

## **Bank Lending During the Financial Crisis of 2008**

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December 15, 2008

### **Abstract**

This paper documents that new loans to large borrowers fell by 37% during the peak period of the financial crisis (September-November 2008) relative to the prior three-month period and by 68% relative to the peak of the credit boom (Mar-May 2007). New lending for real investment (such as capital expenditures) fell to the same extent as new lending for restructuring (LBOs, M&A, share repurchases). Banks that have access to deposit financing cut their lending less than banks with less access to deposit financing. In addition, there is a large overhang of revolving credit facilities, which may also have curtailed lending. We document an increase in drawdowns of revolving credit facilities. Many of these drawdowns were undertaken by low credit quality firms concerned about their access to funding. While helpful to these borrowers, they may limit the ability of banks to make other loans. Banks with more revolving lines outstanding relative to deposits reduced their lending more than those with less revolving line exposure.

\* We thank Shawn Cole, Gary Gorton, Anil Kashyap, Arvind Krishnamurthy, Hamid Mehran, Jeremy Stein, Amir Sufi, and participants at the HBS Finance Research Colloquium for helpful comments, Chris Allen for help with the data, and Division of Research at Harvard Business School for research support.

## **1. Introduction**

The global financial crisis that erupted in September, 2008 has thrown economies around the world into recession. The seeds of this crisis were sown in the credit boom that peaked in mid-2007, followed by the meltdown of sub-prime mortgages and securitized products. The resulting concerns about the health of financial institutions became a full-blown banking panic following the failures of Lehman Brothers and Washington Mutual, and government takeovers of Fannie Mae, Freddie Mac, and AIG. Although the panic subsided in the first half of October after a variety of government actions to promote the liquidity and solvency of the financial sector, prices across most asset classes and commodities fell drastically, the cost of corporate and bank borrowing rose substantially, and financial market volatility rose to levels that have rarely, if ever, been seen.

The goal of this paper is to understand a key mechanism through which financial crises can affect the real economy, namely the supply of credit to the corporate sector. Towards this end, we examine data on loan syndications, which is the primary source of loans for large corporations. In these syndications a lead bank “originates” a loan and lines up other financial institutions to buy a portion of the loan. This market has evolved over the last twenty years as the main vehicle through which banks and other financial institutions lend to large corporations.

We start by documenting that syndicated lending started falling in mid-2007 and that it accelerated with the onset of the financial crisis in September 2008. During the September-November 2008 period, lending was 37% lower than the prior three-month period and it was 68% lower than the three-month period at the peak of the credit boom, March-May 2007.

Lending fell across all types of loans – those used to finance buyouts and takeovers as well as

those for real investment. New revolving credit facilities and new term loans also fell. The decline in lending was particularly steep for below-investment-grade loans.

Our finding of a decline in lending is ostensibly at odds with Chari, Chistiano and Kehoe (2008) who document that commercial and industrial (C&I) loans reported on the balance sheet of U.S. banks rose by about \$100 billion from September to mid-October, 2008. However, their finding can be reconciled with ours if the rise in C&I loans on bank balance sheets reflects an increase in drawdowns of *existing* revolving credit facilities. Indeed, we document that this was likely the case. From news accounts alone, we are able to document \$16 billion of credit line drawdowns (Table II), which would account for approximately 15.5% of the increase in C&I loans reported on bank balance sheets. In almost all instances, the firms state that they are drawing on their credit lines because of concerns about the financial markets. Thus, these drawdowns are likely to be crisis-related, not drawdowns for usual business purposes. Given our estimate of roughly \$3,500 billion in outstanding revolving credit lines, the drawdowns were likely much larger than what we find in news reports.

A reduction in lending does not, by itself, show that there was a decline in the supply of credit. It is possible that the recession and general economic uncertainty reduced the demand for credit by corporate borrowers. To separate supply and demand effects, we relate bank lending to a bank's willingness or ability to lend during the crisis. In particular, we focus on the role of deposits and revolving credit lines in mitigating and exacerbating the effects of the turmoil in financial markets.

We argue that banks that have a strong base of deposits will likely cut their lending less during the crisis. Concerns about bank solvency made it difficult for banks to roll over short-term debt and raise additional long-term debt. Commercial paper issuance by financial

institutions fell dramatically, and commercial paper that was issued was very short term. Thus, banks with a large and stable base of deposits (particularly if they are insured) should be less dependent on financing from short-term debt markets, and therefore less credit-constrained. In addition, as concerns about general credit quality rose during the crisis, investors pulled their money from uninsured money market funds and the commercial paper market, and redeployed their funds to banks in the form of insured deposits. Therefore, banks that were in a better position to attract deposits, were likely less credit-constrained and thus in a better position to lend than banks without a strong deposit base.

Although a strong deposit base could help a bank to continue lending, Kashyap, Rajan and Stein (2002) show that banks that finance more with deposits also extend more credit lines. When credit markets freeze and it is difficult to raise capital, firms tap their unused credit lines. If banks are themselves credit-constrained, then drawdowns of existing lines limit the ability of banks to make new loans. Gatev and Strahan (2006) argue, however, that when there are systemic shocks that lead firms to draw on their credit facilities, those same shocks may also lead to an increase in bank deposits. Specifically, if there is concern about credit quality in commercial paper markets, as occurred after the Enron collapse, firms will tap their backup commercial paper lines. At the same time, investors will withdraw from money market funds that invest in commercial paper, and instead place their money in insured deposits. Thus, banks with deposits are in a better position to withstand the effects of credit line drawdowns. These observations suggest that banks that have more credit line exposure relative to deposits may be in a worse position to continue lending during the financial crisis.

We explore these factors by estimating the cross-sectional determinants of the change in bank lending during the financial crisis. We first establish that banks with more deposit

financing (scaled by assets) had a smaller percentage reduction in lending. The median bank cuts its lending by 39% in August-November 2008, relative to the prior year, August 2007-July 2008. However, a bank with deposits one standard deviation below the mean cuts lending by 51%, while a bank with deposits one standard deviation above the mean cuts lending by only 14%.

Similarly, we look at exposure to revolving lines net of deposits (both scaled by bank assets). This variable, which we call net revolving line exposure, is negatively related to loan growth; banks with more credit line exposure cut lending more during the financial crisis. This regression has somewhat more explanatory power than the regression with deposits. A bank with net revolving line exposure one standard deviation above the mean cuts lending by 47%, while a bank with net exposure one standard deviation below the mean cuts lending by only 10%.

This paper is organized as follows. Section 2 briefly describes the data. Section 3 presents the basic facts about aggregate bank lending for a variety of loan types, and it documents the importance of credit line drawdowns. Section 4 presents the cross-sectional regressions and Section 5 concludes.

## **2. Data**

The data for our analysis come from Reuters' DealScan database of large bank loans. Almost all these loans are syndicated, i.e., originated by one or more banks and sold to a syndicate of banks and other investors, notably to those structuring collateralized debt obligations (CDOs), as well as insurance companies, pension funds, mutual funds, and hedge

funds. Although CDOs were a large buyer of loans, by the fourth quarter of 2007, they effectively disappeared as buyers after the meltdown in securitized mortgages.

The mean size of the loans in 2008 was \$425 million, the median was \$125 million, and 90% were larger than \$21 million. The average borrower had sales of \$5.9 billion. While we do not have data on small loans, the loans in our sample account for a large share of outstanding bank loans. In fact, the value of the outstanding loans in our sample *exceeds* the value of C&I loans on commercial bank balance sheets.<sup>1</sup>

A difficulty with using DealScan to analyze such a recent period is that there are lags in reporting. Some loans are reported within a day of origination, while others may not be reported for several months. These reporting lags will lead to significant underestimation of loan volume for recent months. Using information on reporting dates in the DealScan database, we calculate that for the period November 1, 2006 through October 31, 2007, 21% of loans are reported within a day, 36% within 7 days, 49% within 14 days, 57% within 21 days, and 95% within a year.

We use this information to scale up the data for more recent months, which was collected on December 1, 2008. For example, we identified \$1.89 billion of loans originated in the week ending November, 2008. However, we conservatively estimate that only 28.5% of loans made during this week would have been reported by December 1, 2008. This is the average of three one-day and seven day reporting rate.<sup>2</sup> Thus, we scale up the \$1.89 billion of loans to \$6.64

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<sup>1</sup> This is possible because Federal Reserve Board's C&I figure corresponds to U.S. commercial banks while our sample includes all banks and financial companies. In addition, approximately 48 percent of the loans in our sample are estimated to be held outside the banking sector (<http://www.federalreserve.gov/newsevents/press/bcreg/20081008a.htm>.)

<sup>2</sup> This is conservative because the average is a linear approximation of the reporting hazard function which approximately logarithmic in shape.

billion (i.e., \$1.89 billion divided by 28.5%). We do this for all weeks prior to December 1, 2008 up to 76 weeks using the relevant reporting rates for each week.

### **3. Basic Facts**

Panel A of Figure 1 graphs the dollar volume of loan issues in three-month periods from December 1, 2006 through November 30, 2008. Because we wanted the last period to encompass the peak period of the financial crisis, we defined it as September to November 2008, and defined the other three-month periods accordingly. The dotted line is the actual reported loan originations during the period. The solid line above the dashed line is our estimate of loan originations taking into account reporting lags. Panel B of Figure 1 graphs the number of loan issues, again adjusting for reporting lags.

*[FIGURE 1]*

**Fact 1: New lending in 2008 was significantly below new lending in 2007, even before the peak period of the financial crisis (September-November 2008).**

As can easily be seen from both panels of Figure 1, new lending to large corporate borrowers peaked in the period, March-May 2007. In summer of 2007, concerns about the credit risk of all types of collateralized debt obligations (CDOs), led to a drop in institutional demand for syndicated loans, many of which were put in CDOs. By June-August 2008, the dollar volume of lending was 49% lower than the peak of the credit boom, and the number of loans was down 32%.<sup>3</sup>

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<sup>3</sup> The drop in lending was not just due to financial services firms, which were in significant trouble, but was equally to non-financial borrowers.

**Fact 2: The decline in new loans accelerated during the financial crisis, falling by 37% in dollar volume and 22% in number of issues in the September-November 2008 period relative to the prior three-month period.**

The dollar volume of bank loans fell from \$726.03 billion in March – May 2007, the peak of the credit boom, to \$372.28 15 months later, and then to \$233.31 billion three months later in the September-November 2008 period. The drop in October, 2008 was particularly steep. The dollar volume of lending during the peak financial crisis period was less than one third of peak lending 18 months earlier. The number of issues was less than half. This drop was not just due to the collapse in large LBOs or contraction in the institutional investors demand for corporate loans.

**Fact 3: Real investment loans (working capital or general corporate purposes) and restructuring loans (those for M&A, LBOs, and stock repurchases) have decreased to a similar extent.**

Table I breaks out the loan data by the stated use of the funds. One can see that a large portion of the loans were used for various types of restructuring: leveraged buyouts (LBOs); mergers and acquisitions (M&A); and stock repurchases. These loans have the effect of increasing leverage or changing ownership, but do not fund real investments in physical or working capital. Thus, a reduction in lending for restructuring purposes might be less troubling than a reduction in loans for real investment.

Figure 2 graphs restructuring and real investment loans through time. We define “real investment loans” as those where funds are to be used for general corporate purposes (e.g. capital



expenditures) or working capital, while “restructuring loans” are those used to fund LBOs, M&A, or stock repurchases.

It is apparent that restructuring loans and real investment loans both experienced a significant decline.<sup>4</sup> Although restructuring lending contraction since the peak lending period of March-May 2007 was somewhat bigger than real investment lending contraction (78% vs. 65%), bank loans have fallen not just because LBO and M&A activity has dried up.

*[TABLE 1 & FIGURE 2]*

**Fact 4: During the peak period of the financial crisis (September-November 2008), non-investment grade loans fell by 54% relative to the prior period, while investment grade loans fell by 22%.**

Figure 3 graphs dollar volume of new issues of investment grade and non-investment grade loans. This figure is based on the 33% of the sample for which ratings are available.

During the peak of the credit boom, 50% of all loan syndication and 76% of non-investment-grade syndications were funded by institutional investors, i.e. non-bank financial institutions including CDOs. However, as the credit boom turned into a bust in mid-2007, institutional loan demand dropped drastically, and CDO demand went to zero (Ivashina and Sun, 2007). Thus, the drop in non-investment-grade loans during the September-November period is not driven by the exit of institutional investors; that occurred earlier. The drop in investment-grade lending is also not driven by the drop in institutional demand, as institutional investors were never a large part of that market in the first place

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<sup>4</sup> Lumpiness in LBO and M&A loans is likely to reflect a lag in financing of deals committed during the pre-crisis period. We only observe the day of financing, but typically a takeover funding is committed before the board of directors and regulatory approvals. As a result, observed LBO financing could be less responsive to the market conditions than other types of loans.

[FIGURE 3]

**Fact 5: During the peak period of the financial crisis (September-November 2008), revolving credit facilities and term loans both declined, but the decline in revolving credit facilities (39%) was somewhat larger than the decline in term loans (26%).**

Figure 4 breaks out the sample into term loans and revolving credit facilities. These facilities allow firms to borrow up to a certain amount at a pre-set interest rate (usually a spread over LIBOR). For this right, the firm pays an additional annual fee on all unused portions of the loan. Revolving lines are traditionally funded by banks.

Here too, terms loans and revolving credit facilities track each other. One can see a big drop in 2008 relative to 2007, leading to the low point in September-November 2008. The decline in revolving credit facilities with a maturity greater than one year was even larger. These facilities, which comprise a large portion of originations, require banks to allocate more regulatory capital than do facilities with a maturity of less than one year. Thus, it is not surprising that there has been a bigger drop in the longer term facilities.

[FIGURE 4]

As noted above, it is important to reconcile our findings with those of Chari et. al. (2008), who have documented that C&I loans on bank balance sheets were trending slightly upward for much of 2008, until they rose substantially in following the collapse of Lehman Brothers before stabilizing in the middle of October 2008. Figure 5 shows this graphically.

To reconcile our findings with theirs, it is useful to note the following identity:

$$\begin{aligned} \text{OutstandingLoans}_t = \\ \text{OutstandingLoans}_{t-1} + \text{NewLoans}_t + \text{Drawdowns}_t - \text{LoanRetirements}_t \end{aligned}$$

Thus, outstanding loans will increase more if there are more new loans, more drawdowns, or fewer loan retirements. Since new loans appear to be decreasing, this means that there are either more draw-downs or fewer loan retirements.

*[FIGURE 5]*

**Loan Retirements.** Firms may choose to retire debt early with excess cash flow or a stock issue. In fact, in many LBOs, there are explicit plans to pay down debt early with excess cash flow. Though we have no direct evidence of a reduction in loan retirements, it would not be surprising if firms increasingly chose not to repay debt early. This would be the case for LBOs that are running into trouble, firms that want the security of having more cash on their balance sheets, or those that are reluctant to repay debt by issuing equity in a down market..<sup>5</sup>

**Revolving Credit Facility Drawdowns.** Firms could be increasing their drawdowns of existing credit lines. These would not count as new loans in our data, but would count as new loans in the Federal Reserve data.

Figure 6 plots the total outstanding amount of revolving credit facilities. It rose dramatically through 2006 and 2007, peaking in early 2008 and falling slightly during 2008 to the current level of \$3,373 billion. While only a fraction of the total has been drawn, there may have been a recent increase in drawdowns. The only way to know for sure is to look at firms' quarterly filings, but these have only been released for the third quarter. Nevertheless, we have some indication from news reports, that firms may have increased their revolver drawdowns.

*[FIGURE 6]*

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<sup>5</sup> The flip side of a reduction in loan retirements is an increase in loan roll-overs. Some bank debt used to finance LBOs had "PIK toggles" which allowed firms to opt out of paying cash interest, but instead to increase the principal outstanding on the loan (i.e. interest was "payment-in-kind"). Harrah's recently opted for the toggle on its \$1.4 billion bank loan, as have a number of other firms. This would show up as increase in loans outstanding.

Table II lists 24 credit line drawdowns reported by the media since mid-August 2008. There were no equivalent announcements in the prior three-month period, which suggests that there has been an increase in drawdowns. The drawdowns total \$16 billion. Sixteen of the 22 rated companies are currently below investment grade. At the time of the drawdowns, the average credit default swap spread for the eight companies for which data were available was over 1,500 basis points. Nevertheless, twelve of the sixteen firms were able to draw down and pay interest rates that were below current rates for non-investment-grade debt (LIBOR + 275 basis points). Although violation of the financial covenants could prevent companies from drawing down the lines, most of the loans originated in the past two years were “covenant-lite;” they had loose covenants, which would not prevent them from drawing down their credit lines as their financial condition worsened.<sup>6</sup>

[TABLE II]

The reasons given for the drawdowns are also instructive. In fourteen cases, firms state that they are drawing down to enhance liquidity and financial flexibility during the credit crisis. For example, in an 8-K filing with the SEC, the Tribune Company notes that it “is borrowing under the revolving credit facility to increase its cash position to preserve its financial flexibility in light of the current uncertainty in the credit markets.” While Tribune’s recent bankruptcy filing and the credit problems of the other firms list in Table II make clear that financial market turmoil was not the only reason for an increase in drawdowns, it is likely that that a combination

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<sup>6</sup> A typical loan contract included Material Adverse Change (MAC) provision that would allow the lender to terminate the deal under the terms of covenants negotiated under the agreement. As the provision’s title indicates, the borrower would need to be facing *material* change in its financial performance. Thus, it has nothing to do with the financial health of the bank, and it has everything to do with the financial health of the borrower. However, based on the firm’s public announcements, the latter appears to be the reason for revolvers drawdowns. In addition, the effectiveness of the MAC provision would be hampered by the “covenant-lite” terms.

of firm-specific credit problems and market-wide financial turmoil led to an acceleration of drawdowns.

While C&I loans on bank balance sheets rose from September to mid-October, Figure 5 shows that they leveled off just after October 14, 2008 when the Treasury bought equity in nine large banks and the FDIC offered to guarantee new issues of bank debt. Veronesi and Zingales (2008) have documented that this led to a large drop in the perceived probability of default as measured by bank credit default swap spreads. Thus, as concerns about bank solvency diminished, firms slowed their drawdowns of revolving lines.

Figure 5 also shows that as C&I loans rose so did deposits until they started declining in mid-October. Funds that would otherwise have been invested in commercial paper and money market funds moved over to insured deposits with concerns about credit quality in those markets. They moved back to commercial paper and money market funds after a variety of interventions in those markets. These patterns lend support to our claim that banks with greater access to insured deposits would have had less financing trouble and would have been in a better position to lend.

#### **4. Determinants of Bank Lending During the Crisis**

We now examine the characteristics of banks that affected their lending behavior during the crisis. We start by examining the role of deposits. We argue that deposits, particularly insured deposits, are a more stable source of capital than short-term debt. With concerns about bank solvency, interbank lending dried up and banks found it difficult to roll over short-term debt. As discussed by Diamond and Rajan (2001), this is a common feature of financial crises.

Thus, we predict that firms with a larger amount of deposits relative to assets would cut lending by less in the financial crisis.

To examine this prediction, we start by calculating total deposits as a fraction of assets measured as of December 2007. Ideally, we would also use insured deposits; however, we were not able to get these data for the several foreign banks in our sample (e.g., Royal Bank of Scotland, Societe Generale). As Table III indicates, 52% of the median bank's liabilities are deposits. At the 25<sup>th</sup> percentile, the bank has no deposits. This is because 10 of the 38 firms in our sample are investment banks (such as Goldman Sachs) or finance companies (CIT Group and GE Capital). Bear Stearns, which failed in March, 2008 is dropped from the sample. We keep Lehman Brothers, which failed in September 2008, and Merrill Lynch and Wachovia, both of which were acquired in October 2008. None of the results depend on to their inclusion.

*[TABLE III]*

The empirical analysis looks at the percentage change in bank lending during the August – November 2008 period relative to a base period before the crisis. We use two base periods. One base period is August 2007-July 2008, the year before the August-November 2008. As shown in the prior section, this base period was a credit crisis of its own, with a big decline in bank lending. We call this base period Crisis I, and the later period Crisis II. We also compare Crisis II to the period August 2006-July 2007, which was a period of robust loan growth. We refer to this period at Pre-Crisis.

As can be seen from Table III, in Crisis II the median bank cuts lending drastically. For example, in Crisis II, there is a 39% decrease in the number of monthly loan syndications in which the median bank participates relative to Crisis I; there is a 55% decrease relative to Pre-

Crisis. There is a 49% drop in the dollar volume of loans relative to Crisis I and a 62% drop relative to Pre-Crisis.

The question we take up now is whether these reductions are related to deposits. Table IV reports the results of regressing percentage change in loan growth on deposits (normalized by assets). In odd columns we calculate the change in loans relative to Crisis I as the base period and in even columns the base period is Pre-Crisis. In Panel A we measure loans in three different ways: the total number of loans in which the bank participates either as a lead bank or syndicate member (columns 1 and 2); the total number of loans in which the bank acts as the lead bank (columns 3 and 4); the dollar amount of loans in which in which the bank acts as the lead bank (columns 5 and 6) Note that we do not observe the actual amount of a loan, only the amount lent by the syndicate and whether a bank is a lead lender or other syndicate member.

*[TABLE IV]*

Regardless of how we define the change in loans, the coefficient on deposits is positive, and statistically significant in most of the specifications. For example, in column 3 of Table IV, Panel A, the dependent variable is the percentage change from Crisis I to Crisis II in the number of loans in which the bank plays the lead role. The average bank experiences a 32% drop in the number of lead syndications; however, the estimated coefficients imply that banks with deposits one standard deviation above the mean experience a 14% drop, while banks one standard deviation below the mean experience a 51% drop in dollar lending volume.

Banks with low deposits experience the biggest declines in lending. It is possible, however, that these banks, many of which are investment banks or finance companies, specialize in loan types that experience an especially sharp drop in demand. In particular, there was a big drop in LBO and M&A activity during Crisis I and Crisis II. If investment banks made more of

these loans before the crisis (perhaps to support their private equity and M&A advisory businesses), it could generate the pattern we observe. Panel B addresses this concern by focusing on real investment loans – those intended to be used for “corporate purposes” or working capital. Here too we observe the same basic pattern of results, with positive and often statistically significant coefficients on deposits.

Another concern might be that less deposit-dependent banks, particularly investment banks, experienced a greater increase in lending during the credit boom. It would therefore not be surprising if they experienced a steeper fall. We performed three tests to rule out this possibility. First, we documented that less deposit-dependent banks did not increase their lending more during the credit boom. Second, we excluded investment banks from the sample, with no effect on the results. Third, we included the growth in loans during the credit boom as a control in our regression analysis. This control did not affect the estimated coefficient of deposits on loan growth.

The analysis uses total deposits as our main explanatory variable. Since insured deposits are an even more stable supply of capital, it would be useful to verify that the same relationship holds with this variable. Unfortunately, we do not have reliable information on insured deposits from many of the foreign banks in the sample. Nevertheless, for those we do have, we have found that there is a positive relationship between loan growth and insured deposits.

As a final test we examined the effect of deposits on loan growth in a panel data set where a bank’s month lending is the unit of observation. We find the same basic pattern of results using that approach. However, since our main interest is in how different types of banks respond to the crisis, the panel structure does not add much and risks understating standard



errors. Thus, we reported only the cross-sectional results, with its conservatively estimated standard errors.

We now move to our analysis of the effect of potential drawdowns of outstanding revolving credit facilities on lending behavior of banks. As noted in the introduction and as demonstrated in Table II, firms have been drawing on their credit lines both because of their own financial troubles and because of concerns about the ability of banks fund these commitments. One way to examine this effect would be to estimate the relationship between loan growth and the existing stock of outstanding revolving lines. The problem with this approach is that revolving lines and deposits are highly positively correlated as theory suggests (Kashyap, Rajan and Stein, 2002 and Gatev and Strahan, 2006). Thus, estimating an independent effect with few observations is difficult, if not impossible.

Instead, we calculate a variable that measures the mismatch between revolving lines and deposits, i.e. the stock of outstanding revolving lines less deposits normalized by bank assets. We will refer to this variable as net revolving line exposure. Gatev and Strahan (2006) show that deposits tend to rise when there are abnormally high credit lines drawdowns. These drawdowns are likely to occur when credit risk associated with commercial paper is perceived to be high. But at those times, would-be commercial paper investors will move their funds to insured deposits. We saw a similar phenomenon between September 2008 and mid-October 2008, as shown in Figure 5. Thus, banks with large revolver exposure but few deposits will not see an offsetting increase in deposits as credit lines are drawn down. This drains the bank of liquidity, and leads it to lend less. By contrast, a bank that has limited revolver exposure and a large deposit base does not face the prospect of drawdowns and has a stable funding base. Such a bank should be in a better position to make new loans during the financial crisis.

Table III indicates that the average firm's deposits exceeds its revolving lines by 26% of assets. It is important to keep in mind that this is a crude estimate as we have a very imprecise measure of revolving line exposure both because we can only crudely estimate actual allocations in loan syndications and because we do not know whether there were prior drawdowns on existing credit lines.

Table V shows that, in general, the net revolving line exposure is negatively related to the percent change in loans, measured in the same way as Table IV. Banks with greater net exposure, lend less. For example, the estimated coefficients reported in a column 3, which estimates the effect on the change in the number of lead syndications, predicts that a bank with net revolving line exposure one standard deviation above the mean cuts lending by 47%, while a bank one standard deviation below the mean cuts lending by only 10%.

*[TABLE V]*

Of course, one has to be careful interpreting our results since our measure subtracts out deposits, which is positively related to lending. Thus, it is not surprising that our net exposure measure has an estimated negative effect. However, it is worth noting that in most specifications the net revolving line exposure measure has a higher  $R^2$  than the comparable regressions with deposits as the dependent variable. These findings should be interpreted as suggestive of an effect of revolving lines, but they are admittedly not conclusive.

## **Conclusion**

New lending declined substantially during the financial crisis across all types of loans. Some of this decline could reflect a drop in demand as firms scale back expansion plans during a recession. However, we show that there may be a supply effect as well: banks with less access

to deposit financing and more revolving line exposure reduced their lending more than other banks. While this is consistent with the existence of a supply effect at the bank level, it is possible that there was a shifted in lending from one set of banks to another without affecting the aggregate supply of credit. If, however, bank-borrower relationships matter for the lending process, then borrowers may not be able to easily switch from one lender to another. Ultimately, to determine the real effects of the financial crisis, researchers will need to examine the investment and performance of potential borrowers, not just lenders.

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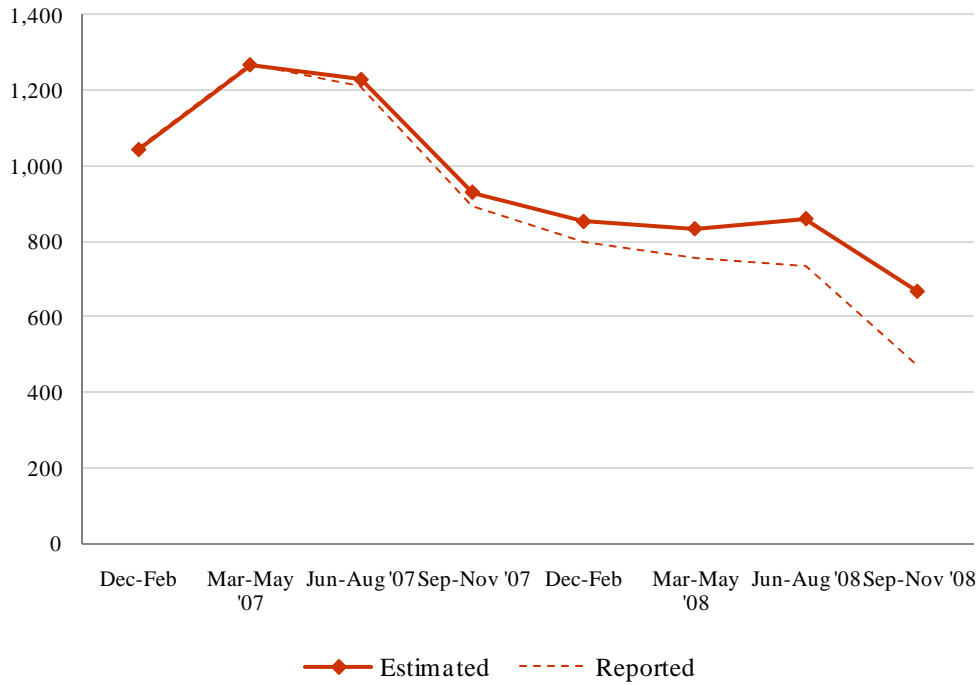
### Figure 1: Total Loan Issuance, US Corporate Loans

Compiled from DealScan database of loan originations. Reported corresponds to loans reported in DealScan as of December 1, 2008.

Panel A: Total amount of loans issued (Billion USD)



Panel B: Total number of loan issued

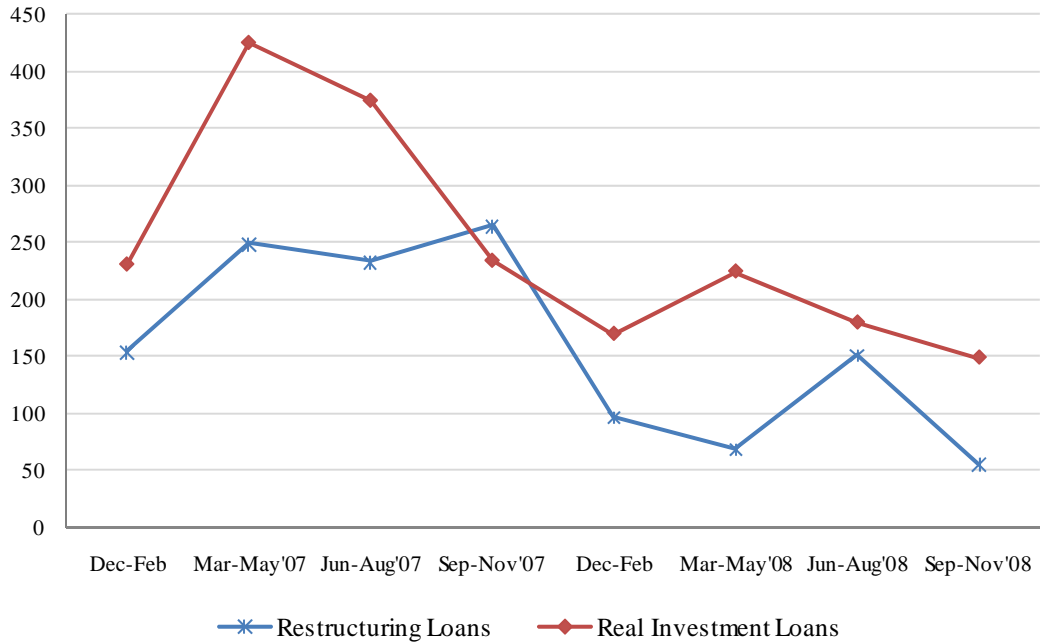


**Figure 1 - continued**

<b>Month</b>	<b>Loan amount</b>		<b>Number of loans</b>	
	<b>Reported</b>	<b>Estimated</b>	<b>Reported</b>	<b>Estimated</b>
Dec-Feb	419.05	419.05	1,043	1,043.00
Mar-May '07	726.03	726.03	1,267	1,267.00
Jun-Aug '07	640.21	648.84	1,211	1,228.02
Sep-Nov '07	526.41	548.89	892	930.46
Dec-Feb	279.80	299.51	797	853.06
Mar-May '08	306.34	339.09	754	833.88
Jun-Aug '08	319.00	372.28	733	860.37
Sep-Nov '08	162.49	233.31	467	668.42

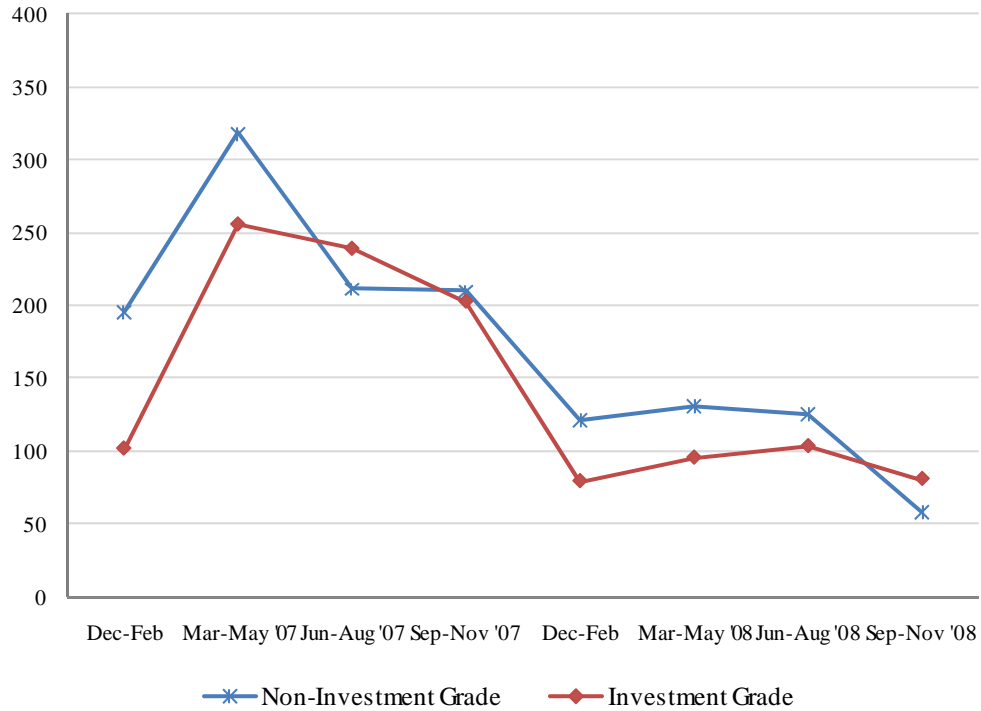
**Figure 2: Real Investment Loans vs. Restructuring Loans (Billion USD)**

Compiled from DealScan database of loan originations. Real Investment Loans are defined as those that are intended for general corporate purposes, capital expenditure or working capital. Restructuring Loans are defined as those that are intended for leveraged buyouts, mergers and acquisitions, or share repurchases. The numbers correspond to pro-rated figures.



**Figure 3: Total Loan Issuance, by Corporate Rating (Billion USD)**

Compiled from DealScan database of loan originations. This figure is based on a sub-sample of loans for which credit ratings are available.

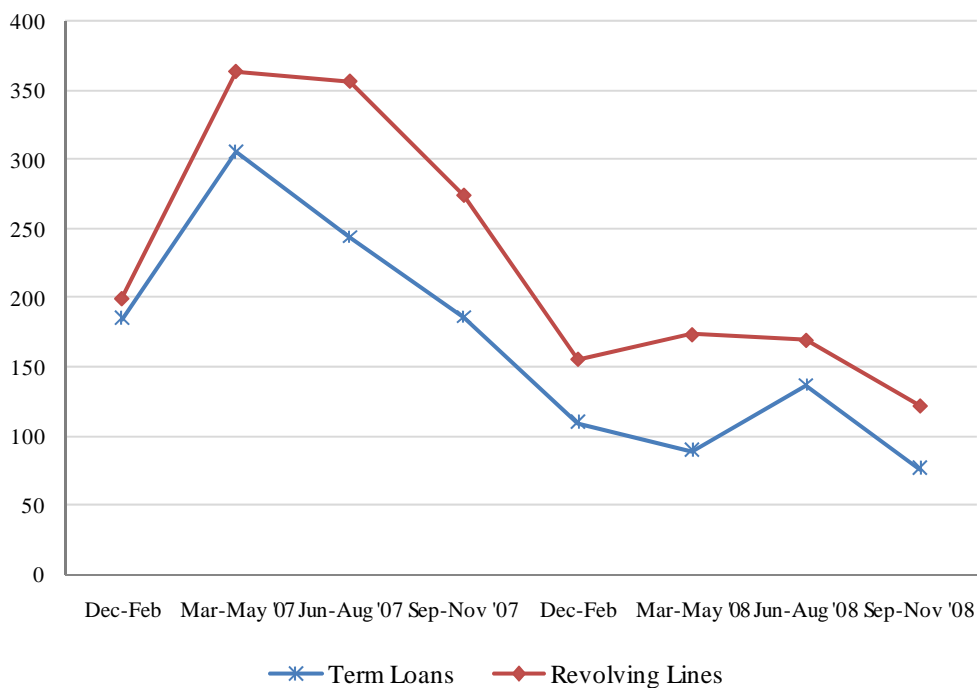


Month	Investment Grade	Non-Investment Grade
Dec-Feb	101.62	195.30
Mar-May '07	255.66	318.07
Jun-Aug '07	238.93	211.13
Sep-Nov '07	202.63	209.81
Dec-Feb	79.25	120.71
Mar-May '08	95.41	130.82
Jun-Aug '08	103.31	124.96
Sep-Nov '08	80.78	57.54



**Figure 4: Total Issuance of Revolving Credit Facilities vs. Term Loans (Billion USD)**

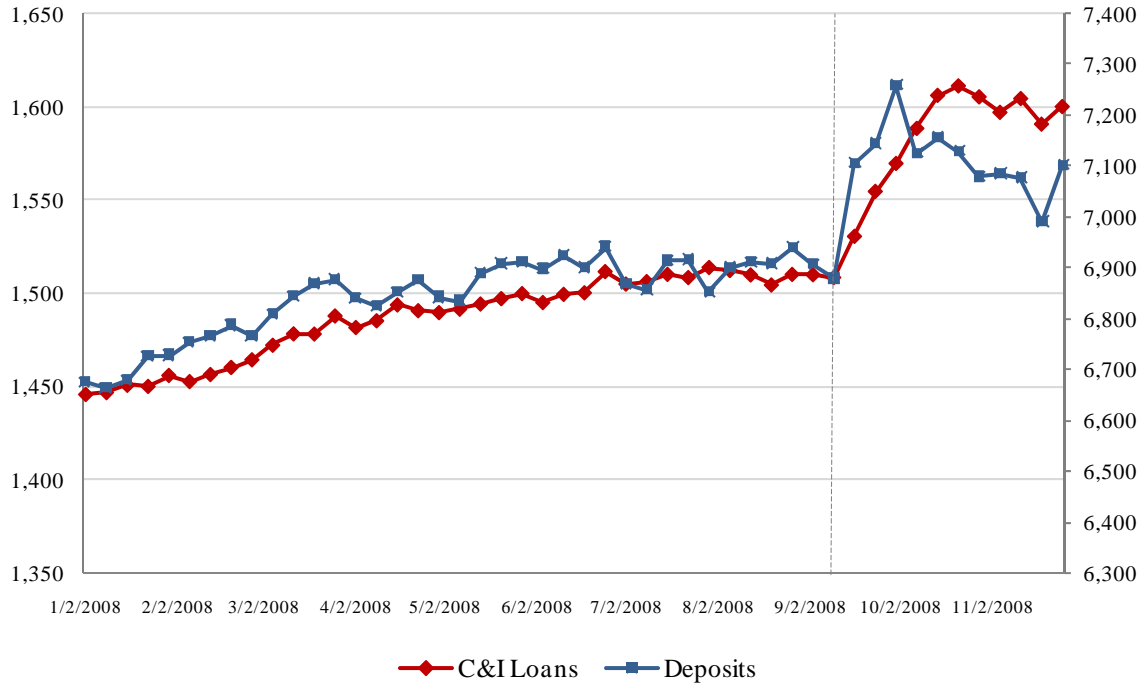
Compiled from DealScan database of loan originations. The numbers correspond to pro-rated figures.



Month	Term Loans	Revolving Lines	Revolving Lines <1 Yr.	Revolving Lines =>1 Yr.
Dec-Feb	184.44	199.23	26.83	172.40
Mar-May '07	305.08	363.75	61.25	302.49
Jun-Aug '07	243.20	356.65	83.48	273.17
Sep-Nov '07	185.44	274.07	52.29	221.78
Dec-Feb	109.62	155.35	21.26	134.09
Mar-May '08	89.61	173.08	63.26	109.82
Jun-Aug '08	136.55	169.04	59.08	109.96
Sep-Nov '08	76.31	121.54	51.61	69.93

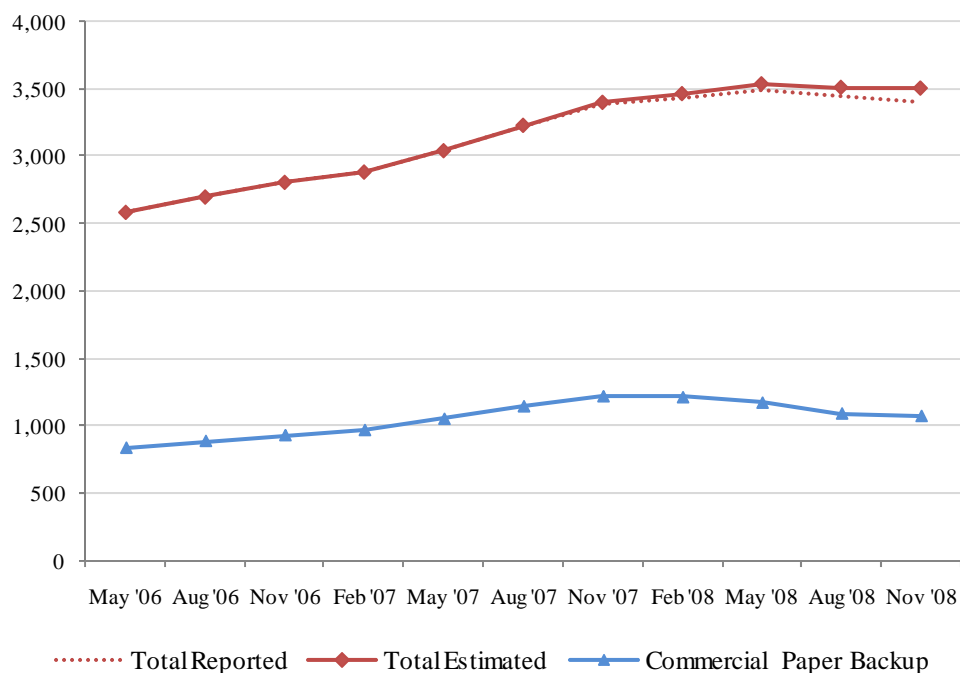
**Figure 5: Commercial and Industrial Bank Credit and Deposits (Billion USD)**

Compiled from Federal Reserve Statistical Release, includes commercial banks in United States (seasonally adjusted).



**Figure 6: Total Exposure to Revolving Credit Facilities (Billion USD)**

Compiled from DealScan database of loan originations.



Month	Total Reported	Total Estimated	Commercial Paper Backup
May '06	2,589.90	2,589.90	831.34
Aug '06	2,703.01	2,703.01	882.07
Nov '06	2,811.21	2,811.21	926.15
Feb '07	2,887.09	2,887.09	964.25
May '07	3,044.89	3,044.89	1,048.54
Aug '07	3,227.35	3,232.13	1,142.97
Nov '07	3,385.89	3,401.65	1,218.29
Feb '08	3,440.65	3,466.29	1,210.85
May '08	3,493.13	3,538.72	1,170.38
Aug '08	3,444.54	3,512.43	1,088.77
Nov '08	3,405.45	3,506.73	1,070.13

**Table I: Total Loan Issuance by Loan Purpose, US Corporate Loans (Billion USD)**

Compiled from DealScan database of loan originations. The numbers correspond to pro-rated figures.

Year	Month	Corp. purposes	Work. Capital	CP backup	LBO	M&A	Recap.	Debtor-in-poss.	Exit financing	Proj. finance	Real estate	Other	Total
2005	Mar-May	237.45	53.79	43.94	15.89	38.04	47.23	1.18	4.99	0.86	12.10	2.90	458.38
2005	Jun-Aug	208.08	56.87	31.85	21.14	39.89	36.31	2.38	10.80	1.75	13.44	2.58	425.08
2005	Sep-Nov	177.23	54.95	20.26	22.61	85.72	21.06	1.31	2.87	0.22	17.67	4.10	407.99
2005-06	Dec-Feb	196.20	69.43	15.57	33.08	74.03	17.98	3.02	24.37	0.44	11.03	0.72	445.87
2006	Mar-May	281.78	52.41	27.79	27.74	95.01	39.86	2.07	3.75	1.07	13.37	0.00	544.85
2006	Jun-Aug	258.96	61.53	22.35	30.86	122.59	22.54	1.43	8.93	12.29	14.54	1.71	557.71
2006	Sep-Nov	205.32	36.62	16.50	49.96	66.17	14.81	1.21	13.17	1.93	14.55	1.18	421.41
2006-07	Dec-Feb	199.67	30.47	11.22	69.50	59.43	25.17	0.20	5.18	2.68	15.52	0.00	419.05
2007	Mar-May	369.65	54.93	6.15	93.11	111.44	43.74	1.65	13.77	14.88	16.72	0.00	726.03
2007	Jun-Aug	330.72	43.09	13.00	87.18	104.94	40.25	0.30	6.84	3.59	18.93	0.00	648.84
2007	Sep-Nov	205.05	28.33	27.86	140.55	115.66	8.38	0.87	6.73	2.37	10.62	2.46	548.89
2007-08	Dec-Feb	119.57	49.73	1.33	34.72	57.47	4.46	1.51	15.20	6.34	9.18	0.00	299.51
2008	Mar-May	206.22	17.84	2.35	12.78	53.22	2.96	1.19	12.66	14.99	13.57	1.32	339.09
2008	Jun-Aug	148.81	30.46	5.77	50.14	95.76	5.51	3.84	14.71	4.78	11.64	0.88	372.28
2008	Sep-Nov	135.71	12.77	3.37	7.55	45.87	1.88	3.66	0.92	13.10	7.58	0.92	233.31

**Table II: Revolving Lines Drawdowns, US Corporate Loans (Billion USD)**

Compiled from SEC filings and Reuters. Exposure to Lehman Brothers identifies loans with Lehman in the original lending syndicate.

Date drawn	Company	Current credit rating	Amount drawn (\$MM)	Credit line (\$MM)	Maturity	Spread (Undrawn/ Drawn)	Lead bank	Exposure to Lehman Brothers	Comment (SEC filings)
08/25/2008	Delta Air Lines	BB-/Ba2	1,000	1,000	2012	50/ L+200	JPM	Yes	Simply put, we have taken this action to increase our cash balance as we approach the closing of the merger. We believe this will provide us with the utmost in flexibility – at minimal cost – as we prepare for this critical transition.
09/15/2008	FairPoint Communications	BB+/Ba3	200	200	2014	37.5/ L+275	Lehman Brothers	Yes	The Company believes that these actions were necessary to preserve its availability to capital due to Lehman Brothers' level of participation in the Company's debt facilities and the uncertainty surrounding both that firm and the financial markets in general.
9/19/2008	Michaels Stores	B	120	1,000	2011	25/ L+150	Bank of America	No	The Company took this proactive step to ensure that it had adequate liquidity to meet its cash needs while there are disruptions in the debt markets.
9/22/2008	General Motors	B-/Caa3	3,400	4,100	2011	30/ L+205	Citigroup, JPM	No	The company said it was drawing down the credit in order to maintain a high level of financial flexibility in the face of uncertain credit markets.
9/26/2008	Goodyear Rubber & Tire Co.	BB+/ Baa3	600	1,500	2013	37.5/ L+125	JPM	No	Temporary delay in the company's ability to access \$360 million currently invested with The Reserve Primary Fund, Goodyear said in a statement. The funds also will be used to support seasonal working capital needs and to enhance the company's liquidity position.
9/26/2008	AMR Corp	B-	255	225	2013	50/ L+425	GE Capital Corp.	No	Cash balance
9/30/2008	Duke Energy	A-/ Baa2	1,000	3,200	2012	9/ L+40	Wachovia, JPM	Yes	In light of the uncertain market environment, we made this proactive financial decision to increase our liquidity and cash position and to bridge our access to the debt capital markets. This improves our flexibility as we continue to execute our business plans.
10/1/2008	GameStop	BB+/Ba1	150	400	2012	25/ L+100	Bank of America	No	Acquisition
10/2/2008	Dana Corp	BB+/Ba3	200	650	2013	37.5/ L+200	Citibank	Yes	Drawing down these funds is a prudent liquidity measure. Ensuring access to our liquidity to the fullest extent possible at a time of ambiguity in the capital markets is in the best interest of our customers, suppliers, shareholders, and employees.
Oct-2008	Six Flags	B/B2	244	275	2013	50/ L+250	JPM	Yes	(W)e borrowed \$244.2 million under the revolving facility portion of the Credit Facility to ensure we would have sufficient liquidity to fund our off-season expenditures given difficulties in the global credit markets.
Oct-2008	Saks	B+/B2	80.6	500	2011	25/L+100	Bank of America	No	Cash balance
Oct-2008	Monster Worldwide		247	250	2012	8/L+30	Bank of America	No	"We have always viewed our revolving credit as an insurance policy, and given the events in the market, we felt that it was appropriate to access that insurance," CFO Timothy Yates said in an Oct. 30 earnings call.

10/9/2008	CMS Energy	BB+/ Baa3	420	550	2012	20/ L+100	Citigroup	No	Cash balance
10/10/2008	American Electric Power	BBB/ Baa2	2,000	3,000	2012	9/ L+45	JPM, Barclays	No	AEP took this proactive step to increase its cash position while there are disruptions in the debt markets. The borrowings provide AEP flexibility and will act as a bridge until the capital markets improve.
10/15/2008	Lear Corp	BB/B1	400	1,000	2012	50/ L+200	Bank of America	No	Given the recent volatility in the financial markets, we believe it is also prudent to temporarily increase our cash on hand by borrowing under our revolving credit facility.
10/16/2008	Southwest Airlines	BBB+/ Baa1	400	1,200	2010	15/ L+75	JPM	No	Although our liquidity is healthy, we have made the prudent decision in today's unstable financial markets to access \$400 million in additional cash through our bank revolving credit facility.
10/16/2008	Chesapeake Energy	BB/Ba2	460	3,000	2012	20/ L+100	Union Bank of California	Yes	Cash balance
10/16/2008	Ebay		1,000	1,840	2012	4/ L+24	Bank of America	Yes	Acquisition
10/20/2008	Tribune Co.	B/Caa1	250	750	2013	75/ L+300	JPM	Yes	Tribune is borrowing under the revolving credit facility to increase its cash position to preserve its financial flexibility in light of the current uncertainty in the credit markets.
10/23/2008	FreeScale Semiconductor	BB/B-	460	750	2012	50/ L+200	Citibank	Yes	We made this proactive financial decision to further enhance our liquidity and cash position. This improves the company's financial flexibility as we continue to execute our business plans.
10/24/2008	Idearc	BBB-/ Ba3	249	250	2011	37.5/ L+150	JPM	No	The company made this borrowing under the revolver to increase its cash position to preserve its financial flexibility in light of the current uncertainty in the credit markets.
11/13/2008	Genworth Financial	A/A2	930	1,700	2012	5/ L+20	Bank of America, JPM	Yes	The Company intends to use the borrowings along with other sources of liquidity for the repayment of outstanding holding company debt (including the Company's senior notes maturing in 2009) at maturity and/or the purchase and retirement of outstanding debt prior to maturity or for other general corporate purposes.
11/23/2008	Computer Sciences	A-/Baa1	1,500	1,500	2012	7/L+25	Citibank	No	The Company took the action due to the current instability of the commercial paper market and to ensure the Company's liquidity position in light of the ongoing credit market dislocation.
11/25/2008	NXP Semiconductors	B	400	600	2012	50/ L+275	Morgan Stanley	No	In view of the current global financial turmoil we are drawing USD 400 million under our revolving credit facility. This is a proactive financial decision in order to secure availability of this facility in a turbulent financial market environment.

**Table III**  
**Summary Statistics**

Deposits and Assets correspond to the Call reports figures as of the end of 2007. Revolving lines committed is the sum of all revolvers outstanding as of the end of 2007 calculated using DealScan. Pre-crisis, Crisis I, and Crisis II are respectively defined as periods August 2006 through July 2007, August 2007 through July 2008, and August 2008 through November 2008. The dependent variable is in percentage changes; e.g.  $\% \Delta$  Total number of loans (Crisis II vs. Crisis I) =  $[\text{Mean (Monthly number of loans issued between Aug'08 and Nov'08)} / \text{Mean (Monthly number of loans issued between Aug'07 and Jul'08)} - 1]$ . (Lead bank) indicates variables calculated using only loans where the bank is the lead arranger; based on pro-rata credit and estimated retained share of the loans. All the other variables just count the total number of loans with the bank participation. Real investment loans are defined as those that are intended for general corporate purposes, capital expenditure or working capital. To account for reporting bias, all loan numbers correspond to pro-rated figures.

		Full sample						Excluding outliers					
		Obs.	P25	P50	P75	Mean	Std	Obs.	P25	P50	P75	Mean	Std
Deposits/Assets		38	0	0.52	0.65	0.38	0.30	36	0	0.47	0.63	0.36	0.30
(Revolving lines committed – Deposits)/Assets		38	-0.46	-0.28	0.02	-0.26	0.24	36	-0.37	-0.25	0.02	-0.24	0.23
All loans:													
$\% \Delta$ Total number of loans	Crisis II vs. Crisis I	38	-0.48	-0.39	-0.21	-0.03	1.44	35	-0.50	-0.41	-0.26	-0.41	0.20
$\% \Delta$ Total number of loans	Crisis II vs. Pre-Crisis	38	-0.71	-0.55	-0.31	0.14	2.51	35	-0.72	-0.58	-0.34	-0.52	0.27
$\% \Delta$ Total number of loans (lead bank)	Crisis II vs. Crisis I	38	-0.53	-0.39	-0.06	-0.32	0.39	36	-0.53	-0.39	0.00	-0.30	0.38
$\% \Delta$ Total number of loans (lead bank)	Crisis II vs. Pre-Crisis	38	-0.77	-0.46	-0.25	-0.37	0.56	36	-0.77	-0.46	-0.24	-0.36	0.57
$\% \Delta$ Total amount of loans (lead bank)	Crisis II vs. Crisis I	38	-0.67	-0.49	-0.31	-0.48	0.32	36	-0.67	-0.49	-0.31	-0.48	0.31
$\% \Delta$ Total amount of loans (lead bank)	Crisis II vs. Pre-Crisis	38	-0.83	-0.64	-0.32	-0.51	0.49	36	-0.83	-0.64	-0.32	-0.50	0.50
Real investment loans:													
$\% \Delta$ Total number of loans	Crisis II vs. Crisis I	36	-0.42	-0.33	-0.15	-0.06	1.10	35	-0.49	-0.36	-0.21	-0.36	0.24
$\% \Delta$ Total number of loans	Crisis II vs. Pre-Crisis	36	-0.62	-0.49	-0.30	-0.21	1.19	35	-0.67	-0.53	-0.36	-0.50	0.26
$\% \Delta$ Total number of loans (lead bank)	Crisis II vs. Crisis I	37	-0.53	-0.30	0.05	-0.27	0.51	35	-0.53	-0.30	0.18	-0.25	0.51
$\% \Delta$ Total number of loans (lead bank)	Crisis II vs. Pre-Crisis	37	-0.76	-0.48	-0.20	-0.32	0.67	35	-0.76	-0.48	-0.14	-0.31	0.68
$\% \Delta$ Total amount of loans (lead bank)	Crisis II vs. Crisis I	38	-0.72	-0.50	-0.22	-0.24	1.35	36	-0.71	-0.50	-0.23	-0.23	1.38
$\% \Delta$ Total amount of loans (lead bank)	Crisis II vs. Pre-Crisis	38	-0.85	-0.67	-0.30	-0.52	0.48	36	-0.84	-0.67	-0.29	-0.51	0.48

**Table IV**

**Change in Lending and Deposits**

Deposits and Assets correspond to the Call reports figures as of the end of 2007. Pre-crisis, Crisis I, and Crisis II are respectively defined as periods August 2006 through July 2007, August 2007 through July 2008, and August 2008 through November 2008. The dependent variable is in percentage changes; e.g. %Δ Total number of loans (Aug'08-Nov'08 vs. Aug'07-Jul'08) = [Mean (Monthly number of loans issued between Aug'08 and Nov'08)/Mean (Monthly number of loans issued between Aug'07 and Jul'08) – 1]. (Lead bank) indicates variables calculated using only loans where the bank is the lead arranger; based on pro-rata credit and estimated retained share of the loans. All the other variables just count the total number of loans with the bank participation. Real investment loans are defined as those that are intended for general corporate purposes, capital expenditure or working capital. To account for reporting bias, all loan numbers correspond to pro-rated figures. Estimates excluding outliers are reported in italics. Robust standard errors are reported in brackets. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5%, and 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	%Δ Total number of loans	%Δ Total number of loans	%Δ Total number of loans (lead bank)	%Δ Total number of loans (lead bank)	%Δ Total amount of loans (lead bank)	%Δ Total amount of loans (lead bank)
	Crisis II vs. Crisis I	Crisis II vs. Pre-Crisis	Crisis II vs. Crisis I	Crisis II vs. Pre-Crisis	Crisis II vs. Crisis I	Crisis II vs. Pre-Crisis
Panel A: All loans						
Deposits/Assets	1.29** [0.62]	2.42* [1.26]	0.62*** [0.21]	0.93*** [0.27]	0.29* [0.17]	0.61** [0.25]
	<i>0.27**</i>	<i>0.52***</i>	<i>0.69***</i>	<i>1.05***</i>	<i>0.33*</i>	<i>0.69***</i>
Constant	-0.55*** [0.13]	-0.86*** [0.24]	-0.56*** [0.09]	-0.75*** [0.07]	-0.59*** [0.08]	-0.76*** [0.07]
Observations	38	38	38	38	38	38
R-squared	0.07	0.08	0.20	0.23	0.07	0.13
Panel B: Real investment loans						
Deposits/Assets	0.45* [0.26]	0.65*** [0.22]	0.49 [0.31]	0.98*** [0.32]	0.22 [0.25]	0.43 [0.29]
	<i>0.14</i>	<i>0.41***</i>	<i>0.58*</i>	<i>1.12***</i>	<i>0.27</i>	<i>0.51*</i>
Constant	-0.46*** [0.10]	-0.69*** [0.06]	-0.47*** [0.15]	-0.72*** [0.08]	-0.54*** [0.11]	-0.69*** [0.12]
Observations	37	37	37	37	37	38
R-squared	0.09	0.19	0.08	0.18	0.02	0.07



**Table V**

**Change in Lending and Revolvers Overhang**

Deposits and Assets correspond to the Call reports figures as of the end of 2007. Revolving lines committed is the sum of all revolvers outstanding as of the end of 2007 calculated using DealScan. Pre-crisis, Crisis I, and Crisis II are respectively defined as periods August 2006 through July 2007, August 2007 through July 2008, and August 2008 through November 2008. The dependent variable is in percentage changes; e.g.  $\% \Delta$  Total number of loans (Aug'08-Nov'08 vs. Aug'07-Jul'08) =  $[\text{Mean (Monthly number of loans issued between Aug'08 and Nov'08)} / \text{Mean (Monthly number of loans issued between Aug'07 and Jul'08)} - 1]$ . (Lead bank) indicates variables calculated using only loans where the bank is the lead arranger; based on pro-rata credit and estimated retained share of the loans. All the other variables just count the total number of loans with the bank participation. Real investment loans are defined as those that are intended for general corporate purposes, capital expenditure or working capital. To account for reporting bias, all loan numbers correspond to pro-rated figures. Estimates excluding outliers are reported in italics. Robust standard errors are reported in brackets. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5%, and 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	% $\Delta$ Total number of loans	% $\Delta$ Total number of loans	% $\Delta$ Total number of loans (lead bank)	% $\Delta$ Total number of loans (lead bank)	% $\Delta$ Total amount of loans (lead bank)	% $\Delta$ Total amount of loans (lead bank)
	Crisis II vs. Crisis I	Crisis II vs. Pre-Crisis	Crisis II vs. Crisis I	Crisis II vs. Pre-Crisis	Crisis II vs. Crisis I	Crisis II vs. Pre-Crisis
Panel A: All loans						
(Revolving lines committed – Deposits)/Assets	-2.19* [1.18]	-4.27* [2.36]	-0.79*** [0.26]	-0.83** [0.37]	-0.41* [0.21]	-0.66 [0.42]
Constant	-0.33** -0.65*** [0.15]	-0.68*** -1.04*** [0.32]	-0.78*** -0.49*** [0.08]	-1.13*** -0.59*** [0.09]	-0.36* -0.56*** [0.07]	-0.89* -0.68*** [0.07]
Observations	37	37	37	38	37	38
R-squared	0.15	0.18	0.23	0.13	0.09	0.11
Panel B: Real investment loans						
(Revolving lines committed – Deposits)/Assets	-0.50 [0.36]	-0.65*** [0.21]	-0.72* [0.41]	-1.02** [0.43]	-0.46 [0.31]	-0.63 [0.37]
Constant	-0.16 -0.44*** [0.09]	-0.52** -0.64*** [0.05]	-0.73* -0.43*** [0.14]	-1.36*** -0.58*** [0.10]	-0.42 -0.55*** [0.09]	-0.85** -0.68*** [0.11]
Observations	36	36	36	37	36	38
R-squared	0.13	0.31	0.12	0.14	0.07	0.10