

Effects of Bank Lending Shocks on Real Activity: Evidence from a Financial Crisis

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Abstract

U.S. banks experienced dramatic declines in capital and liquidity during the financial crisis of 2007-2009. We study the effect of shocks on banks' capital and liquidity positions on their borrowers' investment decisions. The recent financial crisis serves as a natural experiment in the sense that the crisis was not expected by banks ex-ante, and had a detrimental but heterogeneous impact on banks' capitals and liquidity positions ex-post. Consistent with our hypothesis, we find that borrowers of more affected banks reduced more investment during the crisis. We find that borrowing firms whose banks have a higher level of non-performing loans and lower level of tier one capital, hold less liquid asset, and experience greater stock price drop tend to invest less in the capital expenditure when comparing investment before and during the crisis. Shocks on banks, however, have limited effect on firm R&D expenditures and net working capital. Our results suggest that shocks on banks' capital and liquidity positions negatively affect borrowers' investment levels, in particular their capital expenditures.

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1. Introduction

During the 2007-2009 financial crisis, U.S. banks experienced dramatic declines in capital from bad loan write-downs and collateralized debt obligation value plunges. According to the Global Financial Stability Report, U.S. banks wrote down \$680 billion dollars on their balance sheets between the second quarter of 2007 to the fourth quarter of 2009. Furthermore, as concerns about the solvency and liquidity of banks deepened, banks were exposed to greater liquidity risk from exposure to undrawn loan commitments, withdrawal of wholesale deposits, and the loss of other short-term financing. Such enormous write-downs and losses, along with the higher level of liquidity risk, caused banks to pull back their new loan lending. Ivashina and Scharfstein (2010) report that new loans to large borrowers fell by 79% from the peak of the financial crisis relative to the credit boom.

Bernanke (1983) argues that if firms cannot resolve the credit shortage from their banks, this may cause large contractionary real effects on firm investment and production. He stated that because markets for financial claims are incomplete, financial sectors serve as the intermediation between borrowers and lenders by providing market-making and information-gathering services. During the great depression, the effectiveness of the financial sectors providing such services decreased and credit flow from the savers to the borrowers was distorted, which led to the decline in aggregate output. This study extends the literature by investigating the real effect of bank credit supply shock on borrowers' investment decisions during the financial crisis of 2007-2009. Rather than examining the impact of bank credit supply on investment at the aggregate level, we explore the within-bank variation in credit supply and its relation with borrowers' investment levels. The recent financial crisis serves as a convenient natural experiment in the sense that the crisis was not expected by banks ex-ante, and had a detrimental but heterogeneous impact on banks' capitals and liquidity positions ex-post.

Our study rests upon the premise that banks with more capital losses or higher liquidity risk during the crisis had to reduce credit to their borrowers. Holmstrom and Tirole (1997) predict that a capital squeeze on banks reduces banks' capacity of providing monitoring activity and therefore reduces the credit supply of banks. Diamond and Rajan (2001) note while the assets of banks are illiquid loans, the liabilities of the banks are in demand deposits. Banks can ration credit if they face high or uncertain liquidity risk from the needs of demand depositors. Cornett et al. (2010) find that banks' efforts to manage liquidity risk during the crisis of 2007-2009 led to a decline in credit supply.

We hypothesize that borrowers whose banks experienced more capital losses or were subject to more liquidity risk experienced a greater decline in their investment, either because they were not able to gain credit or the fear of not being able to gain credit from their banks in the future. Following Huang (2009 and Cornett et al (2010), we use banks' mortgage backed security holdings, non-performing loans, core deposits, liquid assets, tier one capital ratios, and recent stock performance to measure shocks on banks' capital and liquidity positions.

We use the empirical strategy similar to a difference-in-difference approach to test whether borrowers of more affected banks reduced more investment during the crisis. Specifically, we compare the investment of firms before and after the financial crisis as a function of the bank financial position, controlling for borrowers' internal resources (cash reserves), investment opportunities (Tobin's Q), cash flow, and size. We use the TED spread, the difference between the 3-month LIBOR rate and the 3-months Treasury rate, as proxy for the severity of the crisis. As a robustness check, we further define crisis as a dummy variable if the statement date of the firm-quarter observation is between July 1, 2007 and June 30, 2009. We are most interested in the coefficients on the interaction of the crisis variable and banks' financial positions, which indicates the bank's role in mitigating or worsening the impact of the crisis on investment.

Our sample of borrower-lender pairs comes from Loan Pricing Corporation's Dealscan database. We constrain our sample to nonfinancial U.S. firms with only a unique lending relationship. As pointed by Carvalho *et al.* (2011), the real effects are expected to be more pronounced among these firms. It also allows us to identify the shock from the lender in a cleaner setting. We then link borrowers with Compustat to retrieve their accounting information. We further match each lender to its parent company using Capital IQ to retrieve the parents' accounting information from Capital IQ.

We find that as the TED spread increased or the crisis deteriorated corporate investment declined. Specifically, with one percentage point increase in the TED spread, corporate capital expenditure declined by 0.053% of assets relative to an unconditional mean of 0.94% of assets per quarter.

Consistent with our hypothesis, we find that borrowers of more affected banks reduced more investment during the crisis. This effect was particularly pronounced on firms' capital expenditures spending. Shocks on both banks' capital position and liquidity position are transmitted to the borrowing firms. Specifically, for banks with a higher level of non-performing loans, which are subject to higher capital losses and asset write-offs, their borrowers invested

less in capital expenditure during the crisis. Borrowers whose banks have a higher level of tier one capital invested more in capital expenditure during the crisis. We further show that borrowing firms, whose banks carried more liquid assets and buffered better the systematic liquidity shock, tended to invest more in capital expenditures. Borrowing firms whose banks experienced greater stock price drops reduced more their capital expenditure. Our main results remain robust even if we define crisis as a dummy variable, provided the firm-quarter observation is between July 1, 2007 and June 30, 2009.

We further investigate whether shocks on banks affected other perspectives of firm investment, such as the R&D expenditure and net working capital. R&D expenditure has been viewed as having great importance for firms to stay competitive in the long run. Net working capital can be viewed as a type of short-term investment that provides necessary operating liquidity for firms to meet their short-term financing needs and operational expenses. We show that R&D expenditure was barely affected by the crisis or shocks on banks. We further find weak evidence that borrowing firms dropped their level of net working capital due to their banks' financial conditions.

Our study extends the existing literature in several ways. First, we provide direct evidence on the real effects of bank credit supply shocks during the 2007-2009 financial crisis. Although extensive literature has shown that shocks to banks reduce their credit provision, the literature has limited evidence of how such credit supply shocks affect borrowing firms' investment and operation decisions. The historic magnitude of the 2007-2009 crisis merits a systematic examination of such real effects. Second, distinctive from other studies on the real effects of the 2007-2009 crisis as in Duchin et al. (2010) and Carvalho et al. (2011), we examine directly how the financial health of banks is directly related to their borrowers' operation decisions. In particular, we investigate how banks' capital and liquidity positions are related to borrowing firms' investment decisions. Third, our data and methodology allow us to separate the supply side effects (the lender) from the demand side effects (the borrower) on real outcomes by controlling directly borrowers' investment opportunities and unobservable fixed effects.

The remainder of the paper is organized as follows. Section 2 discusses related literature. Section 3 describes our data sources and the empirical model. Section 3 discusses empirical results, and we end with a short conclusion in Section 4.

2. Related literature

Previous literature shows that shocks on the financial system, in particular, the banking sector can affect corporate financing and real investment policies. Friedman and Schwartz (1963) argue that difficulties of the banks can worsen the general economic contractions primarily by leading to a rapid fall in the supply of money. Bernanke (1983) points out that in addition to its effects via the money supply proposed by Friedman and Schwarz (1963), the financial crisis of 1930-33 affected the macroeconomic performance by distorting the credit flow from the savers to the borrowers, as borrowers found credit expensive and difficult to obtain. There are at least two channels through which shocks on banks can reduce the credit supply and affect firms' investment and operation decisions. On one hand, Holmstrom and Tirole (1997) point out that shocks to bank capital reduce banks' capacity of providing monitoring activity and therefore reduce their ability to supply credit. On the other hand, Diamond and Rajan (2001) suggest that fear of liquidity shortage can discourage banks from extending illiquid loans to their borrowers.

Peek and Rosengren (1997) investigate the real effects of Japanese bank shocks to real economic activities, in particular construction activities in the US commercial real estate market. They find that the supply shock in Japanese bank loans significantly reduced the commercial real estate activities in those markets with a large Japanese bank penetration.

A sharp reduction of credit availability during the recent financial crisis was documented by Ivashina and Scharfstein (2010). They report that new loans to large borrowers fell by 79% from the peak of the financial crisis relative to the credit boom. Moreover, Huang (2009) finds that that more distressed banks disbursed fewer funds to existing commercial borrowers under pre-committed, formal lines of credit; the effect is stronger for small and riskier firms with shorter relationships. Huang's study suggests that credit availability on lines of credit depends upon lenders' financial strength; as credit conditions tighten, loans disbursed from committed lines can be rationed even though theories suggest that lines of credit are designed to protect borrowers from credit rationing. Cornett et al. (2010) provide evidence of a decline in credit supply as a consequence of the reduced liquidity during the financial crisis.

The transmission of shocks in the banking sector to borrowing firms depends upon several factors. One important factor is the ability of a firm to substitute between bank credit and other sources of external financing. As pointed out by Becker and Ivashina (2010) access to the public

debt market allows firms to substitute bonds for bank loans and reduces their exposure to the supply of bank lending.

Other studies argue that the availability of internal resource of financing or dependence on external funds of borrowers can either mitigate or enhance the impact of a financial crisis on firms' investment decisions. For instance, Duchin *et al.* (2010) study the effect of the recent financial crisis on corporate investment decisions; precisely, they document a decline during the crisis and the decline is greatest for firms that have low levels of internal funds, such as cash, or are more dependent on external financing.

Lending relationship is another factor associated with the transmission of bank distress to borrowing firms. A recent paper by Carvalho *et al.* (2011) finds that severe bank distress is associated with more equity valuation losses to borrowers, especially for those that have strong lending relationships at the time of the shock. They argue that it is more difficult for borrowers with strong lending relationships to substitute other sources of external finance, and therefore they experience larger drops in their equity values.

Despite the evidence that shocks on credit availability affect the real sector and that such shock can be mitigated or enhanced by certain mechanisms, the existing literature remains largely silent about the impact of banks' capital and liquidity positions on their borrowers' investment decisions. Our paper intends to fill this gap. To our knowledge, this paper is the first systematic study that provides direct evidence on the real effects of bank credit supply shocks during the 2007-2009 financial crisis. Distinctive from other studies on the real effect of the 2007-2009 crisis, as in Duchin *et al.* (2010) and Carvalho *et al.* (2011), we examine directly how banks' capital and liquidity positions are related to borrowing firms' investment decisions. Our data and methodology further allow us to separate the supply side effect (the lender) from the demand side effect (the borrower) on real outcomes by controlling for borrowers' investment opportunities and unobservable fixed effects.

3. Data and empirical strategy

3.1 Sample

Our sample consists of quarterly data on non-financial firms. Specifically, we exclude financial firms and utilities, defined as firms with SIC codes between 4900-4949 and 6000- 6999. The data begin January 1, 2006, and end December 31, 2010. We exclude firms with a quarterly asset growth greater than 100% at some point during our sample period; this eliminates firms

that have undergone mergers or acquisitions and therefore experienced skewed investment. We further eliminate firms with total assets less than \$ 1 million.¹

We focus the analysis on firms with only one lending relationship for two main reasons. First, as pointed by Carvalho *et al.* (2010), the real effects are expected to be more pronounced, and second it allows us to identify the shock from the lender in a cleaner setting.² We use the Loan Pricing Corporation's Dealscan database to identify non-financial borrowers that have a unique lender between year 2000 and year 2005.³ We then link borrowers with Compustat to retrieve their accounting information.⁴ Following Cornett *et al.* (2010), we first match each lender to its parent Bank Holding Company (BHC), using Capital IQ, and we then retrieve the BHCs' accounting information from Capital IQ Bank Regulatory data. Our final sample consists of 7,125 quarterly observations for 474 firms.

We construct our variables for the borrowers following Duchin *et al.* (2010). Detailed descriptions of the constructed variables can be found in the appendix. With the exception of size and Tobin's Q, we winzorize borrowers' accounting variables at the 1st and 99th percentiles to lessen the influence of outliers. We winzorize Tobin's Q by bounding Q below 10.

Following the procedure used by Cornett *et al.* (2010), we identify the exogenous shock to liquidity that characterized the recent financial crisis using the TED spread, which is measured as the difference between the 3-month LIBOR rate and the 3-month Treasury rate. The TED spread is an indicator of the perceived risk of default on interbank loans. The LIBOR reflects the credit risk of lending to commercial banks, and we assume that the T-bill rate is a risk free rate. Figure 1 shows how the TED spread tracks the severity of the crisis quite closely.

As a robustness check, we further identify the recent financial crisis as a systematic shock to the banking sector and define crisis as an indicator variable equal to one when the firm's quarter ends between July 1, 2007 (2007q3) and June 30, 2009 (2009q2). Finally, we control for the demand side factors, including proxies for firms' investment opportunities, as explained in more detail in the next section.

¹ We constrain our sample to firms with assets more than \$1 million to eliminate the concern that our results are driven by those small companies. Our main results remain robust even if we lift this constraint.

² For firms with multiple lending relationships, it is complicated to identify the aggregate shocks on lenders and therefore measurement error can be introduced to the shock variables.

³ We use the period 2000 to 2005 because we would like to have the recent lending relationships that exist before our sample period. We will alter the event window in the next version for a test of robustness.

⁴ The link table is kindly provided by Michael Roberts.

3.2 Empirical strategy

In this section, we first discuss the determinants of a firm's investment and of a bank's shock and then describe our empirical model; the results are then presented in section 4.

To analyze the impact of the financial position of a bank on a borrower's corporate investment, we employ an approach similar to the difference of differences method. In this approach we compare the investment of a firm before and after the financial crisis as a function of the bank's financial position, controlling for a borrowers' internal resources (cash reserves), investment opportunities (Tobin's Q), cash flow, and size.

We are mainly interested in studying the role of banks' financial positions in mitigating or worsening the impact of the crisis on investment. Our identification strategy is based on the premise that the financial crisis was an unexpected negative shock to banks' capital and liquidity positions, which either induces banks to reduce credit supply or increases the likelihood of banks' not being able to extend credit in the future, which therefore curtails their borrowers' investment level. We expect that borrowers from banks experiencing smaller negative shocks will invest more than borrowers from banks experiencing larger negative shocks when the TED spread spiked and the crisis worsened. We test this idea by interacting the TED variable with the measurement of shocks on bank's capital and liquidity positions. Specifically, we estimate the following regression model.

$$\text{INVEST}_{i,t} = \text{TED}_t + \text{BShock}_{i,t-1} * \text{TED}_t + \text{BShock}_{i,t-1} + \text{Cash}_{i,t-1} + \text{Cash}_{i,t-1} * \text{TED}_t + \text{BSIZE}_{i,t-1} + \text{BTobQ}_{i,t-1} + \text{BCashFlow}_{i,t-1} + \text{LSize}_{i,t-1} + \text{FE} + e_{i,t} \quad (1)$$

Following convention, we measure Investment (INVEST) as the ratio of the quarterly capital expenditure to total assets. As pointed out by Duchin et al. (2010), since capital expenditure is reported on a year-to-date basis in quarterly financial statements, we subtract the previous quarter's capital expenditure from the current quarter's capital expenditure for fiscal quarters 2, 3, and 4.

We identify as explanatory variables, in addition to the BHC shock variables (BShock) described below, the firm's cash position (Cash), measured as the ratio of the sum of cash and short-term investments to total assets, the cash flows (BCashFlow), measured as the ratio of operating income before depreciation to total assets, the growth opportunities as proxied by

Tobin's Q^5 (BTobQ), and the borrower's size measured by the log of total assets in each quarter (BSIZE). We expect that firms with more investment opportunities and abundant cash flows will tend to invest more, while we have no expectation of the sign on size. Since, as Duchin et al. (2010) point out, firms' cash holdings play an important role in their investment level (particularly during a crisis) we include cash as a control in our model. As we pointed out previously, the TED spread is a proxy for the severity of the financial crisis. We also include the interaction of Cash with the TED spread; the coefficient on the interaction term shows the relation of Cash with INVEST as the TED spread changes (most importantly, during the financial crisis).

Following Duchin et al. (2010), we use other measures of investment or corporate spending to test our model: research and development expenses (R&D), and net working capital (NWC), measured as current assets minus current liabilities and cash. Similar to the INVEST variable, all these alternative dependent variables are scaled by total assets.

As explanatory variables of the magnitude of the shocks on banks (BShock), we consider asset quality as proxied by both (1) the mortgage backed securities (MBS) position that we assess using the sum of government and non-government mortgage backed securities, and (2) the non-performing loans (NPL), which are comprised of non-accrual loans, restructured loans, and loans 90 days past due and accruing interest. The recent crisis reveals how excessive reliance on wholesale funding and lack of liquidity can be a major source of bank fragility and a factor in the reduction of credit; therefore, we include among our explanatory variables (3) core deposits (COREDEP), as proxy for the core deposit intangible assets and measured domestic deposits less time deposits in excess of \$100,000⁶ and (4) asset liquidity, taken as the ratio of liquid assets minus short term noncore funding to non-liquid assets (LIQ)⁷. To take into account the bank capital we include (5) the Tier 1 capital ratio (TIER1). Finally, we include (6) bank return (the change in dividend adjusted price in each quarter (RET)) as a measurement of bank performance. In all of our regressions, we control for bank size effect by including (7) LSIZE,

⁵ Tobin's Q is measured as: the market value of assets (total assets + market value of common equity – common equity – deferred taxes)/(0.9*book value of assets + 0.1*market value of assets).

⁶ We include COREDEP also because it has been argued to be an important determinant of bank equity value [Flannery (1982)].

⁷ Trading Assets, Noninterest-and Interest-Bearing assets, U.S. Treasury Securities, U.S. Government Agency Obligations, U.S. Government Sponsored Agency Obligations, Mortgage Pass-Through Guaranteed by GNMA, Mortgage Pass-Through Issued by FNMA and FHLMC, MBS Issued or Guaranteed by FNMA, FHLMC, GNMA minus the sum of Federal Funds Sold in Domestic Offices, Securities Purchased Under Agreements to Resell, Federal Funds Purchased in Domestic Offices, Securities Sold Under Agreements to Repurchase, Commercial Paper and Other Borrowed Money, Short-Term. Non-liquid assets are measured as 1 minus liquid assets.

measured as the log of total assets, to take into account the possible correlation between the shock measurement and banks' size.⁸

Each of these variables is included in the regression separately and is interacted with the TED spread. The coefficients on the interaction terms indicate the relation between each lender's shock measure and the borrower's level of investment as the TED spread changes. Moreover, all the independent variables with the exception of the TED spread is measured with one quarter lagged with respect to INVEST. By doing so, we can allow for enough time for the shock on banks to transmit to their borrowers'?

To account for heterogeneity, each variable, with the exception of liquid assets (LIQ) and market return, is divided by the book value of total assets in the same quarter. Most importantly, we include firm fixed effects to account for time-invariant borrower-specific factors that may be related to investment but which are either unobservable or not included in the model specification. The advantage of the fixed-effects model is that if the omitted borrower specific factors are correlated to the independent variables they are likely to bias the regression coefficients. To account further for this, we estimate standard errors clustering by firm.

Table 1 – Panel A and B - describes some summary statistics for our variables with respect to BHCs over the period from 2006q1 to 2010q4. In Panel A, statistics are presented separately for each quarter, whereas in Panel B summary statistics are computed with respect to the overall sample. The overall mean of MBS is 11.02 percentage points; when looking at the crisis and non-crisis period separately, in Panel A, we notice that the average percentage of MBS is greater in the non-crisis period vs. the crisis period (11.51 vs. 10.20) and this difference is statistically significant. Panel B shows that there is quite a variation in the MBS ratio with some BHC not having an MBS position and some having up to 38 percent of total assets represented by MBS. Not surprisingly, the average percentage of COREDEP is statistically greater during the non-crisis period than during the crisis (49.68 vs. 45.64). Although the average COREDEP is 48.35 percent of assets (see Panel B), we want to highlight the variation across BHC in our sample. COREDEP ranges from 0.05 to 82 percent of assets. Most importantly, the LIQ ratio is consistently higher during the non-crisis periods than during the crisis period, and this difference is statistically significant at the 1% level. More precisely, there is a noticeable increase of LIQ starting from 2009q1, which is consistent with the injection of liquidity by the FED during the fourth quarter

⁸ Our main results remain robust when we exclude the lender size from the regression specification.

of 2008. We also notice that the level of regulatory capital ratio (TIER1) is lower during the financial crisis period. Finally, the change in price is lower (negative return) on average during the crisis, as we expected; however, this difference is not statistically significant. The NPL ratio is not statistically different between the two periods analyzed; however, we notice an increased trough time, which is consistent with the argument that the quality of loans started to worsen during the crisis.

Table 2 displays summary statistics for borrower variables in our base model (1) from January 1, 2006, to December 31, 2010. The average quarterly capital expenditure is 0.93% of firm assets and the average cash position is 24% of firm assets. The average cash flow is 1.09% of firm assets and Tobin's Q is 1.79. The average total assets is about \$339 million. Notice that our sampled firms are much smaller than the average of total assets in Duchin et al. (2010), which is around 5.1 billion dollars. This is largely because we constrain our sample to only firms with a single lender, which tend to be small firms.

4. Results

Table 3 presents estimates for our base specification described in Section 3.2. Column (1) does not have any controls except TED spread and firm fixed effects, and establishes the basic patterns in the data. Columns (2) to (7) provide the results of the model specification (1) presented above, where each shock variable is included independently as well as with its interaction term with the TED spread. In column (8) we provide results of the model specification, including all the lender shock variables as well as their interaction terms.

Results from Colum (1) show that as the TED spread increases or the crisis deteriorates corporate investment declines. Specifically, with one percentage point increase in the TED spread, corporate capital expenditure declines by 0.053% of assets relative to an unconditional mean of 0.94% of assets per quarter.

Column (2) shows that banks' MBS holdings do not have much impact on their borrowers' investment level. Indeed, the interaction term TED*MBS carries a negative but insignificant sign. This could possibly be explained by the fact that the MBS variable provided by Capital IQ

includes both government and non-government backed MBS. This can bias against finding significant results.⁹

Column (3) suggests that banks' asset quality proxied by NPL has a very important impact on borrowers' investment levels. Column (3) shows that NPL alone and its interaction term with the TED spread both have negative coefficients, which are statistically significant at the 5% and 10% levels. Overall, borrowers, whose banks have a higher percentage of NPL as a fraction of total assets, invest less, and, most importantly, as the TED spread increases, borrowers from these banks cut more of their investment. Specifically, when holding the TED spread as the average level of 0.42 of the non-crisis period, one standard deviation increase in NPL is associated with a 0.08 percentage point decrease in their borrowers' capital expenditure, which is 8.6 percent of the unconditional mean of the 0.94% capital expenditure. In comparison, when holding the TED spread as the average level of 1.67 during the crisis period, a one standard deviation increase in NPL is associated with a 0.126 percentage decrease in their borrowers' capital expenditures, which is 13.4 percent of the unconditional mean of 0.94% capital expenditure. Together these results suggest that borrowers, whose banks got hit more severely by drops in asset value, and therefore greater declines in their capital positions, experienced greater reductions in investment during the crisis.

With respect to the liquidity position of a lender, Column (4) shows an interesting result. The coefficient on COREDEP is positive but not statistically significant, indicating that banks that rely more on core deposits do not have as much impact on their borrowers' investment levels. The interaction of COREDEP with the TED spread has a negative and statistically significant coefficient at the 5% level; this indicates that as the TED spread increases, banks that rely more on COREDEP tend to reduce more of their credit, hence, borrowers tend to reduce more their investments. When using the LIQ variable (Column (5)) we notice that we cannot infer that banks that hold more liquid assets on average extend more credit, since the coefficient on LIQ is not statistically significant. However, it is important to highlight the result with respect to the interaction term of LIQ and the TED spread; the coefficient is positive and statistically significant at 5% both in columns (5) and (8) (when considering all the shock variables together). This result

⁹ In the next version of the paper we plan to use Bankscope data to extract a more detailed measurement of banks' MBS holdings in order to be able to consider only the non-government component of the MBS.

is quite straightforward and consistent with Cornett et al. (2010), indeed, we can infer that as the TED spread increases borrowers of more liquid banks invest more.

Because BHCs are regulated on the basis of their reported book equity ratios (with some Tier 1 adjustments), managers prefer to report the highest possible value for their book equity. Therefore, BHCs with lower TIER1 are subject to more regulatory pressure. As a consequence we would expect a positive sign on the TIER1 coefficient; however, column (6) contains a negative coefficient. Nevertheless, the interaction term with the TED spread has a positive sign and is significant at the 1% level. We can conclude that as the TED spread increases borrowers of more capitalized banks invest more.

Column (7) shows that when we use changes in lender's equity value (RET) to capture changes in bank financial conditions, we find that firms whose banks are in good financial condition (in market value terms) cut their quarterly investment less when the TED spread increases. In contrast, the negative coefficient on the RET variable points out that the higher the bank equity return the greater the negative effect on the investment of the borrower.

Column (8) provides results of the model specification including all the lender shock variables as well as their interaction terms. The interaction term of TED with core deposit, liquid asset, and stock return remains statistically significant. The insignificance of the other interactions, for instance the NPL, is possibly due to the high correlation between these interaction terms.

Except in column (8), LSIZE consistently has a significant negative sign, which implies that borrowers from large banks reduce investments more. However, this path does not hold during the financial crisis; indeed the coefficient on TED*LSIZE is positive in most specifications and statistically significant in columns 2, 5 and 6. This result indicates that large banks were able to extend more credit during the financial crisis, which is consistent with Cornett et al. (2010) that point out how larger banks reduced credit more intensively than small banks during the financial crisis. We can conclude that as the TED spread increases borrowers of large banks invest more.

Except in column (7), our results show that cash reserve does not play an important role in firms' capital expenditure levels, contrary to the results of Duchin et al. (2010), possibly because of the different sample. As expected, the coefficients on BTobQ and BCashFlow are positive, suggesting that firms with more investment opportunities and abundant cash flow invest more. The coefficient on BSize is negative but not statistically significant; therefore, we cannot infer that bigger firms reduced investments more than small firms. Overall, our results imply that

firms that have lending relationships with banks having more illiquid assets, higher non-performing loans, lower tier 1 capital, and larger price drops, cut their quarterly investment more than other firms. Therefore, a bank's financial condition did have an effect on corporate capital expenditures during the financial crisis.

In Table 4 we report the result of our model specification (1) by replacing the TED spread with an indicator variable equal to 1 during the period 2007q3 – 2009q2 (CRISIS) and 0 otherwise. As pointed out by Cornett et al. (2010) this approach has the advantage of better robustness because the indicator is by construction free of outliers, but has a drawback in that it misses the activity during the 2008 period when liquidity dried up. The results are quite consistent in terms of sign patterns with those in Table 3. It must be noticed that the magnitude is different because CRISIS varies between 0 and 1 as a discrete variable.

We further investigated whether shocks on banks affected other perspectives of firm investment, such as the R&D expenditure and net working capital. R&D expenditure has been viewed of great importance for firms to stay competitive in the long run. Net working capital can be viewed as a type of short-term investment that provides necessary operating liquidity to firms to meet their short-term financing needs and operational expenses. The results are shown in Tables 5 and 6. The results suggest that that R&D expenditure is barely affected by their banks' financial conditions. This possibly suggests that R&D expenditure is less elastic relative to the overall economy due to its strategic significance. Alternatively, the missing information of R&D expenditure and the reduced degrees of freedom might be responsible for the insignificant interactions. Table 6 provides weak evidence that borrowing firms decrease their levels of net working capital due to shocks on their banks.

5. Conclusions

A sharp reduction of credit availability during the financial crisis of 2007-2009 was documented by Ivashina and Scharfstein (2010). They report that new loans to large borrowers fell by 79% from the credit boom to the peak of the financial crisis. Such a decline of credit supply results from bank capital losses of bad loan write-downs and collateralized debt obligation devaluation, as well as banks' greater liquidity risk, which was due to exposure to undrawn loan commitments, withdrawal of wholesale deposits, and the loss of other short-term financing.

This study extends the literature by studying the real effect of bank credit supply shock on publicly traded firms' investment and production decisions using the 2007-2009 financial crisis as an experimental setting. We employ an approach similar to difference-in-differences approach in which we compare the investments of firms before and during the financial crisis as a function of their banks' financial positions, controlling for borrowers' internal resources (cash reserves), investment opportunities (Tobin's Q), cash flow, and size. Following Huang (2008) and Cornett et al. (2010), we use banks' mortgage backed security holdings, non-performing loans, core deposits, liquid assets, tier one capital ratios, and recent stock performance to measure shocks on banks' capital and liquidity positions.

We find that borrowers of more affected banks reduced investment by a greater extent during the crisis. This effect was particularly pronounced on firms' capital expenditures. Shocks on both banks' capital and liquidity positions were transmitted to the borrowing firms. Specifically, borrowing firms whose banks have a higher level of non-performing loans, a lower level of tier one capital, hold lower levels of liquid assets, and experience greater stock price drops tended to invest less in capital expenditures during the crisis than before. Shocks on banks, however, had a limited effect on firms' R&D expenditures and net working capital.

Appendix

Variable definition

Investment (INVEST) = quarterly capital expenditure to total assets. Since capital expenditure is reported on a year-to-date basis in quarterly financial statements, we subtract the previous quarter's capital expenditure from the current quarter's capital expenditure for fiscal quarters 2, 3, and 4.

Cash position (Cash) = cash and short-term investments to total assets.

Cash flows (BCashFlow) = operating income before depreciation to total assets.

Tobin's Q (BTobQ) = market value of assets (total assets + market value of common equity – common equity – deferred taxes)/(0.9*book value of assets + 0.1*market value of assets).

Borrower's size (BSIZE) = log of total assets.

TED spread = quarterly average of the monthly difference between the 3-months LIBOR rate and the 3-month T-bill rate

Research and development expenses (R&D) = R&D expenses to total assets.

Net working capital (NWC) = current assets minus current liabilities and minus cash to total assets.

Mortgage backed securities (MBS) = government and non-government mortgage backed securities to total assets.

Non-performing loans (NPL) = non-accrual loans, restructured loans, and loans 90 days past due and accruing interest to total assets.

Core deposits (COREDEP) = domestic deposits less time deposits in excess of \$100,000 to total assets.

Assets liquidity (LIQ) = liquid assets minus short-term noncore funding to non-liquid assets (LIQ).
Liquid assets = Trading Assets, Noninterest-and Interest-Bearing assets, U.S. Treasury Securities, U.S. Government Agency Obligations, U.S. Government Sponsored Agency Obligations, Mortgage Pass-Trougths Guaranteed by GNMA, Mortgage Pass-Trougths Issued by FNMA and FHLMC, MBS Issued or Guaranteed by FNMA, FHLMC, GNMA minus Federal Funds Sold in Domestic Offices, Securities Purchased Under Agreements to Resell, Federal Funds Purchased in Domestic Offices, Securities Sold Under Agreements to Repurchase, Commercial Paper and Other Borrowed Money, Short-Term. Non-liquid assets are measured as one minus liquid assets.

Tier 1 capital ratio (TIER1) = Tier 1 regulatory capital to risk weighted assets.

Bank return (RET) = change in dividend adjusted price in each quarter.

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Table 1**Summary Statistics for Bank Characteristics**

This table reports summary statistics for lender characteristics, including various proxies for shocks on the lender. N is the number of borrower-lender pairs of each quarter. SIZE is calculated as the log(Total Assets), MBS is calculated as the ratio of mortgage backed securities in portfolio to total assets, NPL is measured as the ratio of Non-performing Loans to Total Assets, LIQ is the ratio of liquid assets to non-liquid assets, TIER1 is the Tier 1 capital ratio in percentage, and RET is measured as the change in a quarter of the dividend adjusted price. Panel A reports bank characteristics by year, and Panel B reports their summary statistics.

Panel A

Year Quarter	N	LSIZE	MBS	NPL	COREDEP	LIQ	TIER1	RET
2006Q1	405	11.88	12.67	0.30	53.83	9.05	9.17	5.97
2006Q2	400	11.88	12.94	0.29	52.53	8.77	9.45	5.75
2006Q3	392	11.97	13.10	0.29	50.23	5.84	9.31	-2.01
2006Q4	369	11.94	10.71	0.32	49.28	1.67	9.31	7.27
2007Q1	364	11.99	10.29	0.34	49.96	2.47	9.40	3.19
2007Q2	347	12.04	10.12	0.35	49.47	2.53	9.34	-0.73
2007Q3	345	12.09	10.47	0.35	47.82	3.28	9.18	2.45
2007Q4	321	12.08	9.30	0.39	45.69	-0.67	9.03	-3.60
2008Q1	326	12.21	10.30	0.44	46.53	-1.71	8.80	-9.40
2008Q2	307	12.15	10.29	0.58	46.06	-0.34	8.46	-8.50
2008Q3	295	12.21	11.27	0.66	44.19	-0.55	8.76	-17.15
2008Q4	281	12.19	10.61	0.82	45.40	-2.54	8.62	31.70
2009Q1	293	12.43	9.83	1.00	45.44	7.01	9.91	-39.97
2009Q2	279	12.50	9.52	1.23	43.97	17.25	10.58	-32.82
2009Q3	272	12.52	10.15	1.50	45.36	23.10	11.32	51.03
2009Q4	260	12.45	9.95	1.64	47.18	31.51	11.75	29.08
2010Q1	257	12.48	12.08	1.65	48.91	34.87	11.63	-5.97
2010Q2	252	12.47	11.53	1.72	49.21	43.13	11.80	17.86
2010Q3	247	12.58	12.30	1.70	49.43	44.30	12.03	-13.86
2010Q4	243	12.45	12.29	1.70	50.76	44.64	12.12	1.43
Overall	6,255	12.19	11.02	0.78	48.25	12.08	9.87	0.96
Crisis	2,447	12.23	10.20	0.68	45.64	2.72	9.17	-9.66
Non-Crisis	3,403	12.22	11.51	0.98	49.68	20.99	10.55	8.25
t-test	-	0.118	-3.181	-1.300	-5.253	-3.237	-3.060	-1.932

Table 1-Panel B

Variable	N	Mean	Median	Std. Dev.	Min	Max
LSIZE (LogTA)	6,245	12.18	12.91	2.17	4.98	15.14
MBS (Percentage point)	5,140	11.04	10.28	5.78	0.00	38.16
NPL (Percentage point)	5,791	0.78	0.42	0.88	0.00	10.63
COREDEP (Percentage point)	4,925	48.35	50.26	14.07	0.05	82.00
LIQ (Percentage point)	4,925	11.94	0.42	37.74	-55.54	422.18
TIER1 (Percentage point)	5,666	9.87	9.00	2.25	4.18	29.50
RET (Percentage point)	5,940	0.95	0.85	23.77	-95.90	300.90

Table 2**Summary Statistics for Borrower Characteristics**

This table reports summary statistics for the sample of firm-year-quarter observations from January 1, 2006 to December 31, 2010. INVEST is measured as Cash is cash and short term investments. BTobQ is the Tobin's Q measured as the market value of assets to the book value of assets following Kaplan and Zingales (1997) and it is bounded above 10. BCashFlow is measured as operating income before depreciation and amortization. BSize is the log of total assets. Each variable is measured with one quarter lag respect to INVEST.

Variable	N	Mean	Median	Std. Dev.	Min	Max
INVEST (Percentage point)	7,125	0.93	0.53	1.06	0.01	4.07
Cash	7,121	0.24	0.18	0.21	0.01	0.69
BTobQ	7,047	1.79	1.52	0.93	0.57	5.92
BCashFlow (Percentage point)	6,773	1.09	2.06	4.71	-11.22	7.84
Total Assets (Millions)	7,121	338.83	92.42	831.93	1.03	12,635.37
BSize	7,121	4.60	4.53	1.55	0.03	9.44

Table 3

Regression of Capital Expenditure on TED Spread, Shock on Banks, and Interactions

This table presents panel regression of firm-level quarterly investment for quarters with an end-date between January 1st, 2006 and December 31st, 2010. Dependent variable is measured as capital expenditures divided by total assets in percentage points. Definitions for independent variables can be found in appendix. Standard errors are clustered at the firm level. ***, **, or * indicates that the coefficient estimate is significant at the 1%, 5%, or 10% level respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TED	-0.053*** (0.015)	-0.051 (0.142)	-0.190 (0.117)	0.292 (0.217)	-0.141 (0.128)	-0.592*** (0.214)	-0.259** (0.128)	0.473 (0.376)
MBS		0.001 (0.005)						0.000 (0.006)
TED*MBS		-0.004 (0.004)						-0.001 (0.004)
NPL			-0.075** (0.030)					-0.079 (0.058)
TED*NPL			-0.041* (0.024)					-0.028 (0.050)
CoreDep				0.002 (0.004)				0.004 (0.005)
TED*CoreDep				-0.004** (0.002)				-0.004* (0.002)
Liq					-0.001 (0.001)			0.000 (0.001)
TED*Liq					0.001** (0.001)			0.001** (0.001)
Tier1						-0.061*** (0.014)		-0.019 (0.029)
TED*Tier1						0.021* (0.011)		-0.011 (0.017)
Ret							-0.002*** (0.001)	-0.001 (0.001)
TED*Ret							0.001*** (0.000)	0.001** (0.000)
LSize		-0.132** (0.058)	-0.087* (0.045)	-0.134** (0.063)	-0.147** (0.068)	-0.096** (0.042)	-0.132** (0.054)	-0.067 (0.052)
TED*LSize		0.007 (0.009)	0.015* (0.009)	-0.009 (0.012)	0.011 (0.009)	0.028*** (0.011)	0.018* (0.010)	-0.015 (0.017)
BCash		0.165 (0.189)	0.157 (0.183)	0.192 (0.193)	0.210 (0.194)	0.181 (0.190)	0.147 (0.177)	0.200 (0.203)

Table 3- Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TED*BCash		0.039 (0.071)	0.097 (0.070)	0.013 (0.072)	-0.012 (0.073)	0.070 (0.071)	0.124* (0.074)	-0.010 (0.071)
BTobQ _i		0.250*** (0.035)	0.233*** (0.038)	0.236*** (0.034)	0.240*** (0.035)	0.245*** (0.038)	0.267*** (0.036)	0.181*** (0.040)
BCashFlow _i		0.012** (0.006)	0.014** (0.006)	0.013** (0.006)	0.013** (0.006)	0.016*** (0.005)	0.015*** (0.005)	0.013** (0.006)
BSize		-0.017 (0.076)	-0.043 (0.069)	-0.038 (0.078)	-0.030 (0.078)	-0.045 (0.072)	-0.072 (0.069)	-0.035 (0.079)
cons	0.980*** (0.014)	2.083*** (0.588)	1.774*** (0.511)	2.101*** (0.764)	2.329*** (0.684)	2.433*** (0.543)	2.349*** (0.589)	1.554* (0.872)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Number of observations	7,045	4,884	5,500	4,690	4,690	5,398	5,584	4,538
R2	0.551	0.623	0.580	0.613	0.613	0.581	0.575	0.609

Table 4

Regression of Capital Expenditure on Crisis Indicator, Shock on Banks, and Interactions

This table presents panel regression of firm-level quarterly investment for quarters with an end-date between January 1st, 2006 and December 31st, 2010. Dependent variable is measured as capital expenditures divided by total assets in percentage points. Definitions for independent variables can be found in appendix. Standard errors are clustered at the firm level. ***,**, or * indicates that the coefficient estimate is significant at the 1%, 5%, or 10% level respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis	-0.029 (0.025)	0.037 (0.189)	-0.228 (0.200)	0.528* (0.305)	-0.144 (0.196)	-0.773** (0.343)	-0.367* (0.198)	1.056* (0.604)
MBS		0.001 (0.005)						-0.000 (0.006)
Crisis * MBS		-0.005 (0.006)						0.002 (0.007)
NPL			-0.090*** (0.030)					-0.108* (0.058)
Crisis * NPL			-0.059 (0.041)					-0.030 (0.067)
CoreDep				0.004 (0.005)				0.006 (0.006)
Crisis * CoreDep				-0.006** (0.003)				-0.006** (0.003)
Liq					-0.000 (0.001)			0.001 (0.001)
Crisis * Liq					0.002** (0.001)			0.002 (0.001)
Tier1						-0.048*** (0.013)		-0.012 (0.028)
Crisis * Tier1						0.029* (0.017)		-0.029 (0.028)
Ret							-0.001** (0.001)	-0.001 (0.001)
Crisis * Ret							0.002** (0.001)	0.001 (0.001)
LSize		-0.127** (0.057)	-0.080* (0.044)	-0.137** (0.063)	-0.148** (0.069)	-0.091** (0.042)	-0.121** (0.053)	-0.070 (0.051)
Crisis * LSize		0.005 (0.013)	0.020 (0.015)	-0.016 (0.017)	0.015 (0.014)	0.039** (0.017)	0.030** (0.015)	-0.039 (0.026)
BCash		0.221 (0.181)	0.218 (0.175)	0.217 (0.186)	0.239 (0.185)	0.241 (0.180)	0.228 (0.168)	0.218 (0.196)

Table 4- Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crisis *BCash		0.006 (0.109)	0.093 (0.112)	-0.015 (0.113)	-0.058 (0.113)	0.038 (0.111)	0.113 (0.112)	-0.051 (0.113)
BTobQ _i		0.251*** (0.035)	0.236*** (0.038)	0.237*** (0.034)	0.242*** (0.034)	0.253*** (0.037)	0.263*** (0.036)	0.184*** (0.040)
BCashFlow _i		0.012* (0.006)	0.014** (0.006)	0.013** (0.006)	0.013** (0.006)	0.016*** (0.006)	0.015*** (0.005)	0.012** (0.006)
BSize		-0.024 (0.077)	-0.048 (0.069)	-0.044 (0.079)	-0.036 (0.078)	-0.049 (0.073)	-0.082 (0.070)	-0.041 (0.080)
_cons	0.943*** (0.010)	2.026*** (0.576)	1.694*** (0.506)	2.072*** (0.761)	2.343*** (0.691)	2.207*** (0.519)	2.243*** (0.577)	1.434* (0.848)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	7,125	4,884	5,500	4,690	4,690	5,398	5,584	4,538
R2	0.544	0.623	0.579	0.613	0.613	0.580	0.575	0.609

Table 5

Regression of R&D Expenditure on TED Spread, Shock on Banks, and Interactions

This table presents panel regression of firm-level quarterly investment for quarters with an end-date between January 1st, 2006 and December 31st, 2010. Dependent variable is measured as R&D expenditures divided by total assets in percentage points. Definitions for independent variables can be found in appendix. Standard errors are clustered at the firm level. ***,**, or * indicates that the coefficient estimate is significant at the 1%, 5%, or 10% level respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TED	0.028 (0.032)	0.044 (0.209)	-0.120 (0.200)	0.848* (0.494)	0.158 (0.220)	-0.182 (0.416)	-0.047 (0.204)	0.772 (0.589)
MBS		-0.002 (0.010)						-0.001 (0.011)
TED* MBS		0.004 (0.007)						0.005 (0.007)
NPL			0.116 (0.074)					0.120 (0.078)
TED* NPL			0.068 (0.052)					0.071 (0.052)
CoreDep				0.007 (0.009)				-0.003 (0.007)
TED* CoreDep				-0.008* (0.005)				-0.008 (0.006)
Liq					0.001 (0.002)			0.001 (0.003)
TED* Liq					-0.001 (0.001)			0.000 (0.003)
Tier1						0.026 (0.026)		-0.011 (0.045)
TED* Tier1						0.013 (0.023)		-0.017 (0.027)
Ret							0.001 (0.001)	0.000 (0.001)
TED* Ret							-0.000 (0.001)	-0.000 (0.001)
LSize		0.121 (0.143)	0.009 (0.156)	0.142 (0.146)	0.072 (0.137)	0.069 (0.132)	0.197 (0.137)	-0.025 (0.129)
TED* LSize		-0.001 (0.015)	0.012 (0.015)	-0.034 (0.025)	-0.007 (0.017)	0.014 (0.020)	0.012 (0.016)	-0.025 (0.031)
BCash		0.287 (0.579)	0.053 (0.527)	0.291 (0.600)	0.287 (0.605)	0.084 (0.559)	-0.030 (0.485)	0.123 (0.544)

Table 5- Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TED*BCash		-0.113 (0.187)	-0.094 (0.173)	-0.085 (0.195)	-0.087 (0.189)	-0.111 (0.177)	-0.047 (0.187)	-0.104 (0.198)
BTobQi		0.096 (0.102)	0.156* (0.092)	0.093 (0.103)	0.090 (0.106)	0.127 (0.103)	0.250** (0.105)	0.184* (0.107)
BCashFlowi		-0.040*** (0.013)	-0.031*** (0.011)	-0.043*** (0.013)	-0.043*** (0.013)	-0.033*** (0.012)	-0.032*** (0.011)	-0.038*** (0.012)
BSize		-0.686*** (0.157)	-0.633*** (0.139)	-0.681*** (0.160)	-0.691*** (0.163)	-0.672*** (0.143)	-0.764*** (0.151)	-0.655*** (0.149)
_cons	2.992*** (0.029)	4.604*** (1.732)	5.416*** (1.813)	3.994** (1.859)	5.207*** (1.661)	4.774*** (1.652)	3.768** (1.795)	6.261*** (1.998)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4,405	3,143	3,450	3,009	3,009	3,402	3,516	2,884
R2	0.885	0.908	0.912	0.906	0.906	0.912	0.913	0.913

Table 6

Regression of Net Working Capital on TED Spread, Shock on Banks, and Interactions

This table presents panel regression of firm-level quarterly investment for quarters with an end-date between January 1st, 2006 and December 31st, 2010. Dependent variable is measured as net working capital excluding cash divided by total assets in percentage points. Definitions for independent variables can be found in appendix. Standard errors are clustered at the firm level. ***, **, or * indicates that the coefficient estimate is significant at the 1%, 5%, or 10% level respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TED	-0.302 (0.222)	-1.407 (1.629)	-1.243 (1.221)	-0.882 (3.165)	-0.816 (1.419)	-4.561** (2.259)	-1.309 (1.200)	-7.325* (4.284)
MBS		-0.044 (0.069)						-0.030 (0.082)
TED* MBS		0.018 (0.043)						0.037 (0.056)
NPL			-0.888** (0.446)					-1.009* (0.557)
TED* NPL			-0.008 (0.325)					-0.246 (0.604)
CoreDep				0.045 (0.059)				0.044 (0.058)
TED* CoreDep				0.003 (0.030)				0.033 (0.037)
Liq					0.003 (0.014)			0.006 (0.019)
TED* Liq					0.003 (0.009)			-0.004 (0.011)
Tier1						-0.209 (0.197)		0.026 (0.371)
TED* Tier1						0.202 (0.124)		0.220 (0.216)
Ret							0.019** (0.009)	0.013 (0.008)
TED* Ret							-0.015*** (0.006)	-0.011* (0.006)
LSize		-0.771 (0.621)	-0.412 (0.578)	-0.721 (0.608)	-0.828 (0.645)	-0.863 (0.612)	-1.111 (0.702)	-0.576 (0.487)
TED* LSize		0.032 (0.108)	0.026 (0.093)	0.010 (0.160)	0.010 (0.107)	0.156 (0.110)	0.056 (0.092)	0.241 (0.191)
BCash		-4.382 (3.722)	-4.823 (3.360)	-4.475 (3.846)	-4.245 (3.811)	-4.600 (3.355)	-5.207 (3.367)	-3.955 (3.940)

Table 6- Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TED*BCash		2.059** (0.973)	1.882** (0.942)	2.095** (1.000)	2.015** (1.022)	1.683* (0.936)	1.518 (0.986)	2.178** (1.064)
BTobQi		0.891** (0.416)	0.357 (0.398)	0.893** (0.423)	0.938** (0.422)	0.692* (0.398)	0.527 (0.404)	0.679 (0.452)
BCashFlowi		0.276*** (0.091)	0.276*** (0.078)	0.282*** (0.093)	0.280*** (0.093)	0.272*** (0.082)	0.321*** (0.078)	0.283*** (0.095)
BSize		2.097* (1.111)	1.836* (1.013)	2.235* (1.164)	2.225* (1.162)	1.983** (1.010)	1.607 (0.993)	2.538** (1.163)
_cons	5.028*** (0.203)	5.189 (8.313)	3.517 (8.092)	1.204 (8.571)	4.608 (8.684)	8.520 (8.069)	11.466 (9.260)	-1.277 (8.707)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	7,034	4,883	5,495	4,690	4,690	5,393	5,579	4,538
R2	0.842	0.862	0.868	0.860	0.860	0.869	0.866	0.862

Figure 1
The TED Spread

Figure 1 shows monthly movements in the TED spread from the beginning of 2006 to the end of 2010. The TED spread is computed as the difference between the 3-month LIBOR rate and the 3-month Treasury rate (both from the Federal Reserve, H15 report).

