

# The Impact of Bank Lending Relationships On Corporate Cash Policy

Huajing Hu<sup>1</sup>

Yili Lian<sup>2</sup>

Chih-Huei Su<sup>3</sup>

## Abstract

The benefits of private information production have been studied in the field of relationship banking. This paper examines the impact of bank relationships on corporate cash policy. We find that firms with lending relationships retain less cash, and save less cash out of cash flow. Furthermore, we find that the effect of lending relationships is more profound for financially unconstrained firms.

---

<sup>1</sup> Robert B. Willumstad School of Business, Adelphi University, Garden City, New York, NY 11530. Tel: (516) 833-8162; fax: (516)877-4607; e-mail: hhu@adelphi.edu.

<sup>2</sup> Penn State Worthington Scranton, Business Building 114, 120 Ridge View Drive, Dunmore, PA 18512. Tel: (570) 963 2662; email: yx150@psu.edu.

<sup>3</sup> Zicklin School of Business, Box B10-225, Baruch College, New York, NY 10010. Tel: (646) 312-3490; fax: (646) 312-3451; e-mail: chihhuei.su@baruch.cuny.edu.

# The Impact of Bank Lending Relationships On Corporate Cash Policy

## Abstract

The benefits of private information production have been studied in the field of relationship banking. This paper examines the impact of bank relationships on corporate cash policy. We find that firms with lending relationships retain less cash, and save less cash out of cash flow. Furthermore, we find that the effect of lending relationships is more profound for financially unconstrained firms.

## I. Introduction

Keynes' (1936) argues that the liquidity management decision is irrelevant if the market works well and there is no wedge between internal financing and external financing. However, due to market frictions, there is a link between financing frictions and a precautionary demand for cash holdings. Graham and Harvey (2001) find that many CFOs view the liquidity decision as one of the most important decisions they make. Liquidity management has been an important topic in corporate finance research<sup>1</sup>.

One branch of the literature is related to the optimal level of liquidity that a firm should maintain. Theory predicts that optimal cash flow increases with investment opportunities and the size of liquidity shortfall. Empirically, Opler, Pinkowitz, Stulz and Williamson (1999) examine the determinants and implications of cash holdings and marketable securities by publicly traded U.S. firms. They find that firms with more growth opportunities and riskier cash flows keep higher ratios of cash to total non-cash assets, while firms with better access to capital markets have relatively lower ratios of cash to total non-cash assets.

In addition, Almeida, Campello and Weisbach (2004) predict that the propensity to save cash out of cash flow is related to whether the firm is financially constrained. Intuitively, if a firm is financially constrained, it has a strong incentive to save cash out of cash flow to safeguard against future liquidity shortfall, which leads to a higher cash flow sensitivity of cash.

Those literatures mainly focus on how firm characteristics affect firms' liquidity management. In this paper, we will examine firms' liquidity management from a different perspective, more specifically, how bank lending relationships affect firms' liquidity policy. There are at least two reasons why this topic is important. First, there is evidence that bank loan increases substantially (Figure 1) and has been the primary source of external financing<sup>2</sup>.

---

<sup>1</sup> Chudson (1945), Vogel and Maddala (1967), Baskin (1987), John (1993), Hardford (1998), etc.

<sup>2</sup> Bharath et al. (2008), Graham et al. (2008)

Second, the bank lending relationship reduces information asymmetry that leads to the wedge between internal financing and external financing. Existing banking literature has extensively examined the role of banks in financing and monitoring real economic activity. Banks establish monitoring mechanisms and maintain lending relationships with borrowers, thereby generating private information that can be used to certify a firm's valuation and mitigate information asymmetry between shareholders and managers of the firm (e.g. Diamond (1984, 1991) and Leland and Pyle (1977)). In addition, Banks monitor and certify firm operations, thereby reducing financing frictions and preventing managers from extensive expropriations. In this regard, we anticipate that the lending relationship affects a firm's liquidity policy.

In this article, we examine whether corporate cash holdings and cash flow sensitivity of cash vary systematically with bank lending relationship. In other words, does the bank lending relationship affect a firm's liquidity management?

Following existing literature (Bhather al. 2007), we use three approaches to measure the bank lending relationship. We use a dummy variable, defined as 1 if there is bank lending over the past three years, 0 otherwise. In addition, we also use two intensity variables. One is defined as the maximum ratio of the number of deals by a bank to a borrower in the last three years over the total number of deals by the borrower in the last three years. The other intensity variable is defined as the maximum ratio of the dollar amount by a bank to a borrower in the last three years over the total dollar amount of deals by a borrower in the last three years.

First, we examine how bank lending relationships affect a firm's cash holding. We find that firms without bank lending relationships maintain a higher level of liquid assets than firms with lending relationship.

Second, we examine whether the cash flow sensitivity of cash varies with bank lending relationships. We find evidence that firms with lending relationships hoard less cash out of cash flow after controlling for numerous firm characteristics. In addition, Almeida et. al. (2004) find that financially constrained

firms have higher cash flow sensitivity. Therefore, using different measures of financial constraints, we further examine whether the effect of bank lending relationships on cash flow sensitivity is different between financially constrained firms and financially unconstrained firms. Interestingly, we find that the benefit of lending relationships only exists among the financially unconstrained firms.

There is concern that certain firm characteristics that lead to a close lending relationship simultaneously affect a firm's stored liquidity. Therefore, to mitigate the selectivity problem, we use two-stage least square IV regression. Our results are similar after controlling for potential selectivity bias.

Overall, our results suggest that firms benefit from maintaining a close lending relationship. However, the benefits are limited to financially unconstrained firms.

This paper contributes to several areas of the finance literature. First, this paper contributes to corporate liquidity management literature. Extant literature examines how firm characteristics affect corporate liquidity management. This paper examines the question from a different perspective, whether firms benefit from a close lending relationship.

Second, this paper contributes to the lending relationship literature. There is research that finds that the lending relationship alleviates the financial constraints through lowering the interest rate and increasing credit availability. This paper tests the benefits of lending relationships from another angle and also helps to explain why firms maintain a close lending relationship.

The rest of the paper is organized as follows. Section II reviews the literature and develops hypotheses. Section III describes the data and summary statistics. Section IV reports the empirical results and Section V summarizes the findings.

## **II. Literature Review and Hypothesis Development**

### **1. Liquidity Management Literature review**

Keynes (1936) argues that the importance of balance sheet liquidity is affected by the extent to which firms have access to external financing. If there is no market friction, corporate liquidity is

irrelevant. However, due to information asymmetry, there is a wedge between internal financing and external financing. Therefore, firms have to maintain a certain level of leverage to safeguard against future investment needs to avoid the risk of being short of capital and forced to cut back investment.

One branch of the extant literature focuses on the optimal level of liquidity. Opler, Pinkowitz, Stulz, and Williamson (1999) predict that firms maintain a level of cash when the marginal cost of liquid asset shortage is equal to the marginal cost of liquidity assets as shown in Figure 2. They find empirical evidence that firms with more growth opportunities and cash flow volatility tend to hold more cash, while firms with better access to external financing tend to hold less cash.

Another branch focuses on the cash flow sensitivity of cash that is first introduced by Almeida, Campello and Weisbach (2004). Using a sample of manufacturing firms for the time period between 1971 and 2000, they find that financially constrained firms with restricted access to external capital markets save cash out of cash flow, while unconstrained firms do not.

## **2. Bank lending Relationship Literature**

The field of relationship banking has extensively explored the benefits and costs of bank lending relationships. Banks play the role of delegated monitors and produce private information about their borrowers, which leads to less information asymmetry. The benefit of such monitoring is found in the positive market reaction to the granting of bank loans, particularly by relationship banks (see James (1987) and Lummer and McConnell (1989)). In addition, this benefit has been transferred to borrowers through better loan terms, looser collateral requirements and greater funds availability. (Petersen and Rajan (1994, 1995), Berger and Udell (1995, 1996), and Bharath, Dahiya, Saunders and Srinivasan (2011))

## **3. Hypotheses Development**

Market frictions create a wedge between internal and external financing. Therefore, firms have to maintain a certain level of liquid assets. The optimal level of liquid assets is determined by the marginal cost of liquid asset shortage and the marginal cost of liquid assets, as shown in Figure 2.

The presence of bank lending relationships reduces the information as well as the wedge between internal financing and external financing. Therefore, we hypothesize that such benefits lower firms' costs of capital as well as the demand for holding high levels of cash.

In Figure 2, the marginal cost curve will shift leftward, which generates a lower optimal liquidity level.

*Hypothesis 1: The presence of bank lending relationships decreases the level of corporate cash holdings.*

Almeida et al. (2004) find that firms save cash out of cash flow if firms have restricted access to external capital markets, which is called as “the cash flow sensitivity of cash”. The sensitivity of cash to cash flow should increase with the wedge between internal financing and external financing. Accordingly, we construct Hypothesis 2 as follows.

*Hypothesis 2: The presence of a prior bank lending relationship decreases the cash flow sensitivity of cash.*

Almeida et al. (2004) find that the cash flow sensitivity of cash varies with financial constraints. Financially constrained firms have higher sensitivity than financially unconstrained firms. Therefore, the impact of the lending relationship on sensitivity might be different due to different level of financial constraints.

*Hypothesis 3: The impact of lending relationship on cash-flow sensitivities for financially constrained firms is different from those for financially unconstrained firms.*

### **III. Sample Description**

## 1. Data sources, variable definitions, and sample selection

Our sample is obtained from COMPUSTAT and covers the time period 1990 to 2012.<sup>3</sup> We exclude financial firms and utility firms (SIC codes 4900 through 4999 or codes 6000 through 6999) and firms with book value of assets, net fixed capital, or sales less than one million dollar. In addition, only firms with at least two years in the time series are kept in our sample. In order to minimize the impact of outliers, we trim all the firm-level variables at 1% and 99%.

We obtain Bank loan data from the Loan Pricing Corporation (LPC) DealScan database. Using the DealScan Compustat link table provided by Chava and Roberts (2008), we match the corresponding loan records to Compustat data.

Following Bharath et al. (2007), the bank lending relationship is measured by an intensity variable, as defined either in terms of total number of deals or in terms of total dollar amount of deals.

$$Rdeals_M = \frac{\text{Number of deals by bank}_M \text{ to borrower}_i \text{ in last 3 years}}{\text{total number of deals by borrower}_i \text{ in last 3 years}}$$

$$Ramount_M = \frac{\text{Dollor amount by bank}_M \text{ to borrower}_i \text{ in last 3 years}}{\text{Total dollar amount of deals by borrower}_i \text{ in last 3 years}}$$

Because firms might borrow from multiple banks simultaneously, we utilize a firm's largest relationship intensity across all the relationship banks. We use the following three variables to define the lending relationship.

- **max Rdeals**= Maximum of Rdeals of borrower I across all banks.
- **max Ramount**= Maximum of Ramount of borrower I across all banks.
- **Relationship Dummy (RLdummy)** equals to one if either max Rdeals or max Ramount exceeds zero, and zero otherwise.

For the first two measures, the larger the maximum relationship intensity is, the more bank-dependent the firm is.

---

<sup>3</sup> Dealscan database starts from 1987, and we require three-year window to calculate bank lending relationships .



Our final sample is an unbalanced panel data of 53501 observations.

## 2. Summary Statistics

In panel A of Table 1, we report the means, medians and standard deviations of the key firm level variables for the whole sample, such as Cash Holdings, Q, Cash Flow, Size, Acquisition, Expenditures, NWC, Short-term Debt for the subsamples with bank relationship and without bank relationships. In Panel B of Table 1, we provide the summary statistics for firms with lending relationships. Panel C of Table 1 reports the summary statistics for firms without lending relationships. Panel D of Table 1 provides statics for firms that do not have data available in LPC. We find that the cash holding is significantly less for firms with lending relationships (0.10) than for firms without lending relationships (0.163). Firms that never had any lending relationships keep the highest level of cash (0.259). This is consistent with our expectation that firms with lending relationship hold less liquidity assets, especially cash and marketable securities.

## IV. Empirical Results

### 1. Corporate Cash Holdings

In this section, we first investigate the impact of lending relationships on the corporate cash holding policy to test Hypothesis 1. We construct the model as follows:

$$Cash\ Holdings_{i,t} = \beta Lending\ Relationship_{it} + \gamma Firm - Specific_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable, Cash Holdings, refers to three corporate cash holding measurements, including the ratio of cash to total assets, the ratio of cash to net assets, and the natural logarithm of the ratio of cash to net assets (e.g. Bates et al. (2009)). We use the ratio of cash to total assets as the main measure of corporate cash holdings and the other two measures as robustness tests. The key independent variable of interest is LendingRelationship, which can be represented by lending relationship dummy varalbe, Max\_Rdeals, and Max\_Ramount, respectively (see Bharath et al. (2007)). Following Opler et al.

(1999), Firm-Specific variables include size, market-to-book ratio, cash flow, net working capital, and payout to shareholders. Size is defined as the natural log of assets. Market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Cash Flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes, and common dividends. Net working capital is non-cash working cash capital divided by total assets. Payout to shareholders is the sum of cash dividends and stock repurchases over assets. Industry sigma measures the volatility of an industry's cash flow for a 10-year period. Industries are defined by 2-digit SIC codes.

Table 2 provides the regression results with the ratio of cash to net assets as the dependent variable in columns (1), (2) and (3), with the ratio of cash to net assets as the dependent variable in columns (4), (5) and (6), and with the natural logarithm of the ratio of cash to net assets in columns (7), (8, and (9). All regressions control for firm fixed effects and year effects, and standard errors are clustered by firms. The estimated coefficients of lending relationships are all positive and significant at the 1% level across all models, implying that the presence of a lending relationship decreases the level of cash holdings.

The coefficients of other control variables generally have expected signs and significance level. Similar to effects documented in Opler et al. (1999) and Bates et al. (2009), larger firms and firms with higher leverage, more working capital, more capital expenditures, and greater acquisition activities tend to reserve less cash, while firms with more investment opportunities measured by market to book ratio, higher cash flow, and higher R&D intensity prefer to hold more cash.

As is shown in Table 2, the lending relationship significantly decreases corporate cash holdings in all estimations. The effect is significant at the 1% level across all model specifications. For example, a lending relationship leads to a decrease in the ratio of cash to total asset by 1.1 % and a decrease in the ratio of cash to net assets by 2.4%. The results are consistent with our expectation. In sum, the results in

Table 2 are consistent with the hypothesis that a firm stores less liquidity due to prior lending relationships.

## 2. Cash Flow Sensitivity of Cash

According to Keynes (1936) and Almeida, Campello, and Weisbach (2004) , access to external capital markets affects the propensity to save cash out of cash flow, that is captured by the cash flow sensitivity of cash.

Following Almeida, Campello, and Weisbach (2004), we estimate cash flow sensitivity of cash as follows:

$$\Delta CashHoldings_{i,t} = \beta_0 + \beta_1 CashFlow_{i,t} + \beta_2 Q_{it} + \beta_3 Size_{i,t} + \beta_4 LendingRelation_{i,t} + \beta_5 CashFlow * LendingRelation_{it} + \varepsilon_{it}$$

(2)

Where,  $\Delta CashHoldings$  is defined as the change in holdings of cash and marketable securities over total assets, Cash Flow as the ratio of earnings before extraordinary items and depreciation ( minus dividends) to total assets, and Q as the market value divided by the book value of assets. We expect  $\beta_1$  to be positive according to Almeida, Campello, and Weisbach (2004). The coefficient of interest is  $\beta_5$  . According to H2,  $\beta_5$  is expected to be negative in equation (2). All regressions control for firm fixed effects and year effects, clustering by firms.

Panel A of Table 3 reports the regression results of equation (2). Column 1 provides the base regression result without the lending relationship variable. The lending relationship variable in Column 2 is defined as a dummy variable. Variable 2 is the Maximum number of deals across all banks by firm i in column 2 and is the maximum amount across all deals and banks in column 3.

The base regression results are similar to those reported in earlier studies. The change in cash holding is positively and significantly related to cash flow. We also find that the change in cash holding is positively and significantly related to investment opportunities measured by market-to-book ratio

More importantly, the results in Panel A show that the level of cash flow sensitivity varies. The coefficients of all three relationship intensity interaction are significantly negative. For example, the sensitivity of firms with lending relationships is almost 25% lower than that of firms without lending relationship. This is consistent with H2 that firms with lending relationship have better access to external financing, which in turn reduces the cash flow sensitivity.

An alternative measure of the empirical cash flow sensitivity of cash is estimated from a specification in which a firm's decision to change its cash holdings is modeled as a function of a number of sources and competing uses of funds <sup>5</sup>. The model is estimated as follows:

$$\begin{aligned} \Delta CashHoldings_{i,t} = & \beta_0 + \beta_1 CashFlow_{i,t} + \beta_2 Q_{it} + \beta_3 Size_{i,t} + \\ & \beta_4 Expenditure_{it} + \beta_5 Acquisition_{i,t} + \beta_6 \Delta NWC_{i,t} + \beta_7 \Delta ShortDebt_{i,t} \\ & + \beta_8 LendingRelation_{i,t} + \beta_9 CashFlow * LendingRelation_{i,t} + \varepsilon_{it} \end{aligned} \quad (3)$$

where, a few sources and usage of funds variables are controlled for as well. Expenditure is defined as capital expenditures divided by total assets. Acquisition is an indicator variable that equals one if the firm makes an acquisition in that year and zero otherwise,  $\Delta NWC$  is the change in non-cash working capital divided by total assets.  $\Delta ShortDebt$  is the change in short-term debt divided total assets. All regressions control for firm fixed effects and year effects, clustering by firms.

Table 3 Panel B reports the empirical model of Equation (3). The results are similar after controlling for different firm characteristics. The interaction is significantly negative after controlling for firm level variables.

In estimating equation (3), we take into consideration the endogeneity of financial and investment decisions and therefore use an instrumental variables (IV) approach to mitigate the concern. However, it

---

<sup>5</sup> Fazzari et al. (1988), Fazzari and Petersen (1993), and Calomiris et al. (1995), Kim, Mauer, and Sherman (1998), Opler et al. (1999), Harford (1999)

is usually difficult to identify the proper instruments. We follow the rationale in Fazzari and Petersen (1993), Almeida, Campello and Weisbach (2004). They suggest that the initial stock of a specific asset affects the investment in a specific asset category due to decreasing marginal valuation associated with stock levels. Therefore, our set of instruments includes two lags of the level of fixed capital (net plant, property, and investment to total assets), lagged acquisitions, lagged net working capital, and lagged short-term debt, as well as two-digit SIC industry indicators and twice-lagged sales growth. In addition, we include firm-fixed effects to explicitly control for possible simultaneity biases stemming from unobserved individual heterogeneity. Because it is possible that unspecified time effects could influence our estimations, we allow the residuals to be correlated within years (across firms) using the "sandwich" (or Huber-White) variance/covariance matrix estimator. The results are similar.

Overall, the results in table 3 are consistent with H2 that prior lending relationships reduce the information asymmetry, increase a firm's access to external financing and therefore reduce the cash flow sensitivity of cash.

### **3. Does the impact of lending relationships on cash flow sensitivity of cash vary with financial constraints?**

In this subsection, we further test whether the impact differs due to different access to external financing market, measured by financial constraint measurement. There is significant debate regarding how to measure financial constraints. We use three alternative measures that exist in the current literature.

*1) Payout ratio:* Due to market imperfections, internal funds may have cost advantages over external funds. Firms, especially those facing financial constraints, are inclined to retain cash flow instead of disgorging cash as dividends. Thus, payout policy may reflect the firms' financial conditions. A high retention ratio (low payout) indicates a firm is more financially constrained. We rank firms based on their payout ratio and assign firms in the top (bottom) 3 deciles of the payout ratio as financial unconstrained (constrained) firms. This is performed on a yearly basis. We compute the payout ratio as dividends of

common/ordinary shares plus purchase of common or preferred stock to operating income before depreciation. Fazzari, Hubbard, and Petersen (1988) employ a similar method to measure financial constraint.

2) *Firm size*: Firm size is another indicator of financial condition. Large firms are usually firms with longer years in operation, well known to the market, have less information asymmetry problem and, thus, are less vulnerable to financial constraints. We rank firms based on asset size over the 1990 to 2012 period and assign to the financially constrained (unconstrained) group those firms that are in the bottom (top) three deciles of the size distribution. The classification is performed on an annual basis. Fama and French (2002) and Frank and Goyal (2003) separate constrained firms from unconstrained firms according to firm size.

3) *Bond ratings*: The classification is based on whether firms have their public debt rated during the sample period. However, some unconstrained firms may choose not to use debt financing and hence they will not have a debt rating. Thus, the financially constrained group includes only firm-years that both lack a public debt rating and report positive debt during our sample period. The financially unconstrained group consists of firms that have rated bonds during the sample period and firm-years that lack a public debt rating but report zero debt. We retrieve data on firms' bond ratings. Our sample period is restricted to 1985 to 2007 because no ratings are available before 1985. Whited (1992) and Lemmon and Zender (2004) use a similar method to characterize financial constraints.

Table 5 provides summary statistics for financially constrained and financially unconstrained firms under the three different financial constraint measures. Consistent with existing literature, overall, constrained firms keep more cash than unconstrained firms. Under all financial criteria, the mean changes in cash holding for both financial constrained firms and financially unconstrained firms are both positive.

Table 6 presents the estimation results of regressions (3) for subsamples classified based on different financial criteria. Panel A shows that among financially constrained firms based on payout ratios, firms

with lending relationships are less sensitive than firms without lending relationships. However, for financially constrained firms, the impact of a lending relation does not exist anymore. The difference in the impact of lending relationships between financially constrained and financially unconstrained subsamples is statistically significant. The results are also qualitatively similar in Panels B and C, where alternative measures of financial constraints are used.

Overall, these results imply that the benefit of a lending relation exists only for financially unconstrained firms.

#### **4. Controlling for possible Selection Bias.**

Selectivity bias could possibly explain the difference in cash holdings and cash flow sensitivity of cash between firms with lending relationships and firms without lending relationships. To mitigate the selectivity problem, we use two-stage least square IV regression. We first estimate the logit model of lending relationship and then use the predicted variable as the exogenous variable in equation (2) and (3).

The logit model is estimated using the Lending Relationship Dummy as the dependent variable. The instruments are variables that are used in prior literature (Houston and James 1996, 2001; Fohlin, 1998). We include market-to-book ratio as a proxy for growth opportunities, leverage, coverage ratio, variability in asset returns (as a measure of the difficulty in valuing the firm's assets), firm size, and the age of the firm.

To examine whether the characteristics that predict the lending relationship are systematically related to investment activity, we estimate cash holding regression and cash flow sensitivity regression using a random effects model that includes the predicted variable from the first stage as the exogenous variable. As shown in Table 6 and Table 7, the results are similar, which suggests that the effects of selectivity bias are limited.

## **V. Conclusion**

In this paper, we examine how lending relationships affect corporate liquidity management. We find that firms with lending relationships retain less cash, and save less cash out of cash flow. Furthermore, we find that the effect of lending relationships is more profound for financially unconstrained firms.



## References:

- Acharya, V.V., Almeida, H., Campello, M., 2007. Is cash negative debt? A hedging perspective on corporate financial policies. *J. Financ. Intermed.* 16, 515–554.
- Acharya, Viral V., Sreedhar T. Bharath, and Anand Srinivasan, 2007. Does industry-wide distress affect defaulted firms? Evidence from creditor recoveries. *Journal of Financial Economics* 85.3, 787-821.
- Almeida, H., Campello, M., Weisbach, M.S., 2004. The cash flow sensitivity of cash. *J. Finance* 59, 1777–1804.
- Baas, T., & Schrooten, M. 2006. Relationship lending and SMEs: A theoretical analysis. *Small Business Economics*, 27, 127–137.
- Bates, T.W., Kahle, K.M., Stulz, R.M., 2009. Why do U.S. firms hold so much more cash than they used to? *J. Finance* 64, 1985–2021.
- Berger, Allen N., and Gregory F. Udell, 1995. Relationship lending and lines of credit in small firm finance. *Journal of business*, 351-381.
- Bharath, S., Dahiya, S., Saunders, A., Srinivasan, A., 2011. Lending relationships and loan contract terms. *Review of Financial Studies* 24 (4), 1141–1203.
- Brealey, R., Leland, H. E., & Pyle, D. H., 1977. Informational asymmetries, financial structure, and financial intermediation. *The journal of Finance*, 32(2), 371-387.
- Boot, A. 2000. Relationship banking: What do we know? *Journal of Financial Intermediation*, 9, 7–25
- Chava, S., & Roberts, M. R., 2008. How does financing impact investment? The role of debt covenants. *The Journal of Finance*, 63(5), 2085-2121.
- Cole, R. 1998. The importance of relationships to the availability of credit. *Journal of Banking and Finance*, 22, 959–977
- Diamond, D.W. 1984, Financial intermediation and delegated monitoring. *The Review of Economic Studies*, 51(3), 393- 414
- Diamond, D.W. 1991, Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy*, 689-721
- Erickson, T., Whited, T.M., 2000. Measurement error and the relationship between investment and Q. *J. Polit. Econ.* 108, 1027–1057.
- Fama, E. F., & French, K. R., 2002. Testing trade-off and pecking order predictions about dividends and debt. *Review of financial studies*, 15(1), 1-33.
- Faulkender, M., Wang, R., 2006. Corporate financial policy and the value of cash. *J. Finance* 61, 1957–1990.
- Fazzari, S. M., & Petersen, B. C., 1993. Working capital and fixed investment: new evidence on financing constraints. *The RAND Journal of Economics*, 328-342.

- Fazzari, S., Hubbard, R. G., & Petersen, B. C., 1988. Financing constraints and corporate investment.
- Fohlin, C., 1998. Relationship banking, liquidity, and investment in the German industrialization. *The Journal of Finance*, 53(5), 1737-1758.
- Frank, M. Z., & Goyal, V. K., 2003. Testing the pecking order theory of capital structure. *Journal of financial economics*, 67(2), 217-248.
- Graham, John R., and Campbell R. Harvey, 2001, The theory and practice of corporate finance: Evidence from the field, *Journal of Financial Economics* 60, 187–243.
- Houston, J., & James, C., 1996. Bank information monopolies and the mix of private and public debt claims. *The Journal of Finance*, 51(5), 1863-1889.
- Houston, J. F., James, C. M., & Ryngaert, M. D., 2001. Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders. *Journal of financial economics*, 60(2), 285-331.
- Ivashina, V., & Scharfstein, D., 2010. Bank lending during the financial crisis of 2008. *Journal of Financial economics*, 97(3), 319-338.
- Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance and takeovers. *Am. Econ. Rev.* 76, 323–329.
- Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: managerial behavior, agency cost and ownership structure. *J. Financ. Econ.* 3, 305–360.
- Jensen, Michael C, 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review* 76, 323–29.
- Keynes, J.M., 1936, *General Theory Of Employment , Interest And Money* (Palgrave Macmillan).
- Kaplan, S.N., Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? *Q. J. Econ.* 112, 169–216.
- Kothari, S.P., Shu, S., Wysocki, P.D., 2009. Do managers withhold bad news? *J. Account. Res.* 47, 241–276.
- Lemmon, Michael L., and Jaime F. Zender, 2004, Debt capacity and tests of capital structure theories, Working paper, University of Utah and University of Colorado.
- Opler, Tim, Lee Pinkowitz, René M. Stulz, and Rohan Williamson, 1999, The determinants and implications of corporate cash holdings, *Journal of Financial Economics* 52, 3–46.
- Petersen, M. A., & Rajan, R. G. 1994. The benefits of lending relationships: Evidence from small business data. *The journal of Finance*, 49(1), 3-37.
- Petersen, M., & Rajan, R. 1995. The effect of credit market competition on lending relationships. *Quarterly Journal of Economics*, 110, 406–443.

Riddick, L.A., Whited, T.M., 2009. The corporate propensity to save. *The Journal of Finance* 64, 1729–1766.

Whited, T. M., 1992. Debt, liquidity constraints, and corporate investment: Evidence from panel data. *The Journal of Finance*, 47(4), 1425-1460.

Whited, T.M., Wu, G., 2006. Financial constraint risk. *Rev. Financ. Stud.* 19, 531–559.

Table 1: Summary Statistic

Panel A: Relationship Dummy ==1 / 0 (whole sample)

	count	mean	median	SD
$\Delta$ CashHoldings	53501	0.012	0.001	0.099
Cash Holdings	53501	0.125	0.062	0.153
Q	53501	1.702	1.371	1.077
CashFlow	53501	0.075	0.089	0.130
Size	53501	5.678	5.579	1.867
Acquisition	53501	0.027	0.000	0.072
Expenditures	53501	0.070	0.046	0.076
$\Delta$ NWC	53501	-0.000	-0.000	0.003
$\Delta$ ShortDebt	53501	0.002	0.000	0.042

Panel B: Relationship Dummy ==1

	count	mean	p50	sd
$\Delta$ CashHoldings	31914	0.011	0.001	0.088
Cash Holdings	31914	0.099	0.047	0.128
Q	31914	1.636	1.347	0.974
CashFlow	31914	0.076	0.088	0.120
Size	31914	6.099	6.029	1.827
Acquisition	31914	0.030	0.000	0.076
Expenditures	31914	0.071	0.046	0.078
$\Delta$ NWC	31914	-0.000	-0.000	0.002
$\Delta$ ShortDebt	31914	0.001	0.000	0.040

Panel C: Relationship Dummy==0

	count	mean	median	SD
$\Delta$ CashHoldings	21587	0.014	0.001	0.114
Cash Holdings	21587	0.163	0.097	0.176
Q	21587	1.798	1.411	1.206
CashFlow	21587	0.073	0.092	0.143
Size	21587	5.057	4.870	1.749
Acquisition	21587	0.022	0.000	0.064
Expenditures	21587	0.068	0.045	0.074
$\Delta$ NWC	21587	-0.000	-0.000	0.004
$\Delta$ ShortDebt	21587	0.002	0.000	0.044

Panel D: Relationship Dummy==.

	count	mean	median	SD
$\Delta$ CashHoldings	13366	0.015	0.001	0.145
Cash Holdings	13366	0.257	0.187	0.235
Q	13366	1.932	1.465	1.422
CashFlow	13366	0.023	0.062	0.187
Size	13366	4.299	4.154	1.693
Acquisition	13366	0.016	0.000	0.054
Expenditures	13366	0.058	0.035	0.069
$\Delta$ NWC	13366	-0.000	-0.000	0.006
$\Delta$ ShortDebt	13366	0.002	0.000	0.043

Table 2: Cash holding regressions;

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Cash/assets	Cash/assets	Cash/assets	Cash/NA	Cash/NA	Cash/NA	ln(Cash/NA)	ln(Cash/NA)	ln(Cash/NA)
Size	-0.011*** [-6.6]	-0.012*** [-6.7]	-0.012*** [-6.7]	-0.006 [-0.3]	-0.007 [-0.4]	-0.007 [-0.3]	-0.195*** [-9.4]	-0.197*** [-9.5]	-0.197*** [-9.4]
Q	0.014*** [14.2]	0.014*** [14.2]	0.014*** [14.2]	0.022* [2.3]	0.022* [2.3]	0.022* [2.3]	0.133*** [15.1]	0.133*** [15.1]	0.133*** [15.1]
Leverage	-0.191*** [-28.5]	-0.191*** [-28.6]	-0.191*** [-28.5]	-0.330*** [-3.6]	-0.331*** [-3.6]	-0.330*** [-3.6]	-2.209*** [-29.8]	-2.218*** [-29.9]	-2.215*** [-29.8]
Cash Flow	0.059*** [7.7]	0.059*** [7.7]	0.059*** [7.7]	0.41 [1.2]	0.41 [1.2]	0.409 [1.2]	0.700*** [9.2]	0.700*** [9.2]	0.699*** [9.2]
Net Working Capital	-0.428*** [-38.6]	-0.428*** [-38.6]	-0.428*** [-38.6]	-1.022*** [-10.9]	-1.022*** [-10.9]	-1.022*** [-10.9]	-4.409*** [-39.1]	-4.413*** [-39.1]	-4.412*** [-39.1]
Expenditures	-0.184*** [-19.1]	-0.184*** [-19.0]	-0.184*** [-19.1]	-0.496*** [-7.2]	-0.496*** [-7.2]	-0.496*** [-7.2]	-1.704*** [-13.2]	-1.703*** [-13.2]	-1.704*** [-13.2]
Dividend Dummy	0.001 [0.4]	0.001 [0.5]	0.001 [0.5]	-0.002 [-0.3]	-0.002 [-0.3]	-0.002 [-0.3]	0.016 [0.5]	0.017 [0.6]	0.017 [0.6]
R&D	0.184*** [7.1]	0.184*** [7.1]	0.184*** [7.1]	2.39 [1.5]	2.39 [1.5]	2.39 [1.5]	0.910*** [5.8]	0.916*** [5.9]	0.913*** [5.9]
Industry Sigma	0.359*** [4.8]	0.360*** [4.8]	0.360*** [4.8]	0.485* [2.0]	0.487* [2.0]	0.485* [2.0]	5.811*** [6.1]	5.828*** [6.1]	5.821*** [6.1]
Acquisition	-0.126*** [-21.8]	-0.126*** [-21.8]	-0.126*** [-21.8]	-0.369*** [-5.0]	-0.368*** [-5.0]	-0.368*** [-5.0]	-1.024*** [-13.9]	-1.021*** [-13.9]	-1.021*** [-13.9]
Relationship Dummy	-0.010*** [-8.0]			-0.024*** [-5.6]			-0.112*** [-7.2]		
Max_Rdeals		-0.010*** [-7.6]			-0.024*** [-5.5]			-0.101*** [-6.7]	
Max_Ramount			-0.010*** [-7.7]			-0.024*** [-5.5]			-0.104*** [-6.8]
Constant	0.314*** [24.6]	0.315*** [24.6]	0.314*** [24.6]	0.470* [2.3]	0.471* [2.3]	0.471* [2.3]	-0.519*** [-3.6]	-0.515*** [-3.6]	-0.516*** [-3.6]
Observations	51851	51851	51851	51851	51851	51851	51362	51362	51362
Adjusted R-squared	0.275	0.274	0.274	0.039	0.039	0.039	0.215	0.214	0.214

Table 3: Cash Flow Sensitivity Regression with Bank Lending Relationship

Panel A:

	(1)	(2)	(3)	(4)
	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings
Q	0.016*** [16.4]	0.016*** [16.4]	0.016*** [16.4]	0.016*** [16.4]
Cash Flow	0.148*** [20.7]	0.171*** [16.0]	0.169*** [16.4]	0.170*** [16.3]
Size	0.005*** [5.2]	0.004*** [4.8]	0.005*** [4.9]	0.004*** [4.9]
Relationship Dummy		0.004** [2.9]		
CashFlow*RL Dummy		-0.044*** [-3.8]		
Max_Rdeals			0.004** [2.8]	
CashFlow*Max_Rdeals			-0.043*** [-3.7]	
Max_Ramount				0.004** [3.0]
CashFlow*Max_Ramount				-0.045*** [-3.8]
Constant	-0.050*** [-9.1]	-0.051*** [-9.3]	-0.051*** [-9.3]	-0.051*** [-9.3]
Observations	60414	60414	60414	60414
Adjusted R-squared	0.053	0.054	0.053	0.054

Panel B:

		(2)	(3)	(4)
	$\Delta\text{CashHoldings}$	$\Delta\text{CashHoldings}$	$\Delta\text{CashHoldings}$	$\Delta\text{CashHoldings}$
Q	0.016*** [15.6]	0.016*** [15.5]	0.016*** [15.6]	0.016*** [15.6]
Cash Flow	0.192*** [22.8]	0.212*** [17.6]	0.210*** [18.0]	0.212*** [17.9]
Size	0.008*** [8.2]	0.008*** [7.9]	0.008*** [7.9]	0.008*** [7.9]
Acquisition	-0.189*** [-24.5]	-0.188*** [-24.3]	-0.188*** [-24.3]	-0.188*** [-24.3]
Expenditures	-0.116*** [-10.9]	-0.115*** [-10.9]	-0.115*** [-10.9]	-0.115*** [-10.9]
$\Delta\text{NWC}$	-4.857*** [-12.8]	-4.879*** [-12.9]	-4.873*** [-12.8]	-4.876*** [-12.9]
$\Delta\text{ShortDebt}$	-0.066*** [-6.2]	-0.066*** [-6.2]	-0.066*** [-6.2]	-0.066*** [-6.2]
Relationship Dummy		0.003* [2.2]		
CashFlow*RL Dummy		-0.038** [-3.0]		
Max_Rdeals			0.004* [2.3]	
CashFlow*Max_Rdeals			-0.038** [-3.0]	
Max_Ramount				0.004* [2.4]
CashFlow*Max_Ramount				-0.040** [-3.1]
Constant	-0.057*** [-9.8]	-0.058*** [-10.0]	-0.058*** [-10.0]	-0.058*** [-10.0]
Observations	53510	53510	53510	53510
Adjusted R-squared	0.098	0.098	0.098	0.098



Table 4: Summary statistics for constrained and unconstrained firms

Financial Criteria	Size				Payout Ratio				Bond Ratings			
	(Constrained)		(Unconstrained)		(Constrained)		(Unconstrained)		(Constrained)		(Unconstrained)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
$\Delta$ CashHoldings	0.007	-0.000	0.012	0.002	0.015	0.001	0.005	0.001	0.013	0.001	0.012	0.002
CashHolding	0.155	0.084	0.092	0.048	0.127	0.061	0.122	0.066	0.146	0.078	0.094	0.049
Q	1.717	1.313	1.705	1.417	1.663	1.307	1.805	1.499	1.710	1.348	1.689	1.395
CashFlow	0.031	0.064	0.097	0.098	0.044	0.066	0.116	0.111	0.065	0.087	0.089	0.093
Size	3.593	3.630	7.600	7.440	4.894	4.754	6.508	6.473	4.680	4.639	7.132	7.094
Acquisition	0.014	0.000	0.034	0.001	0.023	0.000	0.027	0.000	0.023	0.000	0.032	0.000
Expenditures	0.062	0.036	0.072	0.051	0.071	0.042	0.064	0.048	0.067	0.042	0.074	0.050
$\Delta$ NWC	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000
$\Delta$ ShortDebt	0.002	0.000	0.001	0.000	0.002	0.000	0.001	0.000	0.002	0.000	0.001	0.000
Leverage	0.173	0.113	0.219	0.184	0.227	0.180	0.152	0.118	0.165	0.106	0.243	0.205
Max_Rdeals	0.393	0.000	0.683	1.000	0.541	0.667	0.552	1.000	0.471	0.333	0.676	1.000
Max_Ramount	0.399	0.000	0.703	1.000	0.555	0.861	0.564	1.000	0.481	0.486	0.695	1.000

Table 5: Sub-Sample analysis – Financial Constraints

Panel A: payout ratio:

	(1)	(2)	(3)	(4)	(5)	(6)
	Low-Payout	High-Payout	Low-Payout	High-Payout	Low-Payout	High-Payout
	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings
Q	0.019*** [11.4]	0.001 [0.4]	0.019*** [11.4]	0.001 [0.4]	0.019*** [11.4]	0.001 [0.4]
Cash Flow	0.149*** [10.9]	0.254*** [10.8]	0.146*** [11.1]	0.249*** [10.8]	0.147*** [11.0]	0.253*** [10.9]
Size	0.008*** [5.2]	0.008*** [4.1]	0.008*** [5.1]	0.008*** [4.2]	0.008*** [5.1]	0.008*** [4.2]
Relationship Dummy	-0.004 [-1.7]	0.015*** [4.7]				
CashFlow*RL Dummy	-0.033* [-2.1]	-0.097*** [-4.0]				
Max_Rdeals			-0.003 [-1.5]	0.014*** [4.5]		
CashFlow*Max_Rdeals			-0.029 [-1.8]	-0.094*** [-3.8]		
Max_Ramount					-0.003 [-1.6]	0.015*** [4.7]
CashFlow*Max_Ramount					-0.031 [-1.9]	-0.098*** [-4.0]
Constant	-0.053*** [-5.8]	-0.076*** [-6.5]	-0.053*** [-5.8]	-0.076*** [-6.5]	-0.053*** [-5.8]	-0.076*** [-6.5]
Observations	24003	19677	24003	19677	24003	19677
Adjusted R-squared	0.053	0.043	0.053	0.043	0.053	0.043

Panel B: firm size

	(1)	(2)	(3)	(4)	(5)	(6)
	Small firms	Large firms	Small firms	Large firms	Small firms	Large firms
	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings
Q	0.019*** [10.7]	0.009*** [6.4]	0.019*** [10.7]	0.009*** [6.4]	0.019*** [10.7]	0.009*** [6.4]
CashFlow	0.136*** [9.5]	0.188*** [7.1]	0.134*** [9.6]	0.187*** [7.6]	0.135*** [9.5]	0.190*** [7.4]
Size	0.016*** [5.8]	0.003 [1.9]	0.016*** [5.8]	0.003* [2.0]	0.016*** [5.8]	0.003 [2.0]
Relationship Dummy	-0.003 [-1.3]	0.010** [3.2]				
CashFlow*RL Dummy	-0.003 [-0.2]	-0.069** [-2.7]				
Max_Rdeals			-0.003 [-1.3]	0.009** [3.2]		
CashFlow*Max_Rdeals			0.002 [0.1]	-0.075** [-2.9]		
Max_Ramount					-0.003 [-1.2]	0.010** [3.2]
CashFlow*Max_Ramount					-0.000 [-0.0]	-0.077** [-2.9]
Constant	-0.083*** [-8.2]	-0.046*** [-4.2]	-0.083*** [-8.2]	-0.046*** [-4.2]	-0.083*** [-8.2]	-0.046*** [-4.2]
Observations	16306	22934	16306	22934	16306	22934
Adjusted R-squared	0.058	0.041	0.058	0.041	0.058	0.041

Panel C: Bond rating

	(1)	(2)	(3)	(4)	(5)	(6)
	No Rating	Rating	No Rating	Rating	No Rating	Rating
	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings	$\Delta$ CashHoldings
Q	0.018*** [14.8]	0.011*** [7.3]	0.018*** [14.8]	0.011*** [7.3]	0.018*** [14.8]	0.011*** [7.3]
CashFlow	0.172*** [14.4]	0.172*** [6.9]	0.169*** [14.6]	0.172*** [7.4]	0.171*** [14.5]	0.173*** [7.2]
Size	0.006*** [4.0]	0.002* [2.0]	0.006*** [4.1]	0.002* [2.0]	0.006*** [4.0]	0.002* [2.0]
Relationship Dummy	0.003 [1.8]	0.007* [2.5]				
CashFlow*RL Dummy	-0.029* [-2.1]	-0.069** [-2.9]				
Max_Rdeals			0.003 [1.7]	0.007** [2.6]		
CashFlow*Max_Rdeals			-0.026 [-1.8]	-0.075** [-3.2]		
Max_Ramount					0.003 [1.9]	0.007* [2.5]
CashFlow*Max_Ramount					-0.028* [-2.0]	-0.075** [-3.1]
Constant	-0.057*** [-8.1]	-0.036*** [-4.1]	-0.057*** [-8.1]	-0.036*** [-4.2]	-0.057*** [-8.1]	-0.036*** [-4.2]
Observations	34778	25636	34778	25636	34778	25636
Adjusted R-squared	0.061	0.040	0.061	0.040	0.061	0.040

Table 6: IV regression of corporate cash holdings

	(1) Cash Holding	(2) CNA	(3) lnCNA
Size	0.011*** [5.8]	0.059*** [4.1]	0.139*** [5.0]
Q	0.016*** [13.8]	-0.034*** [-4.2]	0.157*** [9.9]
Leverage	-0.091*** [-11.0]	0.192** [3.0]	-1.067*** [-8.7]
Cash Flow	0.086*** [7.9]	0.960*** [12.6]	0.994*** [6.7]
Net Working Capital	-0.224*** [-30.4]	-0.487*** [-8.3]	-2.946*** [-26.3]
Expenditures	-0.228*** [-17.9]	-0.446*** [-4.9]	-2.404*** [-13.6]
Dividend Dummy	-0.032*** [-10.5]	-0.065** [-2.9]	-0.289*** [-6.7]
R&D	0.476*** [18.3]	6.138*** [30.0]	2.724*** [7.0]
Industry Sigma	0.253*** [6.0]	-2.065*** [-5.7]	6.168*** [9.2]
Acquisition	-0.148*** [-13.7]	-0.485*** [-6.5]	-1.464*** [-9.9]
Relationship Dummy	-0.266*** [-11.9]	-1.053*** [-6.2]	-3.546*** [-10.7]
Constant	0.224*** [27.5]	0.398*** [6.2]	-1.614*** [-13.2]
Observations	29318	29318	28987
R-squared	0.1803	0.0354	0.1243

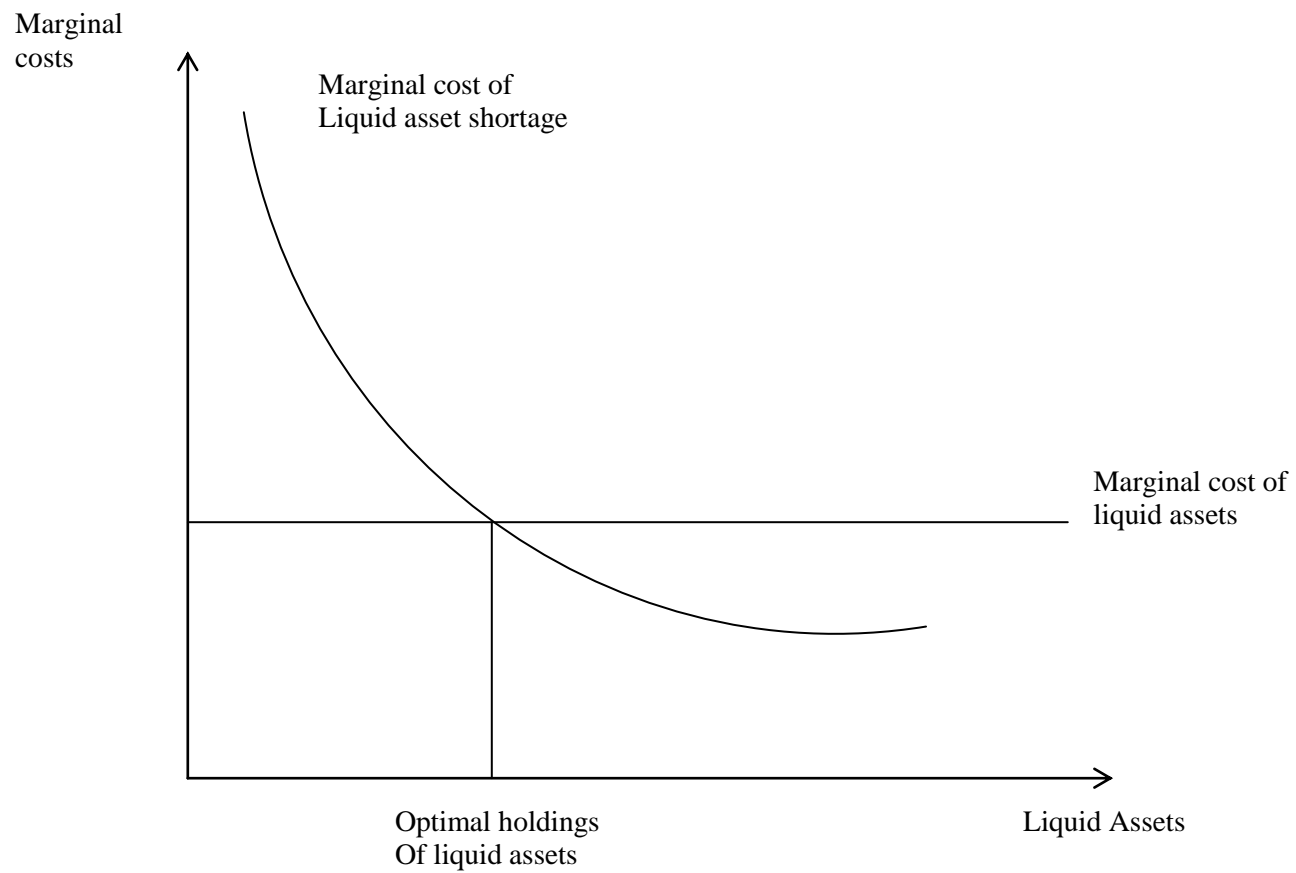
Table 7: IV regression of change in cash holdings

	(1)	(2)
	$\Delta\text{CashHoldings}$	$\Delta\text{CashHoldings}$
Relationship Dummy	-0.039** [-3.1]	-0.021 [-1.6]
CashFlow*RL Dummy	-0.337** [-2.8]	-0.313** [-2.6]
Q	0.010*** [15.3]	0.009*** [14.4]
CashFlow	0.311*** [4.1]	0.368*** [5.0]
Size	0.004*** [5.5]	0.004*** [5.3]
Acquisition		-0.159*** [-22.4]
Expenditures		-0.108*** [-13.7]
$\Delta\text{NWC}$		-6.726*** [-22.3]
$\Delta\text{ShortDebt}$		-0.030* [-2.4]
Constant	-0.022** [-2.8]	-0.024** [-3.1]
Observations	32336	30248
R-squared	0.015	0.0567

Figure 1: Trend in bank lending activities



**Figure 2: Optimal holdings of liquid assets**





## Appendix: Variable Definition

This table provides detailed definitions for all the variables used in the paper.

Variables names	Variable definitions
<u>Lending relationship variables</u>	
Relationship dummy	Relationship dummy Dummy variable=1 if the acquirer has established lending relationships with any banks
max_Rdeals	Acquirers' maximum relationship intensity in terms of number of deals across all lenders
max_Ramount	Acquirers' maximum relationship intensity in terms of dollar amount across all lenders
<u>Firm characteristics</u>	
Cash/assets	The ratio of cash to total assets
Cash/NA	The ratio of cash to net assets
ln(Cash/NA)	The natural logarithm of the ratio of cash to net assets
Size	The natural log of total assets
Q	The book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Market value of equity equals price per share times total number of shares outstanding.
Leverage	(Long-term debt + debt in current liabilities)/firm assets
Cash Flow	Earnings before interest , taxes, depreciation and amortization, less interest, taxes, and common dividends over total assets
Net Working Capital	Non-cash working cash capital divided by total assets
Expenditures	Capital expenditure over firm assets.
Dividend	Equal to one in years a firm pays a common dividend, zero otherwise
R&D	R&D/sales, and set equal to zero if R&D is missing
Industry Sigma	The volatility of an industry's cash flow for a 10-year period. Industries are defined by 2-digit SIC codes.
Acquisition	Acquisitions/firm assets
$\Delta$ NWC	The change in non-cash working cash capital divided by total assets.
$\Delta$ ShortDebt	The change in short-term debt divided total assets.