

Capital Market Frictions and Trade Credit Provisions

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Abstract

Recent literatures on corporate liquidity management such as Almeida, Campello, Weisbach (2004), Sufi (2007), among others, show that capital market frictions drive firms' financial decisions. In this paper, we empirically examine the role of trade credit as a liquidity substitute using a large sample of U.S. manufacturing firms. We have three main findings. First, we show that cash flows, short term debt ratio, asset tangibility, size, and growth potential determine the amount of credit firms receive and extend to their trading partners. Moreover, we show that these determinants have distinct effects for financially constrained and unconstrained firms. Second, using two groups of firms that experienced either credit rating upgrades or downgrades, we find a positive relation between firms' financial strength and their net trade credit provisions and this relationship is much stronger among firms that received rating upgrades. Third, we show that firms that received rating downgrades are more likely to save cash out of the cash flow. However, if they obtain additional liquidity from trade credit, their propensity to save cash decreases. We do not observe such relationships for firms that received rating upgrades. Taken together, our results provide some support for the redistribution view of trade credit (Meltzer, 1960). More importantly, we show that in an imperfect capital market, trade credit may not be a viable liquidity substitute for financially constrained firms.

1 Introduction

Several recent papers show that capital market frictions are directly related to firms' financial decisions. For example, Almeida, Campello, Weisbach (2004, henceforth ACW) offer both theoretical and empirical evidences showing that financially constrained firms tend to save cash out of cash flows in anticipation of future liquidity needs. In contrast, no such relation is found for financially unconstrained firms. Sufi (2007) extends ACW's work by examining firms' use of bank line of credit as opposed to cash. He shows that bank line of credit is a viable liquidity substitute only for firms that maintain high levels of cash flows.

This study empirically examines the role of trade credit as a liquidity substitute. The importance of trade credit as a source of short term finance is well documented in the literature (see Mian, and Smith, 1992, 1994; Petersen and Rajan, 1997; Ng, Smith and Smith, 1999; Wilner, 2000; Fisman and Love, 2003 etc.). Meltzer (1960) first presents the redistribution view of trade credit, which posits that large cash rich firms pass on liquidity via trade credit to their less liquid small customers during period of tight monetary policies. Nilsen (2002) finds that during periods of tight monetary policies, just like small firms which have limited alternatives for financing, large firms without bond ratings switch to more costly means of financing (trade credit). Love, Preve, Sarria-Allende (2007) examine the use of trade credit for firms that experienced the 1997 Asian financial crisis. They show that bank credit is redistributed via trade credit from firms in stronger financial positions to firms with weaker financial stands.

In this study, we examine the determinants of corporate trade credit provisions using a mix of firms that are financially constrained and those that are not. We construct

three proxies of trade credit: (1) the average number of days accounts receivables outstanding (AR_{360}), (2) the average number of days accounts payable outstanding (AP_{360}), and (3) the net trade credit provision in days (NC_{360}), which is the difference between days receivables outstanding and days payable outstanding. Our definition of financial constraint follows ACW. A firm is considered to be financially constrained if its long term debt does not receive S&P 500 credit rating. Using a sample of 51,545 U.S. manufacturing firms from 1985 to 2006, we obtain the following results: first, we show that financially constrained firms on average use more supplier credit (higher AP_{360}), but they are also more generous in providing credit to their customers (higher AR_{360}). On balance, we find no significant differences in net trade credit extension (NC_{360}) between constrained and unconstrained firms. Next, we focus on trade credit policies for a subset of firms that experienced either a credit rating upgrade (henceforth, Upgraders, 1,471 observations) or a credit rating downgrade (henceforth, Downgraders, 1,562 observations). Rating change acts as an exogenous liquidity shock, which offers an ideal environment to test how certain corporate decisions are reached.¹ Our results are strikingly different between these two groups. The univariate analyses reveal that Upgraders (Downgraders) experience positive (negative) changes in supplier credit (AP_{360}), customer credit (AR_{360}), and net credit (NC_{360}), suggesting that when firms' credit conditions improve, they are more likely to receive and redistribute trade credit, whereas when their credit conditions worsen, they also experience contractions in trade credit. These findings suggest that capital market imperfections not only constrain firms' access to external capital but also negatively affect their access to trade credit.

¹ For example, Kisgen (2006) examines corporate debt issuance prior to rating changes.

We next examine the relation between firms' financial strength and their provisions in trade credit using our Upgraders and Downgraders subsamples. We include cash flow to total asset ratio, short term debt ratio, and the net trade credit extension in days, all measured one period before the rating change takes place. These variables are included to control for firms' financial standing before the rating change. We reason that firms with strong financial stands are more capable to continue their trade credit practices when experiencing liquidity shocks.² We also use the contemporaneous measures of cash flow ratio, short term debt ratio, tangible asset ratio, and firm size as proxies of firms' financial strength. We find a much stronger positive association between financial strength and the net trade credit extension for our Upgraders sample than for the Downgraders sample.

Lastly, we investigate firms' cash holding decisions in the presence of trade credit. Building on the research of ACW, we test how firms' cash holding changes in relation to cash flow and the change in net trade credit. We show that for Downgraders subsample, when firms obtain liquidity as trade credit, they are less likely to save cash out of cash flows. Trade credit has no such effect for Upgraders. These results suggest that trade credit acts as liquidity substitute only for firms that lack access to external credit market.

Taken together, our results provide some support of the redistribution view of trade credit. More importantly, we show that capital market frictions directly influence firms' decisions to extend trade credit to their customers. In addition, suppliers seem to base their trade credit decisions on their customers' financial conditions. Customers experiencing financial difficulties do not automatically receive liquidity from their suppliers. Hence, trade credit may not be a viable liquidity substitute for firms that are in

² Blasio (2003), among others, suggests that corporate trade credit policies tend to remain stable over time.

most need of liquidity. Our research also has important policy implications, that is, in markets that are associated with high financing/transaction costs, trade credit might be an important financing alternative, but it is far from sufficient in resolving the liquidity problems faced by capital constrained firms. Improving capital accessibility should be the first order of business for the policy makers.

The remainder of this paper is organized as follows. Section 2 presents the sample and descriptive statistics. Section 3 discusses the empirical models. Section 4 presents the results and discussions. Section 5 concludes.

2 Sample and trade credit measures

2.1 Sample

Our sample is drawn from COMPUSTAT full coverage research annual database for all manufacturing firms (SICs 2000~3999) over 1985-2006. We require each firm-year observation to have data on holdings of cash and marketable securities, sales, costs of good sold, total assets, net income before extraordinary items, depreciation, year-end stock price and the number of shares outstanding. Following ACW, we consider a firm to be financially constrained if its long term debt does not have a Standard & Poor's rating, (COMPUSTAT data item 280) and financially unconstrained otherwise. We also use the rating information to construct our Upgraders and Downgraders sub-samples. Basically, an increase (decrease) in the value of data item 280 indicates a rating downgrade (upgrade) (see COMPUSTAT manual for the detailed information on S&P rating scales). The final sample consists of 51,545 firm-year observations. The Upgraders and Downgraders sub-samples have 1,471 and 1,562 observations, respectively.

2.2 Trade credit measures

We focus on three aspects of trade credit policies: customer credit (accounts receivable), supplier credit (accounts payable), and the net credit which is the difference between the first two measures. First, we compute the accounts payable turnover and the accounts receivable turnover ratios as follows:

$$A_R = \text{NetSales} / \text{AccountsReceivables}$$

$$A_P = \text{CostofGoodsSold} / \text{AccountsPayable}$$

The ratio of accounts receivable to sales represents what percent of sales is credit sales. The inverse of this ratio represents the turnover of receivables. The ratio of accounts payable to cost of goods sold can be viewed in a similar fashion. We multiply each of the above ratios by 360 (the number of days in a year) to obtain trade credit in days. The following three measures are used as our dependent variables in the regression analyses:

$$AR_360 = A_R * 360$$

$$AP_360 = A_P * 360$$

$$NC_360 = (AR_360 - AP_360)$$

These three measures represent the number of days credit is extended to customers, the number of days credit is obtained from suppliers, and the number of days net credit is extended by the firm, respectively.

3 Empirical models and descriptive statistics

3.1. Access to external capital and trade credit extensions

For manufacturing firms and firms in many other industries, they receive trade credit from their suppliers and simultaneously extend credit to their customers. We hypothesize

that certain financial attributes should determine whether firms offer trade credit to their customers and whether firms resort to supplier credit to meet liquidity needs. Specifically, we expect that cash flow, short term debt, asset tangibility, size, and growth potential to be important determinants of trade credit policies. Furthermore, we conjecture that the exact effects of these variables may depend on whether a firm has access to alternative sources of financing. Empirically, we conduct regression analysis based on the model specified in Equation (1):

$$TC_{it} = \alpha_i + \beta_1 * CashFlow_{it} + \beta_2 * STDebt_{it} + \beta_3 * PPE_{it} + \beta_4 * Size_{it} + Tobin'sQ_{it} + \varepsilon_{it}$$

(1)

We use three alternative measures *AR_360*, *AP_360*, and *NC_360* of trade credit (*TC*). We posit that firms' cash flow positions directly drive their decisions whether to offer credits to customers or whether to borrow from their suppliers. Following ACW, cash flow is computed as the sum of earnings before extraordinary items plus depreciation minus total dividends payments and scaled by lagged book value of total assets (*CashFlow*). Our *NC_360* measures the net credit provision, all else being equal, a firm that is more willing to extend credit to its customers and less dependent on supplier credit will have larger *NC_360*. The redistribution view of trade credit suggests that firms might redistribute bank credit as trade credit to their trading partners. Given the short term nature of trade credit, if redistribution of trade credit holds true, we expect a positive relation between the short term debt ratio (*STDebt*) and the net trade credit (*NC_360*). We use net property, plant, and equipment to total asset ratio (*PPE*) to control for the effect of tangible assets. Tangible assets can be used as collaterals, thus, creditors prefer to lend to firms with high tangible asset ratios. Hence, we expect high tangible assets firms are

less dependent on supplier credit, *ceteris paribus*. The relation between tangible assets and customer credit is less clear. Assuming high tangible assets firms have easy access to other means of finance such as bank credit and are willing to redistribute bank credit as trade credit, we would observe a positive relation between *PPE* and *AR_360*. However, if these firms are not inclined to pass on bank credit, we would not observe such a positive relation. We use the natural log of total assets (*Size*) to control for size effect. It is well established in the literature that size increases firms' ability to access external credit market. We expect larger firms to be less dependent on supplier credit, that is, larger firms demand less trade credit, thus a demand effect predicts a negative relation between supplier credit and firm size. On the other hand, similar to the case that banks prefer to lend to larger more established firms, we conjecture that suppliers are also more willing to extend credits to their larger clients (a supply effect) and probably offer trade credit at more favorable terms, therefore, a supply effect predicts a positive relation between supplier credit and firm size. Which effect dominates will be determined empirically. Lastly, we include Tobin's Q ratio to control for the effect of growth potential. All else being equal, high growth firms need funds to finance new projects, thus, we expect these firms to be more dependent on supplier credit (*AP_360*) and to be less likely to extend customer credit (*AR_360*).

3.2. Credit rating changes and trade credit provisions

Whether a firm's debt receives S&P credit rating gives some indication of the financial market's recognition of a firm's stature. All else being equal, firms with higher ratings have easier access to external credit. When firms' financial conditions change, rating agencies will reassign ratings. A credit rating upgrade (downgrade) is often

interpreted as suggesting the subject (firm) has experienced positive (negative) financial changes. In this section, we take advantage of these exogenous events (rating changes) to further explore how capital market frictions affect corporate trade credit.

Using the information on COMPUSTAT S&P long term debt rating (data item 280), we construct subsets of firms that receive either a rating upgrade (the year-on-year change in data item 280 is negative) or a rating downgrade (the year-on-year change in data item 280 is positive). The majority of our sample observations did not experience rating changes and we also could not compute this change in rating for the first firm-year observation for each firm in our sample, we end up with 1,471 observations in the upgrade group and 1,562 observations in the downgrade group.

Love et al. (2007) use a cross country panel data to study the impact of financial crisis on firms' trade credit policies. They find that firms in strong financial stands pre crisis tend to offer more trade credit to their customers. In addition, Blasio (2002) shows that trade credit terms display modest variation over time. Thus, we include three proxies that control for firms' financial stands prior to the changes in ratings. We conduct the following regression analyses for our Upgraders and Downgraders, respectively:

$$TC_{it} = \alpha_i + \beta_0 * X + \beta_1 * CashFlow_{it} + \beta_2 * STDebt_{it} + \beta_3 * PPE_{it} + \beta_4 * Size_{it} + Tobin'sQ_{it} + \varepsilon_{it}$$

(2)

X variable represents three different measures of firms' financial strength. The first one is the cash flow to total asset ratio computed one year prior to the rating change (*Lag_Cashflow*). All else being equal, firms with strong cash flows pre rating changes are more able to continue to provide trade credit. We also include the contemporaneous measure of cash flow ratio (*Cashflow*). In addition, we include the short term debt to total

asset ratio computed one year prior to the rating change (*Lag_STDebt*) and its contemporaneous measure (*STDebt*). In general, trade credits are offered on a short term basis. The redistribution view of trade credit predicts a positive relation between net trade credit provisions (*NC_360*) and short term borrowing (*STDebt*). The lagged short term debt ratio (*Lag_STDebt*) gives some indication of firms' ability to access short term credit market prior to the rating change. The third proxy used for financial strength is the lagged net trade credit provisions (*Lag_NC360*). This measure shows whether a firm is a net trade credit provider or receiver before the rating change. We would expect firms in weak financial positions to be more dependent on trade credit, therefore, not likely to be net trade credit provider. Whether firms in strong financial positions use more trade credit or not depends on the cost of trade credit financing. Traditionally trade credit is considered to be more costly than bank credit. However, suppose suppliers prefer to extend credit to firms in good financial standing at attractive prices, we may also observe financially unconstrained firms use large amounts of trade credit.

As control variables, we include the asset tangibility ratio (*PPE*), firm size (*Size*), and growth potential (*Tobin's Q*). We posit that these variables may have different impact on trade credit between Upgraders and Downgraders.

3.3. Cash Holdings and Trade Credit

ACW offer both theoretical and empirical evidence showing that financially constrained firms tend to save cash out of cash flows. The reasoning is that capital market frictions subject these firms to high transaction costs therefore may not be able to raise capital to fund positive NPV projects at reasonable prices in the future, thus, they store liquidity. Building on their insights, we conjecture that if trade credit is a liquidity

substitute, it should be more important for firms with limited access to external capital, For instance, a credit rating downgrade hampers a firm's ability to obtain external credit at reasonable prices, it might have to hoard cash for future investment needs. Suppose this firm receives more credits from their trading partners, all else being equal, it will be less likely to store cash.³ We do not expect such a relationship for firms received rating upgrades. To empirically test our hypothesis, we conduct the following regression analyses for Downgraders and Upgraders, separately:

$$Change_Cash_{it} = \alpha_i + \beta_0 * TC_Increase * CashFlow_{it} + \beta_1 * CashFlow_{it} + \beta_2 * STDebt_{it} + \beta_3 * PPE_{it} + \beta_4 * Size_{it} + Tobin'sQ_{it} + \varepsilon_{it}$$

(3)

Change_Cash is computed as the change in cash and cash equivalents scaled by total assets from year t-1 to year t . *TC_Increase* is a binary variable set to one if the change in net trade credit from one year prior to the rating change (t-1) to year t is negative and zero otherwise. Thus, when *TC_Increase* is equal to one, it suggests that firms reduce their net credit provision (*AR_360-AP_360*), which improves their liquidity positions. We predict β_0 to be negative and significant and β_1 to be positive and significant in the Downgraders regression. We expect no such significant relationships in the Upgraders regression since trade credit is used not for the liquidity purposes.

3.4. Descriptive statistics

We first present some univariate results in Table 1. Table 1 Panel A gives the results for the tests of mean differences between financially constrained and unconstrained firms. As expected, financially constrained firms keep more cash on hand

³ Here we assume the trading partner will not raise prices on trade credit at the same pace as the external creditors such as banks. Even if the trading partner increases prices, the firm might still substitute trade credit for bank credit for reasons unrelated to financing costs.

as a liquidity buffer. They are also more dependent on supplier trade credit and short term borrowing. Financially constrained firms on average have less free cash flow, fewer tangible assets, and are smaller in size. These financial characteristics probably contribute to their lack of access to external capital. Table 1 Panel B examines the financial characteristics of upgraders and downgraders. We expect upgraders to be in a better financial position to extend credit to their trading partners. Consistent with this view, we find that upgraders collect their accounts receivable much slower than downgraders. However, upgraders seem to pay their suppliers much slower as well. It is well recognized that trade credit is more expensive than traditional means of financing such as bank loans. Given that upgraders should have easier access to other means of credit as compared to downgraders, we postulate that their more frequent use of supplier credit probably is probably because suppliers offer better terms on these credits to upgraders. It is conceivable that suppliers would favor customers in strong financial standings. Panel B shows no significant differences in net credit provision between upgraders and downgraders. Downgraders are more dependent on short term debt which is subject to frequent renewals and interest rates resetting, giving banks more control over their borrowers. As expected, downgraders have less free cash flow relative to upgraders. Low cash flow most likely contributed to their rating changes. Table 1 Panel C presents the mean (median) change in *AR_360*, *AP_360*, and *NC_360* for upgraders and downgraders. It is apparent that rating downgrades (upgrades) have negative (positive) effects on firms' access to trade credit and in response these firms cut back on their customer credit.

Besides receiving credit ratings, ACW (2004) suggest that size is also an important factor that determines firms' access to external capital. We conduct a simple

test of mean differences in trade credit provisions based on whether firms' total assets values are above or below sample median. Table 1 Panel D gives the results. Our upgraders and downgraders samples exhibit similar patterns. For example, larger firms hold less cash, receive more supplier credit, suggesting that trade credit acts as a liquidity substitute and suppliers favor their large customers. However, larger firms do not appear to be more generous in redistributing credits to their customers. One interesting contrast between upgraders and downgraders is the size effect on short term borrowing. Among upgraders, larger firms use more short term debt, but larger downgraders on average use less short term debt. We interpret this result as suggesting that size offers advantages in getting short term financing only when firms financial conditions are improving.

Taken together, Table 1 presents some preliminary evidence suggesting that capital market frictions play an important role in corporate trade credit decisions (see Appendix A for all variable definitions). We conduct multivariate regression analyses and discuss the results in the next section.

4 Regression results and discussions

The regression results are given in Tables 2, 3, 4 using firm fixed effect model controlling for industry effect. We define industry based on the first two digits SIC code. Industry dummy is included but not reported in the tables.

4.1. Access to external capital and trade credit extensions

Table 2 gives the results of regression model in Equation (1). As predicted, we find some interesting contrasts between financially constrained and unconstrained firms. First, short term debt increases net trade credits (*NC_360*) for financially unconstrained firms, supporting the redistribution argument (Meltzer, 1960). In contrast, for financially

constrained firms, although short term debt is positively related to customer credit (AR_{360}) and supplier credit (AP_{360}), short term debt decreases net trade credit (NC_{360}), suggesting that for firms subject to capital market constraints, they become more dependent on short term debt as well as credit offered by trading partners. Furthermore, we find that size decreases (increases) net trade credits for financially unconstrained (financially constrained) firms. This seems to echo our univariate results suggesting that large financially unconstrained are less likely to be net trade credit providers compared to their smaller peers. The coefficients on the other control variables all have predicted signs.

4.2. Financial strength and trade credit

Table 3 reports the regression results of Equation (2). Table 3 Panels A, B, and C use each of the three measures of firms' financial strength prior to the rating change ($Lag_Cashflow$, Lag_STDebt , Lag_NC360) and Panel D include three measures simultaneously. Table 3 Panel A shows that strong cash flow position prior to rating changes is positively related to net trade credit, suggesting that firms with financial resources redistribute credit to their trading partners. Table 3 Panel B reports relatively weak results on the lagged short term debt variable. The pre rating level of short term credit increases customer credit (AR_{360}), therefore, lending some support to the redistribution view. The coefficients on Lag_NC360 reported in Table 3 Panel C all have expected signs. For example, the positive (negative) coefficient on Lag_NC360 in the AR_{360} (AP_{360}) regression is consistent with our view that firms that are in strong financial stands prior to rating changes are more likely to offer credits to their customers and less likely to depend on supplier credit. Table 3 Panel D shows that the lagged and

contemporaneous financial variables are much more significant in the Upgraders regressions. The signs on these variables are in general consistent with previous results. The contrast between Upgraders and Downgraders suggest that when firms experience negative liquidity shock such as credit rating downgrades, their ability and willingness to offer trade credit are less dependent on their financial stands. The significant coefficient on the lagged net credit variable across Upgraders and Downgraders regressions suggests that trade credit policies maintain some stability over time (Blasio, 2002).

4.3. Cash holdings and trade credit

Table 4 gives regression results that relate cash flow sensitivity of cash to trade credit. As expected, Downgraders and Upgraders have distinct results. Consistent with ACW, we find that financially constrained firms (Downgraders) tend to save cash out of cash flow as evidenced by the positive and significant coefficient on *Cashflow Ratio*. Moreover, the negative and significant coefficient on the interaction term (*Cashflow Ratio*TC_Increase dummy*) supports our hypothesis that as a liquidity substitute trade credit decreases propensity to save cash in financially constrained firms. For Upgraders, we find a very weak positive coefficient on the cash flow variable and no significance on the interaction term. In addition, some other interesting results are captured by short term debt ratio, tangible asset ratio, firm size, and Tobin's Q. The contrasting results on *STDebt* suggests that short term debt substitutes cash as a liquidity buffer only for firms with access to external credit. Similar reasoning applies to the interpretation of the tangible asset ratio (*PPE*). All else being equal, creditors favor firms with high tangible assets that can be used as collaterals in the loan agreements. For financially unconstrained firms (Upgraders), those with high *PPE* are able to maintain low cash balances. For

financially constrained firms (Downgraders), tangible assets do not improve firms' access to external capital, hence, can not reduce their cash holdings. Firm size also has opposite effects on cash holding for the two groups. Again only firms with access to external capital (those received upgrades) can reduce cash holdings when size increases. This finding is in spirit similar to Nilsen (2002) which shows that it is not the size per se but the ability access to external credit that drives the decision to use trade credit. Lastly, we observe a positive association between growth potential and cash holding for Upgraders, not for Downgraders.

5. Summary and conclusion

This paper examines how capital market frictions affect corporate trade credit policies using a sample of 51,545 U.S. manufacturing firms from 1985 to 2006. We find that financially constrained firms are more dependent on trade credit as a liquidity substitute. We also find some support for the redistribution view of trade credit. However, the redistribution from short term bank credit to trade credit is more likely to take place for financially unconstrained firms. Moreover, we establish the link between firms' financial strength and their trade credit provisions. We also show that this link is much stronger when firms financial conditions have improved. Lastly, we show that firms that experienced negative liquidity shocks tend to store cash and this tendency decreases if they obtain additional liquidity in the form of trade credit.

Taken together, the empirical results support our view that the ability to access external capital plays a crucial role in firms' trade credit decisions. Moreover, we offer some evidence suggesting that suppliers are more inclined to extend trade credit to

customers with strong cash flows and/or have access to alternative means of finance. For this reason, we conclude that trade credit is not a viable liquidity substitute for firms subject to financial constraints.

Appendix A: Variable definitions

Variables	Definitions
A_P	the ratio of costs of goods sold over accounts payable assuming all purchases are on credit
A_R	the ratio of net sales over accounts receivable
AP_360	the product of 360 and A_P
AR_360	the product of 360 and A_R
Cash ratio	the ratio of cash and marketable securities over total assets
Cashflow Ratio	the ratio of the sum of net income before extraordinary items plus depreciation minus net dividends over lagged total assets
Change_Cash	the ratio of year-on-year change in cash and equivalents over total assets
Financially unconstrained	a binary variable set equal to one if a firm's long term debt receives S&P credit rating and zero otherwise
Lag_Cashflow	Cash flow Ratio lagged by one year
NC_360	the difference between AR_360 and AP_360
Lag_NC360	NC_360 lagged by one year
STDebt Ratio	the ratio of short term debt over total assets
Lag_STDebt	Short term debt ratio lagged by one year
PPE Ratio	the ratio of net property plant and equipment over total assets
Size	the natural log of book value of total assets
TC_Increase dummy	a binary variable set equal to one if year-on-year change in net credit is negative, and zero otherwise.
Tobin's Q	the ratio of the market value of equity plus the book value of debt over the book value of total assets

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Table 1: Descriptive Statistics

Table 1 Panel A gives the results of the tests of mean differences for financially constrained and unconstrained firms in the manufacturing industry (SICs 2000~3999) between 1985-2006. Financially constrained firms are those whose long term debt does not have a Standard & Poor's rating (COMPUSTAT Data Item 280), the rest of the firms are considered to be financially unconstrained. Table 1 Panel B gives the results of the tests of mean differences for firms that received credit rating upgrades or downgrades. Table 1 Panel C presents the change in trade credit for upgraders or downgraders. Table 1 Panel D shows the results of the tests of mean differences with respect to firm size for upgraders or downgraders. See Appendix A for variable definitions.

Panel A:

Variables	Financially constrained	Financially unconstrained	T-statistic	
Cash ratio	0.19	0.09	65.16	***
AP_360	61.08	49.14	24.8	***
AR_360	66.48	58.69	23.72	***
NC_360	5.40	9.55	-8.09	***
A_P	0.17	0.14	24.8	***
A_R	0.18	0.16	23.72	***
STDebt Ratio	0.08	0.05	25.81	***
Cashflow Ratio	-0.05	0.07	-53.27	***
PPE Ratio	0.23	0.32	-44.97	***
TotalAssets	468	6,934	-38.88	***
Tobin's Q	1.60	1.19	25.13	***
# of Observations	41,606	9,939		

Panel B:

Variables	Upgrader	Downgrader	T-statistic	
Cash ratio	0.11	0.09	4.74	***
AP_360	50.96	46.02	4.24	***
AR_360	62.67	59.00	3.5	***
NC_360	11.71	12.98	-0.98	
A_P	0.14	0.13	4.24	***
A_R	0.17	0.16	3.5	***
STDebt Ratio	0.04	0.08	-10.26	***
Cashflow Ratio	0.09	0.01	16.17	***
PPE Ratio	0.29	0.31	-2.58	***
TotalAssets	4,425	5,663	-2.78	***
Tobin's Q	1.38	0.88	11.1	***
# of Observations	1,471	1,562		

Table 1 Panel C:

	Upgraders		Downgraders	
	Mean	Median	Mean	Median
change in AR_360	0.533	0.153	-0.985	-0.266
change in AP_360	0.546	0.231	-0.738	-0.171
change in NC_360	0.850	0.280	-0.839	-0.716
# of Observations	1,471	1,471	1,562	1,562

Table 1 Panel D:

	Upgraders			Downgraders		
	Firm size above group median	Firm size below group median	T-statistic	Firm size above group median	Firm size below group median	T-statistic
Cash ratio	0.10	0.12	-3.07 ***	0.08	0.10	-3.78 ***
AP_360	53.95	47.96	3.21 ***	49.75	42.28	5.44 ***
AR_360	62.19	63.14	-0.6	59.94	58.06	1.36
NC_360	8.24	15.18	-3.47 ***	10.19	15.78	-3.35 ***
A_P	0.15	0.13	3.21 ***	0.14	0.12	5.44 ***
A_R	0.17	0.18	-0.6	0.17	0.16	1.36
STDebt Ratio	0.05	0.03	4.98 ***	0.07	0.09	-2.17 **
Cashflow Ratio	0.10	0.08	3.95 ***	0.03	-0.01	6.19 ***
PPE Ratio	0.32	0.27	5.25 ***	0.32	0.29	3.62 ***
TotalAssets	8,231	613	16.25 ***	10,756	570	14.89 ***
Tobin's Q	1.45	1.31	1.76 *	0.91	0.85	1.15
# of Observations	736	735		781	781	

Table 2: Capital Market Frictions and Trade Credit Provisions

Table 2 examines whether capital market frictions affect firms' trade credit provisions. Financially constrained firms are those whose long term debts do not receive S&P credit ratings. Otherwise a firm is considered to be financially unconstrained. Industry dummies based on first two digits SIC code are included. See Appendix A for variable definitions. T-values are given in the parentheses. ***, **, *, indicate significance levels at 1%, 5%, 10%, respectively.

Dependent Variable	AR_360 Financially unconstrained	AR_360 Financially constrained	AP_360 Financially unconstrained	AP_360 Financially constrained	NC_360 Financially unconstrained	NC_360 Financially constrained
Intercept	73.55*** (35.99)	64.68*** (53.49)	19.63*** (7.77)	57.67*** (25.44)	53.92*** (18.69)	7.01*** (2.97)
Cashflow Ratio	-3.45 (-1.40)	-10.46*** (-21.32)	-16.63*** (-5.47)	-38.89*** (-42.28)	13.18*** (3.80)	28.43*** (29.69)
STDebt Ratio	44.92*** (14.19)	3.43** (2.54)	22.78*** (5.82)	40.15*** (15.87)	22.14*** (4.95)	-36.73*** (-13.94)
PPE Ratio	-32.43*** (-18.14)	-32.61*** (-26.04)	-17.88*** (-8.09)	-17.82*** (-7.59)	-14.55*** (-5.77)	-14.79*** (-6.05)
Size	1.04*** (6.09)	1.90*** (17.70)	3.09*** (14.59)	-2.44*** (-12.10)	-2.05*** (-8.46)	4.34*** (20.69)
Tobin's Q	-1.31*** (-5.87)	-0.31*** (-3.77)	5.48*** (19.89)	3.81*** (24.42)	-6.79*** (-21.58)	-4.12*** (-25.39)
Industry dummy	Included	Included	Included	Included	Included	Included
Observations	1,471	1,562	1,471	1,562	1,471	1,562
R-Square	0.25	0.10	0.18	0.14	0.14	0.11

Table 3 Financial Strength and Trade Credit

Table 3 gives the regression results that relate firms' financial strength to their trade credit policies using a subset of our sample (firms that received credit rating upgrades or downgrades). Industry dummies based on first two digits SIC code are included. See Appendix A for variable definitions. T-values are given in the parentheses. ***, **, *, indicate significance levels at 1%, 5%, 10%, respectively.

Panel A:

Dependent variable	AR_360		AP_360		NC_360	
	Downgrader	Upgrader	Downgrader	Upgrader	Downgrader	Upgrader
Intercept	68.76 *** (14.54)	83.47 *** (14.94)	23.05 *** (4.71)	22.39 *** (3.15)	45.71 *** (7.50)	61.08 *** (7.87)
Lag_Cashflow	-1.16 (-0.20)	0.78 (0.12)	-16.56 *** (-2.73)	-20.07 ** (-2.48)	15.39 ** (2.04)	20.85 ** (2.37)
Cashflow Ratio	-0.47 (-0.09)	-6.17 (-1.07)	-17.95 *** (-3.21)	-14.41 * (-1.95)	17.48 ** (2.51)	8.24 (1.02)
STDebt Ratio	22.12 *** (4.68)	88.67 *** (6.95)	13.09 *** (2.67)	43.07 *** (2.65)	9.03 (1.48)	45.60 ** (2.57)
PPE Ratio	-27.98 *** (-6.05)	-39.84 *** (-7.53)	-22.04 *** (-4.60)	-8.43 (-1.25)	-5.94 (-1.00)	-31.41 *** (-4.27)
Size	1.80 *** (4.31)	0.45 (0.84)	2.90 *** (6.71)	3.08 *** (4.49)	-1.10 ** (-2.04)	-2.63 *** (-3.52)
Tobin's Q	-2.01 *** (-2.76)	-1.01 ** (-2.01)	4.41 *** (5.84)	2.27 *** (3.55)	-6.41 *** (-6.83)	-3.28 *** (-4.71)
Industry dummy	Included	Included	Included	Included	Included	Included
Observations	1,562	1,471	1,562	1,471	1,562	1,471
R-Square	0.22	0.23	0.17	0.12	0.12	0.09

Table 3 Panel B:

Dependent variable	AR_360		AR_360		AP_360		AP_360		NC_360		NC_360	
	Downgrader		Upgrader		Downgrader		Upgrader		Downgrader		Upgrader	
Intercept	68.43	***	82.61	***	24.07	***	21.27	***	44.35	***	61.34	***
	(14.53)		(14.77)		(4.92)		(2.98)		(7.29)		(7.87)	
Lag_STDebt	11.24	*	20.71	**	3.31		16.36		7.93		4.35	
	(1.88)		(2.16)		(0.53)		(1.34)		(1.03)		(0.33)	
Cashflow Ratio	-1.23		-6.58		-23.36	***	-21.53	***	22.13	***	14.95	**
	(-0.24)		(-1.22)		(-4.44)		(-3.12)		(3.38)		(1.99)	
STDebt Ratio	19.26	***	76.61	***	12.76	**	37.01	**	6.51		39.59	**
	(3.88)		(5.53)		(2.47)		(2.09)		(1.01)		(2.05)	
PPE Ratio	-28.04	***	-39.53	***	-23.01	***	-10.07		-5.03		-29.47	***
	(-6.09)		(-7.52)		(-4.81)		(-1.50)		(-0.85)		(-4.02)	
Size	1.78	***	0.51		2.71	***	3.02	***	-0.93	*	-2.52	***
	(4.32)		(0.94)		(6.32)		(4.40)		(-1.74)		(-3.36)	
Tobin's Q	-1.94	***	-0.93	*	4.41	***	2.22	***	-6.35	***	-3.14	***
	(-2.67)		(-1.85)		(5.83)		(3.47)		(-6.76)		(-4.51)	
Industry dummy	Included		Included		Included		Included		Included		Included	
Observations	1,562		1,471		1,562		1,471		1,562		1,471	
R-Square	0.22		0.23		0.16		0.12		0.11		0.09	

Table 3 Panel C:

Dependent variable	AR_360		AR_360		AP_360		AP_360		NC_360		NC_360	
	Downgrader		Upgrader		Downgrader		Upgrader		Downgrader		Upgrader	
Intercept	54.65	***	68.56	***	37.39	***	40.09	***	17.26	***	28.47	***
	(12.64)		(13.11)		(8.15)		(5.95)		(3.64)		(4.59)	
Lag_NC360	0.29	***	0.29	***	-0.27	***	-0.35	***	0.57	***	0.65	***
	(18.58)		(16.04)		(-16.29)		(-15.13)		(32.69)		(29.94)	
Cashflow Ratio	-9.87	**	-5.46		-14.85	***	-21.55	***	4.98		16.09	***
	(-2.14)		(-1.10)		(-3.04)		(-3.37)		(0.99)		(2.73)	
STDebt Ratio	17.95	***	83.17	***	17.53	***	52.96	***	0.42		30.22	**
	(4.19)		(7.10)		(3.86)		(3.51)		(0.09)		(2.17)	
PPE Ratio	-24.24	***	-32.66	***	-26.55	***	-18.87	***	2.31		-13.79	**
	(-5.81)		(-6.71)		(-6.00)		(-3.01)		(0.51)		(-2.39)	
Size	2.08	***	1.04	**	2.44	***	2.27	***	-0.35		-1.23	**
	(5.58)		(2.10)		(6.16)		(3.55)		(-0.87)		(-2.08)	
Tobin's Q	-0.55		-0.61		3.04	***	1.67	***	-3.59	***	-2.28	***
	(-0.83)		(-1.32)		(4.32)		(2.82)		(-4.93)		(-4.17)	
Industry dummy	Included		Included		Included		Included		Included		Included	
Observations	1,562		1,471		1,562		1,471		1,562		1,471	
R-Square	0.36		0.34		0.29		0.24		0.48		0.44	

Table 3 Panel D:

Dependent variable	NC_360	
	Downgrader	Upgrader
Intercept	17.29 *** (3.63)	28.76 *** (4.63)
Lag_NC360	0.57 *** (32.57)	0.65 *** (29.94)
Lag_Cashflow	4.16 (0.70)	13.62 * (1.95)
Lag_STDebt	8.15 (1.35)	-14.79 (-1.39)
Cashflow Ratio	3.39 (0.63)	12.09 * (1.90)
STDebt Ratio	-1.54 (-0.31)	41.01 *** (2.71)
PPE Ratio	2.06 (0.45)	-15.17 *** (-2.62)
Size	-0.41 (-0.99)	-1.33 ** (-2.25)
Tobin's Q	-3.55 *** (-4.88)	-2.41 *** (-4.39)
Industry dummy	Included	Included
Observations	1,562	1,471
R-Square	0.48	0.44

Table 4 Cash Flow Sensitivity of Cash and Trade Credit

This table presents the regression results relating the change in cash holdings to cash flow and the change in trade credit. Industry dummies based on first two digits SIC code are included. See Appendix A for variable definitions. T-values are given in the parentheses. ***, **, *, indicate significance levels at 1%, 5%, 10%, respectively.

Dependent variable: Change_Cash	Downgraders		Upgraders	
Intercept	-0.043	**	0.090	***
	(-2.49)		(4.17)	
Cashflow Ratio	0.224	***	0.043	*
	(8.55)		(1.71)	
Cashflow Ratio*TC_Increase dummy	-0.143	***	0.004	
	(-4.04)		(0.12)	
STDebt Ratio	0.004		-0.117	**
	(0.23)		(-2.37)	
PPE	-0.022		-0.140	***
	(-1.29)		(-6.87)	
Size	0.008	***	-0.006	***
	(5.34)		(-2.86)	
Tobin's Q	-0.001		0.006	***
	(-0.26)		(3.34)	
Industry dummy	Included		Included	
Observations	1,562		1,471	
R-Square	0.085		0.087	