSBF). The Federal Reserve Board and the U.S. Small Business Administration jointly began the survey in 1987 and have done three surveys up to the present. From 3,400 to 5,300 samples with less than 500 employees respond to quite detailed questions about their financial environment. The sample firms are first sent questionnaires, which are followed by calls

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[5] Under the law concerning small businesses in Japan, the term small and medium enterprises refers in general to those with capital stocks not in excess of 300 million yen or having 300 or fewer regular employees and sole proprietorships with 300 or fewer employees. Wholesale, retail and service industry apply smaller threshold values.

from trained interviewers.[6] These processes are designed to increase the precision of the survey. However, each SSBF is used for independent cross-sectional analysis, and samples in one survey year are unlikely to appear again in the next survey since there are about 7.5 million small businesses in the U.S. In addition, an interval of five years between surveys makes it difficult to analyze the instantaneous effects of shocks to firms, which are expected to appear in a year or two. In contrast, since Japan's SFE has been implemented for the past two years consecutively (the division in charge plans to implement the survey also for the year 2003), we are able to construct a panel dataset to absorb each individual firm's effect on the estimation.

5. Effect of Idiosyncratic Shocks on the Relationship between Trade Credit and Bank Loans

Based on the SFE for the years 2001 and 2002, we summarize the effect of changes in credit risk and sales growth on trades payable and bank loans. We focus not only on the quantitative data on balance sheet but also on non-balance sheet items such as changes in the terms of payment, the highest short-term rate paid over the past year and if the firm was requested to accept an increase in the interest rate. We assume these items to respond to idiosyncratic shocks.

5.1 Effects of Corporate Ratings Change

As a proxy for the credit risk of a firm we employ a corporate rating by Tokyo Shoko Research Ltd. (TSR) and analyze the effect of a rating change. TSR is a major private credit research company[7] that makes inquiries about a firm's management and business prospects upon requests by customers. TSR classifies many of the business characteristics of a firm into four major categories: management skills, growth prospects, stability and disclosure and a third party's opinion. Based on the classifications, researchers collect both quantitative and qualitative data such as a CEO's management style, business records, prospects for sales growth, owned capital and reserved collateral. TSR then quantifies the data to score corporate ratings from 0 to 100, and provide the ratings to customers.[8]

These corporate ratings are widely utilized by both financial and non-financial enterprises when starting business relationships with another firm.[9] At the same time, these credit research companies interview those who have business relationships with the inquired firms. Therefore, the corporate ratings are endogenous in that they affect the behavior of financial and non-financial institutions at the same time as being influenced by the actions of these institutions. This endogeneity deters us from determining causality between corporate ratings and financing actions of a firm. Nevertheless, it is still very useful to quantify the relationship among corporate ratings, trade credit, bank loans and other financial variables.

5.1.1. Relationship between Corporate Ratings and Liabilities of a Firm

Figures 5-1 and 5-2 show the distribution of the level of corporate ratings and the difference in corporate ratings. Based on a change in ratings, Tables 5-1 and 5-2 display a firm's total assets, total liabilities, trade payable, loans, the trade payable-total asset ratio, the loans-total asset ratio and their

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[6] There seems to be a trade-off between the level of detail of the questions and the response rate. The 1998 SSBF survey had more than 200 pages questionnaire, but only a response rate of 33%, which was much lower than past response rates.

[7] In Japan, Tokyo Shoko Research and Teikoku Data Bank are the two major credit research companies with database that contains more than 1 million firms, respectively.

[8] Customers include financial institutions and business enterprises.

[9] Some city banks have a rule as to not discount notes receivable by a company with below average ratings.

changes respectively. We divide the samples into four groups according to the size of the ratings change. These sub-samples are not equal in size since the changes are discrete, and for many firms are zero.

The first thing to notice is that total assets and liabilities dropped across almost every category from 2001 to 2002, reflecting the recent behavior of Japanese firms to remove dormant assets and unnecessary liabilities from their balance sheets in an attempt to improve their capital ratio. The further corporate ratings drop, the larger becomes the size of the trade payable decrease. In contrast, even with the drop in corporate ratings we do not observe a larger decline in loans. Rather, in the first quartile, the group with the largest fall in ratings, we observe a smaller decline in loans and an increase in short-term loans. Secondly, trades payable-total asset and loans-total asset ratios clearly behave quite differently. The fall in trades payable is larger than the decline in total assets, and this difference becomes more conspicuous as ratings drop further. Hence, the drop in the trade payable-asset ratio becomes larger with a bigger ratings drop. On the other hand, the increase in loans as well as the short- and long-term loans-total asset ratio becomes larger with a bigger ratings drop. We can thus reject the null hypothesis that the ratios in the first quartile are the same as those in the fourth quartile.

Table 5-3 summarizes other non-balance sheet items relating to the procurement environment of a firm. Our main concern is with accounting for consistent changes in both the balance sheet and non-balance sheet items. For trades payable, changes in the length of payment terms are obtained from the data. Many of the samples reported no change, while some extend payment terms when facing large ratings drops, which possibly alleviates their financial difficulties.

When we look at loans there are a lot of useful non-balance sheet items available for analysis. Even when banks extend loans to firms with deteriorating ratings, it may be justified if they are compensated with higher interest rates, or if firms provide more collateral. The first thing to notice is that the number of regional and second regional banks per firm increases as ratings drop, which implies firms with adverse shocks have difficulties in obtaining financing and tend to procure from relatively smaller-sized banks than larger city banks. Secondly, as ratings become lower, pressures increase from banks to impose more severe loan conditions, part of which is a short-term interest rate increase. Table 5-3 shows that the ratio of firms being asked to accept an interest rate hike is significantly higher in the first quartile than in the third and fourth quartiles. Also, the actual interest rate hike in the first and second quartile is positive while in the fourth quartile the interest rate drops.[10] Finally, other than an increase in the interest rate, no significantly tighter procurement conditions are observed. For example, the ratio of firms newly providing collateral, personal guarantees and government backed guarantees are not significantly different across quartiles.

5.1.2. Types of Main Bank, Collaterals, and Level of Corporate Ratings: Do They Matter?

To investigate the relationship between ratings and corporate procurement in more detail, we further divide the sub-samples by (1) a firm's main bank type, (2) loans with or without collateral, personal guarantees and government backed guarantees and (3) the level of corporate ratings. For the types of main banks,[11] smaller financial institutions may face tougher market conditions partly because

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[10] The interest rate, calculated by dividing paid interest by loans outstanding, moves irregularly across quartiles. A consistent explanation incorporating a change in ratings is difficult to obtain. The ratings change is thought to influence the current interest rate, in which case it is appropriate to use the interest rate in the past year rather than the rate based on the outstanding amount. Furthermore, trade credit is a form of short-term financing and so the short-term interest rate is the appropriate one for comparison.

[11] In terms of asset size, the following inequalities: city bank > trust bank > regional bank > second regional bank > shinkin bank > credit union roughly hold.

of their higher cost structure. Separating by (1) allows us to see if the response of smaller main banks differs significantly from larger main banks. If they suffer from a lack of profit opportunities, these banks may risk their assets by lending to riskier firms. Regarding (2), trade credit is usually not backed by collateral,[12] while many of the bank loans are with collateral, personal guarantees or government backed guarantees, in which case it is a matter of course for banks to maintain loan contracts longer than suppliers retain trade credit. Therefore, we want to see if different responses of trade credit and loans are observed even if we adjust for the difference in guarantees. Dividing our sub-samples by corporate rating, (3), is an attempt to see if not only the changes, but also the level of ratings matter. Recently, it has been said that Japanese financial institutions have introduced a credit scoring lending scheme with which they determine the loan conditions according to the level of their own credit ratings. Even though the ratings by TSR are not identical to the ratings used by individual banks, TSR ratings are a good proxy. We present the results for each of these samples in Tables 5-4, 5-5 and 5-6, respectively.

In Table 5-4, the comparison is made between the samples with shinkin banks or credit unions as main banks and those with regional or second regional banks as main banks.[13] The former have larger increases in the loan-asset ratio not only in the first quartile but also across the entire sample. In contrast, we do not observe much difference in the change of the trade payable-asset ratio. Table 5-5 presents two samples: one with a government-backed guarantee for loans[14] and the other without any type of collateral, personal guarantees or government backed guarantees. Overall changes in the trade payable-asset ratio do not depend much on the existence of guarantees. And even in the samples with no collateral or guarantees a change in the loan-asset ratio is much different from a change in the trade payable-asset ratio. Finally, Table 5-6 summarizes the results for samples with the lowest ratings level category and those with the highest ratings level category. No significant correlation between ratings level and changes in the trade payable-asset ratio is observed, while a low ratings level is accompanied by an acute rise in the loans-asset ratio, in particular when a rating moves downward. In addition, there seems to be a correlation between the ratings level and the non-balance sheet variables, such as the ratio of firms declined for the loans, the ratio of firms requested to accept the rate increase and the highest short-term interest rate paid over the past year.

5.2 Effects of Sales Growth Change

In the previous subsection, we covered the relationship between corporate ratings and the procurement behavior of firms. However, as we discussed in Section 5.1 corporate ratings are endogenous in that they not only affect trade credit provided by suppliers and loans made by banks, but they are also directly influenced by the comments of those suppliers and banks. Here in this section, we focus on the sales growth rate, and report the impact of sales growth on trade credit and bank loans. There are three major reasons to employ sales growth for analysis. First, sales growth

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[12] Upon bankruptcies of a purchaser, suppliers can retrieve their goods from its stockyard. However, it is highly impossible to do it when their goods are already dispersed or suppliers are late detecting signals of bankruptcies. Once legal process starts for bankrupt firms, trade receivable is usually inferior to other collateral backed claims and its payoff is smaller than others.

[13] We follow the judgment by TSR not by the firm as to which is the main bank. There is said to be a bias for a firm to report a larger bank as its main bank since transactions with a larger and more reliable bank are thought to add credence to the firm.

[14] When banks make loans to small and medium companies, credit-guarantee corporations, funded by local governments and financial institutions, guarantees the loans. Once the loans become irrecoverable, the guarantee corporation pays off the outstanding amount to banks. A part of this is recovered by the government affiliated organization, Japan Small and Medium Corporation.

plays an important role in generating corporate ratings by credit research companies since it represents future growth prospects. Secondly, sales are instantly influenced by the outside business environment and are therefore believed to be more exogenous than corporate ratings.[15] At the very least, sales of a firm are not directly affected even when suppliers and banks talk about the firm to research company officials, while corporate ratings are definitely affected. The third and most important point is that sales growth moves closely with the growth in trade payables due to transaction demand. This makes trade credit quite different from bank loans. Bank loans are not necessarily responsive to sales or purchase. Upon sales of products trade credit appears while a loan contract and a purchase contract with suppliers are two distinct processes. In addition, actual correlation between purchase growth and loan growth is not significant. Hence, using the growth rate of sales, we dissect the change in trades payable into two parts: the portion of the change driven by transaction demand and the portion affected by other factors.

We start by dividing the samples by the sales growth rate, just as we did earlier with the ratings change in subsection 5.1 in order to observe discrepancies in financial conditions across the samples. We then calculate the growth rate of purchases using sales growth. Using this purchase growth rate, we extract the trade payable growth without the transaction demand and compare it with the growth rate in loans. Declines in trades payable are regarded as negative for financing, but once we eliminate the automatic part of the decrease in trades payable, it will be possible to compare the attitudes between suppliers and banks in financing firms during adverse business conditions. This possibly provides a new perspective on the substitutability between trade credit and bank loans.

5.2.1. Relationship between Sales Growth and Liabilities of a Firm

After dividing samples into four groups according to growth rate of sales, we present descriptive statistics in Tables 5-7 and 5-8. Responses of the trade payable-asset ratio and the loans-asset ratio are similar as to those observed in Table 5-2. When we observe a drop in sales, the trade payable ratio drops and the loans ratio increases. In contrast, when sales are surging, the trade payable ratio rises, while the loans ratio drops both for the short- and long-term. In Table 5-8, which covers non-balance sheet items, we observe that as sales decrease there are more loan rejections and increased requests to accept an interest rate rise. However, items such as the actual interest rate transacted in the past year and the number of banks per firm do not differ across quartiles.

5.2.2. Trade Credit Adjusted for Transaction Demand

Now we calculate the trade payable excluding the portion attributable to transaction demand and compare this adjusted value with loans. Before we begin it is necessary to clarify the relationship between flow and stock variables, which include sales, purchases and trades payable. In response to sales, firms have to purchase goods and services, and a certain portion of the purchase is paid with credit rather than paying completely with cash. This credit on account shows up on the liability side of the balance sheet as trade payable until the transaction is settled. Therefore, the stock value of trade payable is a function of purchase volume, the credit on account-purchase ratio and the length of payment terms. In addition, sales growth accounts for a significant portion of the purchase volume growth through sales and administrative costs.[16]

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[15] Some of the previous studies do not discuss the endogeneity problem but use sales growth rate as an explanatory variable for the trade payable amount. See Petersen and Rajan (1997, p. 683-684).

[16] It should be noted that by size or by industry, correlation between purchases and trade payable differs significantly. Wholesale and restaurant businesses, where the payment term is often short, have no choice but to use trades payable for financing. By contrast, real estate and construction industries, with

Provided that the credit on account ratio and the length of payment terms are stable, the purchase volume growth and the trade payable growth should be equal. The purchase growth is regarded to represent the transaction demand of a firm, and the deviation of the trade payable from the purchase represents the non-transactional factors of trade credit.

Based on this conjecture, we summarize the growth in purchases,[17] growth in trades payable and the growth in loans to calculate the trade payable growth rate adjusted for transaction demand. These results are presented in Table 5-9. In the table, the purchase growth and the trade payable growth differ significantly in that the trade payable growth rate becomes larger, while the loan growth becomes smaller as sales growth increases. However, once the trade payable growth is adjusted for the transaction demand factor, it behaves similarly to the loan growth in that both of them move upward as the sales growth increases. Hence, after adjusting for transaction demand, we find evidence for the substitutability between trade payable and loans.

6. Conclusion

In this article, we focused on trade credit, a corporate financing measure of significant importance. Following the previous literature, we attempted to add a new perspective using a Japanese panel data collected by the Small and Medium Enterprises Agency. This use of panel data primarily composed of small and medium businesses with non-balance sheet information is unique to the literature. Furthermore, considering the fact that trade credit co-moves with purchases or the amount of sales, we subtracted this portion to adjust the growth in trade credit for transaction demand.

We specified changes in corporate ratings and sales amount as idiosyncratic shocks to individual firms and saw the different responses of loans and trade credit. The trade payable ratio declines and the loan ratio surges as corporate ratings or sales drop. In other words, suppliers are quick to distance themselves from bad businesses, while financial institutions respond slowly to changes in business environment. However, the behavior of trade payable growth adjusted for the purchase growth is quite different from the behavior of the original trade payable growth. This adjusted growth rate moves quite similarly to the loan growth in that a tougher financial environment comes with a smaller decrease in credit and a better environment coexists with a larger credit decrease. This is in accordance with the fact that suppliers tend to give longer terms of payment for trade payable during difficult financial times. At the same time it is possible that they allow more purchases to be credited on accounts.

We also summarized the impact of these shocks on non balance sheet items. The results indicate mounting pressure from financial institutions on worse-off firms. However, the pressure takes the form of increases in interest rates and not necessarily more stringent loan contracts. Thus, while the

their longer payment terms, regard trades payable as only one of their many financing options. Correlation between sales growth and trade payable growth in the wholesale industry is 0.44, while the correlation in real estate is only 0.03.

In addition, there is an asymmetry in correlation between increasing and decreasing sales. Trade payable drops automatically when a long-term supply contract is terminated, while there are many other options to procure funds when supply contracts are initiated.

[17] Ono (2001) calculated the amount of purchase as (change in inventories) + (cost of sales) + (selling, general and administrative expenses) - (personnel expenses) - (depreciation). We do not have the inventory outstanding at the end of fiscal year 2000 or personnel expenses. However, since we have the number of employees, we multiply this by about 5.9 million yen per employee to approximate personnel expenses for each firm.

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short-term interest rate is sometimes higher no significant difference is observed in collateral provision or other conditions.

The above results alone are useful to think about the transmission mechanism of the monetary policy with proper econometric approach used to quantify the effect of idiosyncratic shocks. They can also be a starting point for further analysis. On the recent criticism against banks' unwillingness for loans and the withdrawal of loans, the above results provide many possible implications. It should be possible to determine if banks really are unwilling to lend or if bank actions can be justified in terms of job creation and destruction.

It is also useful to analyze the sample by size or industry. We state in the introduction that small businesses are more prone to depend on trade credit than larger firms are. Our sample is thought to represent small enterprises nevertheless, it may be important to repeat the analysis by firm size. In trade payable there are two forms, accounts payable usually in the form of an invoice and notes payable that explicitly specifies due date and other conditions. Very small firms are sometimes not allowed to use the accounts payable since they are thought to be too risky without any written contract. If these are the prevalent practices across the board, size matters in terms of the choice between accounts and notes payable. Also, as stated in Section 5.2.2, there are large discrepancies in the trade credit practices across industries. For example, retail industries do not assume a sizable amount of trades receivable since they expect to receive cash from customers. Wholesale businesses differ greatly in that they heavily use both trades receivable and payable. Therefore, more detailed inquiry by size and industry will add further meaningful implications to the literature.

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Table 4-1: Descriptive Statistics for Each Survey Year

	mean		median		standard deviation	
	year 2001	year 2002	year 2001	year 2002	year 2001	year 2002
sales	4014	3894	1529	1484	7814.9	7601.7
current profit	116	93	25	19	394.4	355.7
total asset	3983	3886	1296	1251	8347.7	8109.3
trade receivable	961	895	251	232	2773.5	2629.8
total liabilities	2897	2779	884	844	6692.2	6420.9
trade payable	707	648	195	175	1873.7	1727.3
loans	1580	1547	359	350	4793.5	4638.1
# of employees	90.0	88.0	40	39	167.1	164.5

*sample size for each year is 4,065 firms. Balance sheet items are in million yen.

Table 5-1: Relationship between Corporate Ratings and Balance Sheet Items Level

	first quartile	second quartile	third quartile	fourth quartile	Avg.
Change in ratings	Less than -2	Less than 0	Less than +1	Larger than or equal to +1	
number of samples	853	818	1218	760	3649
Total assets	4392	4229	4213	3418	4092
d(Total assets)	-200	-123	-110	+15	-108
Total liabilities	3196	3021	2931	2500	2924
d(total liabilities)	-165	-145	-136	-68	-131
Trade payable	701	701	685	663	688
d(trade payables)	-96	-75	-62	-27	-65
Loans	1871	1679	1558	1368	1619
d(loans)	-9	-58	-35	-44	-36
Short-term loans	973	858	804	660	826
d(short-term loans)	+25	-16	+2	-17	-1
Long-term loans	897	822	754	707	793
d(long-term loans)	-34	-43	-38	-27	-36

*Unit is in million yen.

Table 5-2: Relationship between Corporate Ratings and Balance Sheet Items Ratio to Assets

	first quartile	second quartile	third quartile	fourth quartile	Avg.
d(trade payable/total asset)	-2.04	-1.34	-1.07	-0.70	-1.28
d (loans/total asset)	+2.57	+0.98	+0.37	-1.55	+0.62
d(short-term loans/total asset)	+1.02	+1.05	+0.76	-0.74	+0.57
d(long-term loans/total asset)	+1.55	-0.07	-0.39	-0.81	+0.05

*Unit is in % point.

Table 5-3: Relationship between Corporate Ratings and Non-Balance Sheet Items

	first quartile	second quartile	third quartile	Fourth quartile	Avg.
number of city banks	2.236	2.182	2.336	2.193	2.283
---- (second) regional banks	2.452	2.452	2.186	2.050	2.286
---- shinkin banks and credit unions	1.790	1.442	1.588	1.557	1.598
ratio of firms newly providing collateral	0.048	0.055	0.044	0.052	0.049
---- personal guarantee	0.142	0.126	0.125	0.127	0.130
---- government backed guarantee	0.058	0.079	0.066	0.066	0.067
highest short-term interest rate	2.079	2.155	1.981	2.038	2.056
d(highest short-term interest rate)	+0.091	+0.165	+0.037	-0.014	+0.068
d(interest rate for outstanding loan)	-0.225	-0.280	-0.453	+1.818	+0.113
Ratio of firms without request for more stringent conditions	0.529	0.571	0.558	0.553	0.553
Ratio of firms with request for higher interest rate	0.229	0.181	0.171	0.194	0.194
Change in length of payment terms	1.969	1.980	1.956	1.940	1.961

*Unit of interest rates is %.

*Change in length of payment terms is the average of 1(=shorter than previous year), 2(=unchanged), and 3(=longer).

Table 5-4: Relationship between Corporate Ratings and Balance Sheet Items Ratio (By Main Bank Type)

● Shinkin Bank or Credit Union is the Main Bank in 2001

	first quartile	second quartile	third quartile	fourth quartile	Avg.
number of samples	96	91	141	99	427
d(trade payable/total asset)	-2.44	-0.65	-1.72	-0.19	-1.30
d(loans/total asset)	+4.22	+0.23	+2.55	-2.60	1.23
d(short-term loans/total asset)	+2.19	+0.52	+2.23	-2.13	0.85
d(long-term loans/total asset)	+2.03	-0.29	+0.32	-0.47	0.39

● Regional or Second Regional Bank is the Main Bank in 2001

	first quartile	second quartile	third quartile	fourth quartile	Avg.
number of samples	496	449	605	390	1940
d(trade payable/total asset)	-1.96	-1.12	-1.26	-0.55	-1.27
d (loans/total asset)	+2.23	+0.64	+0.48	-1.40	+0.59
d(short-term loans/total asset)	+0.89	+0.96	+1.10	-0.44	+0.71
d(long-term loans/total asset)	+1.34	-0.32	-0.62	-0.96	-0.12

Table 5-5: Relationship between Corporate Ratings and Balance Sheet Items Ratio (By Collateral, Personal or Government Guarantee)

● With Government Guarantee

	first quartile	second quartile	third quartile	fourth quartile	Avg.
number of samples	378	365	486	339	1568
d (trade payable/total asset)	-2.50	-1.25	-1.17	-0.54	-1.37
d (loans/total asset)	+4.07	+1.08	+0.27	-0.95	+1.11
d (short-term loans/total asset)	+1.88	+1.28	+0.47	-0.80	+0.72
d (long-term loans/total asset)	+2.19	-0.20	-0.19	-0.16	+0.39

● Without Collateral, Personal Guarantee, or Government Guarantee

	first quartile	second quartile	third quartile	Fourth quartile	Avg.
number of samples	91	81	150	77	399
d (trade payable/total asset)	-1.72	-2.18	-0.97	-1.36	-1.46
d (loans/total asset)	+1.32	-0.24	-0.39	-2.93	-0.46
d (short-term loans/total asset)	+0.12	-0.49	-0.53	-0.76	-0.42
d (long-term loans/total asset)	+1.20	+0.26	+0.14	-2.17	-0.04

Table 5-6: Relationship between Corporate Ratings and Balance Sheet Items Ratio (By Level of Corporate Ratings)

● Group with Lowest Ratings in year 2001 (Ratings lower than or equal to 54)

	first quartile	second quartile	third quartile	Fourth quartile	Avg.
number of samples	163	221	345	335	1064
d (trade payable/total asset)	-1.21	-1.43	-1.41	-0.88	-1.22
d (loans/total asset)	5.37	3.00	2.70	-1.16	1.96
d (short-term loans/total asset)	2.09	2.17	2.34	-0.88	1.25
d (long-term loans/total asset)	3.29	0.83	0.35	-0.28	0.70
highest short-term interest rate	2.731	2.748	2.607	2.463	2.611
d(highest short-term interest rate)	0.085	0.254	0.108	0.005	0.104
Ratio of firms without request for more stringent conditions	0.374	0.430	0.432	0.457	0.430
Ratio of firms with request for higher interest rate	0.405	0.348	0.325	0.260	0.321

● Group with Highest Ratings in year 2001 (Ratings higher than 65)

	first quartile	second quartile	third quartile	fourth quartile	Avg.
number of samples	205	155	214	82	656
d (trade payable/total asset)	-2.28	-1.89	-0.99	-1.20	-1.63
d (loans/total asset)	1.67	0.01	-0.32	-2.09	0.16
d (short-term loans/total	0.44	-0.40	0.05	-0.54	-0.01

asset)					
d (long-term loans/total asset)	1.22	0.41	-0.37	-1.55	0.17
highest short-term interest rate	1.497	1.438	1.398	1.392	1.438
d(highest short-term interest rate)	-0.010	-0.075	-0.009	-0.060	-0.032
Ratio of firms without request for more stringent conditions	0.614	0.665	0.636	0.743	0.649
Ratio of firms with request for higher interest rate	0.088	0.032	0.047	0.037	0.055

Table 5-7: Relationship between Sales Growth and Balance Sheet Items Ratio to Assets

	first quartile	second quartile	third quartile	fourth quartile	Avg.
Sales growth	<-13.1%	<-3.4%	<+4.3%	>=+4.3%	
number of samples	913	911	913	912	3649
d (trade payable/total asset)	-3.61	-1.63	-0.53	+0.65	-1.28
d (loans/total asset)	+3.77	+0.79	-0.70	-1.37	+0.62
d (short-term loans/total asset)	+2.35	+0.51	-0.24	-0.33	+0.57
d (long-term loans/total asset)	+1.42	+0.28	-0.46	-1.04	+0.05

*Unit is in % point.

Table 5-8: Relationship between Sales Growth and Non-Balance Sheet Items

	first quartile	second quartile	third quartile	fourth quartile	Avg.
Sales growth	<-13.1%	<-3.4%	<+4.3%	>=+4.3%	
number of city banks	2.180	2.357	2.303	2.274	2.283
---- (second) regional banks	2.278	2.201	2.170	2.506	2.286
---- shinkin banks and credit unions	1.549	1.474	1.744	1.626	1.598
ratio of firms newly providing collateral	0.033	0.044	0.058	0.061	0.049
---- personal guarantee	0.146	0.125	0.125	0.123	0.130
---- government backed guarantee	0.078	0.063	0.063	0.064	0.067
highest short-term interest rate	2.140	2.061	1.922	2.103	2.056
d(highest short-term interest rate)	+0.078	+0.102	+0.034	+0.058	+0.068
d(interest rate for outstanding loan)	-0.446	-0.094	+1.088	-0.130	+0.113
Ratio of firms without request for more stringent conditions	0.509	0.532	0.610	0.560	0.553
Ratio of firms with request for higher interest rate	0.222	0.227	0.156	0.171	0.194
Change in length of payment terms	1.964	1.965	1.934	1.981	1.961

*Unit of interest rates is %.

*Change in length of payment terms is the average of 1(=shorter than previous year), 2(=unchanged), and 3(=longer).

Table 5-9: Growth Rate of Loans, Trade Payable, and Trade Payable Adjusted for Purchase Amount

	first quartile	second quartile	third quartile	fourth quartile	Avg.
Trade payable (incl. transaction demand)	-31.69%	-12.84%	-5.05%	+4.62%	-11.32%
Amount of purchase 2	-33.09%	-8.58%	+1.74%	+18.64%	-5.33%
Trade payable 1(excl. transaction demand)*	-4.65%	-5.64%	-5.53%	-13.75%	-7.46%
Trade payable 2(excl. transaction demand)*	+1.40%	-4.26%	-6.80%	-14.02%	-5.99%
Loans	-3.25%	-6.34%	-4.86%	-6.69%	-5.83%
Change in length of payment terms**	1.9635	1.9654	1.9344	1.9810	1.9611

*Trade payable 1 does not deduct personnel expenses from the purchase amount, while trade payable 2 does.
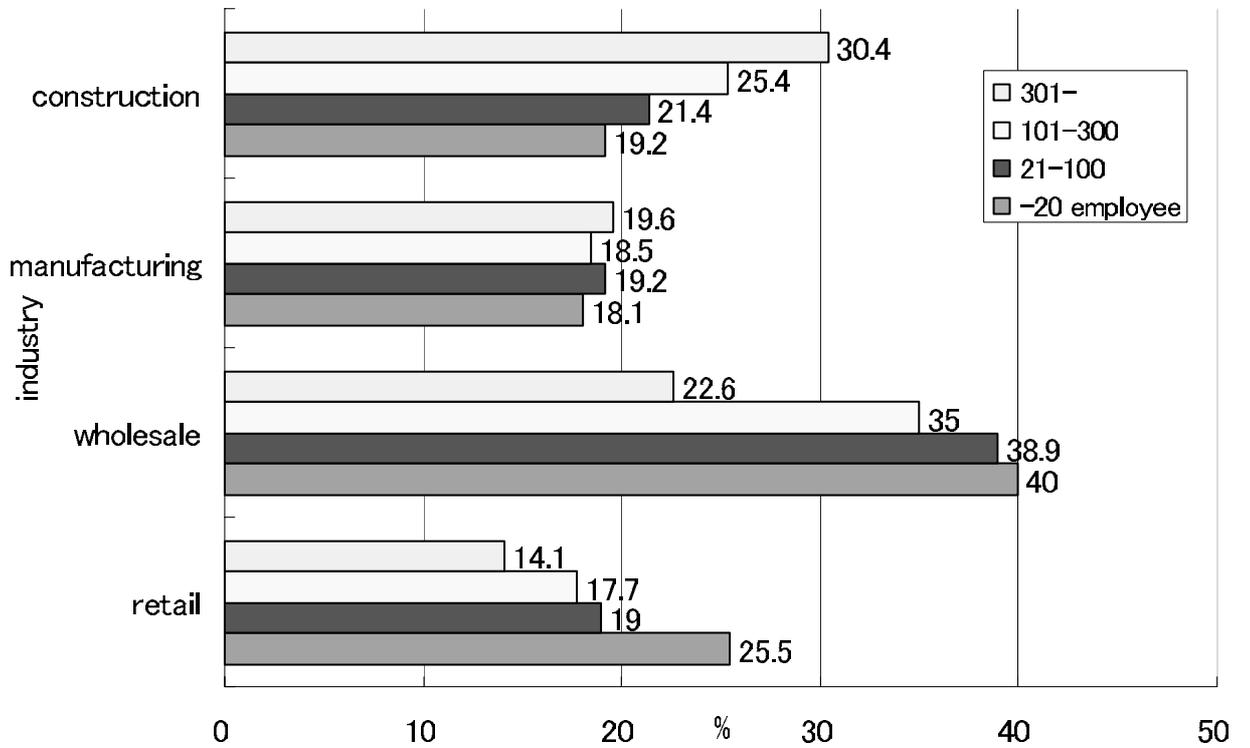
**Change in length of payment terms is the average of 1(=shorter than previous year), 2(=unchanged), and 3(=longer).

**Figure 2-1: Liabilities to Asset Ratio by Number of Employees**
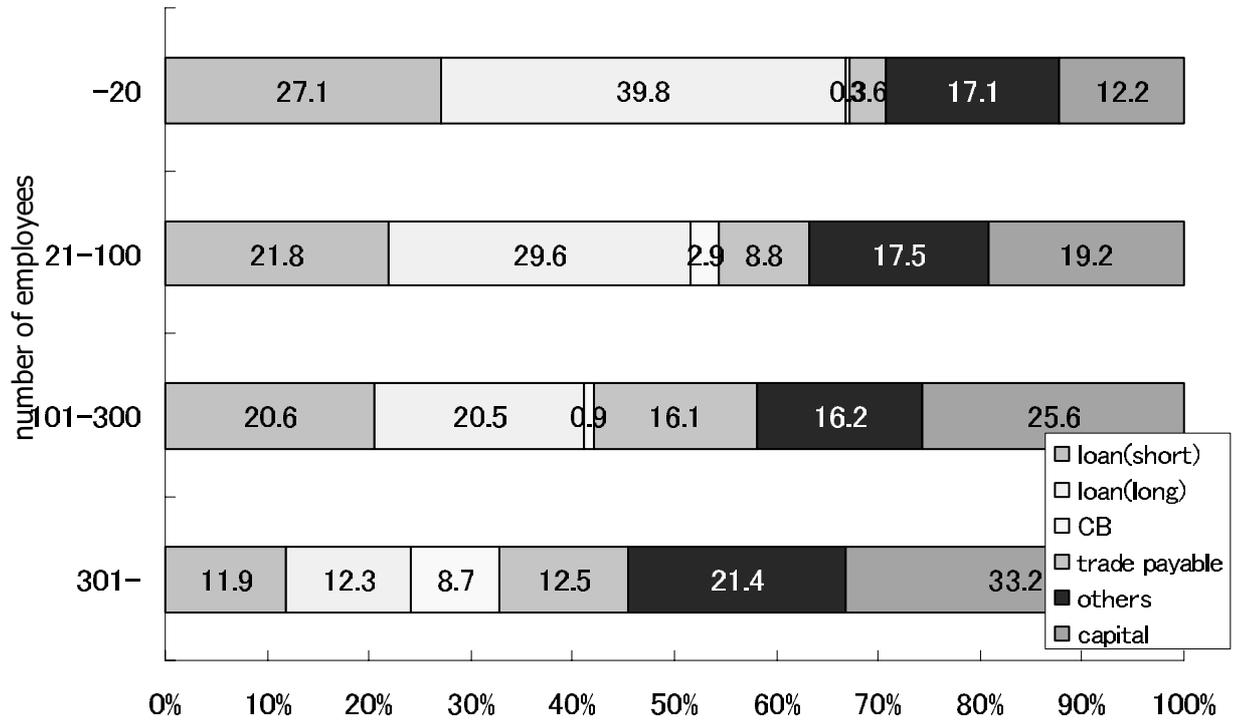
Source: Financial Statements Statistics of Corporations (Ministry of Finance of Japan)

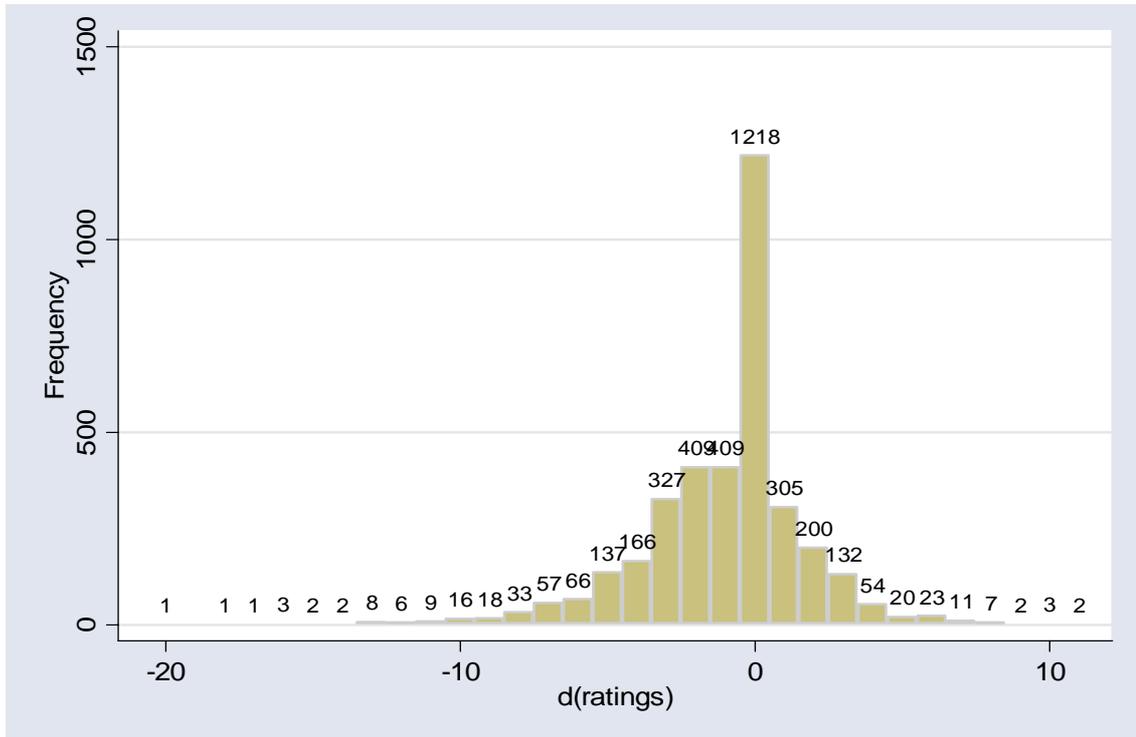**Figure 2-2: Trade Payable to Asset Ratio by Industry and employee number**

Legend:
- □ 301-
- □ 101-300
- ■ 21-100
- ▨ -20 employee

construction:
- 30.4
- 25.4
- 21.4
- 19.2

manufacturing:
- 19.6
- 18.5
- 19.2
- 18.1

wholesale:
- 22.6
- 35
- 38.9
- 40

retail:
- 14.1
- 17.7
- 19
- 25.5

industry (y-axis), % (x-axis: 0 10 20 30 40 50)

Source: Survey of Financial Environment (SME Agency of Japan)

Figure 5-1: Distribution of Corporate Ratings (year 2002)
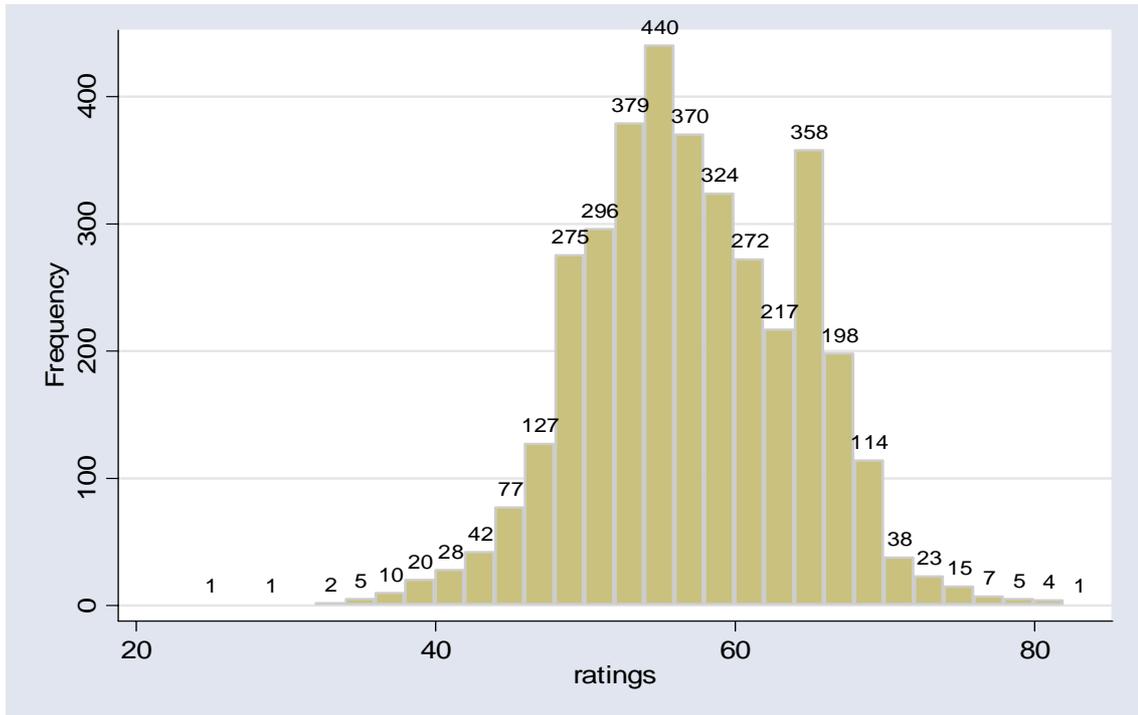
Source: Survey of Financial Environment (SME Agency of Japan)

Figure 5-2: Distribution of changes of ratings (From year 2001 to 2002)

Source: Survey of Financial Environment (SME Agency of Japan)