# Lending Relationships and the Effect of Bank Distress: Evidence from the 2007-2008 Financial Crisis*

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**Abstract**

We study the role of lending relationships in the transmission of bank distress to the real economy. We use the 2007-2008 financial crisis as a laboratory and study a sample of publicly traded firms from 34 countries and a large set of bank loans. We examine the effect of both bank-specific shocks to the financial health of banks (announcements of bank asset write-downs) and systemic shocks (the failure of Bear Stearns and Lehman Brothers) that produced heterogeneous effects across banks. We find that bank distress, as captured by equity valuation losses, is associated with valuation losses to borrower firms that have lending relationships with banks. The effect is concentrated in firms with the strongest lending relationships, the greatest information asymmetry (e.g., smallest firms and firms with the least analyst coverage) and the weakest financial position at the time of the shock (e.g., firms that needed to roll over the largest part of their debt during the shock). Overall, our findings suggest that the loss in the value of lending relationships represents an important channel through which bank distress imposes costs on the real economy.

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## 1. Introduction

The 2007-2008 worldwide financial crisis has renewed interest in understanding the consequences of shocks to the financial health of the banking sector for the real economy. If bank distress impacts bank lending, and borrowing firms are unable to substitute between bank loans and other sources of external financing, shocks to the financial health of banks can be transmitted to the non-financial sector through restrictions on the external supply of capital. A variety of work on the consequences of banking distress for the economy during the U.S. Great Depression and the recent financial crisis emphasizes the importance of bank lending (see Bernanke (1983), Calomiris and Mason (2003), Campello, Giambona, Graham, and Harvey (2010), Duchin, Sensoy, and Ozbas (2010), and Ivashina and Scharfstein (2010)).

We study the role of lending relationships between non-financial firms (borrowers) and banks in the transmission of bank distress to the real economy. Financial economists (Sharpe (1990), Petersen and Rajan (1994, 1995)) have described how financial intermediaries such as banks can reduce the cost of lending by developing mutually beneficial relationships with firms. Central to the value of these relationships is the ability of banks to produce and accumulate proprietary information over time about firms that is not easily transferable. If lending relationships are important for borrowers, banking sector distress can impose substantial costs on firms through a reduction on the value of their existing relationships with banks.

Lending relationships are likely to become less valuable in the event of bank distress for at least three reasons. First, changes in the overall availability, pricing or conditions of new loans from relationship banks should matter for firms. As valuable information is accumulated through lending relationships, there are costs for firms if they must seek alternative sources of external finance. Alternative suppliers of capital also face an adverse selection problem when financing firms that decide to switch. Second, distress in relationship banks can lead them to trade-off higher financial capital at the cost of lower reputational capital by repudiating unenforceable contracts with firms (Boot, Greenbaum, and Thakor (1993)). Third, liquidity needs can change the bargaining power of banks in their current lending relationships with firms (Diamond and Rajan (2000)).

We study the importance of the "lending relationship channel" using the recent financial crisis as a laboratory. In a sample of 1,564 publicly traded firms in 34 countries we measure

lending relationships between banks and firms, looking at a large set of bank loans initiated before the crisis. Most of the loans in our sample are syndicated, and we focus on the relationship between firms and lead arrangers. We would like to compare firms that have a different set of relationship banks but are otherwise identical. The ideal test would find a period when relationship banks experienced significant but different levels of unexpected distress. We would then compare the change in the value of the borrowers over the period, and link changes in their value to relationship bank distress, captured by changes in the equity value of their relationship banks.

Our identification strategy exploits the 2007-2008 financial crisis when banks experienced major but different levels of unexpected distress. We compare changes in the value of borrower firms in the same country over the same period, conditional on several firm-level controls, and relate them to changes in the equity value of relationship banks over the period.

We base our analysis on two types of events. First, we use systemic events that produced major aggregate shocks to the financial health of most banks. We focus on the collapse in the U.S. of the investment banks Lehman Brothers and Bear Stearns and the diverse effects it produced for banks. We also examine the impact on banks of the U.S. Treasury–FDIC plan (Paulson's Plan) as an additional test. As most banks were affected during these events, we estimate the relation between borrowers and their relationship banks' abnormal returns using our entire sample of firms.

Second, we use write-downs for individual banks as a source of new information on bank financial health. We focus on weeks during the financial crisis when there were write-downs by multiple banks and, for each week, restrict the analysis to firms whose relationship banks experienced a write-down during that week. Abnormal returns for banks with write-downs should reflect new information about their financial health. We estimate the link between firms' and their relationship banks' abnormal returns over the same week in this sample.[1]

In each approach, we find an economically and statistically significant link between borrower firm abnormal returns and unexpected changes in relationship bank financial health (captured by abnormal returns). As a benchmark, we estimate the same relation in the sample of firms/weeks when relationship banks experienced no write-downs, and find no link between

[1] Our identification is based on the heterogeneous market reaction to write-downs across relationship banks.

firms' and their relationship banks' abnormal returns. Abnormal bank returns in the average week might capture not only news about bank distress but also news about discount rates, liquidity or other cash-flow news about banks. Since we are able to single out the write-down periods when there was important news about the financial health of specific banks, if bank distress matters for relationship firms, we expect to see a stronger relation between bank returns and firm returns during these periods and for these specific banks.

We then refine the analysis by estimating this relation separately for different groups of firms. This allows us to test several predictions of the lending relationship channel. We first analyze how this effect is related to the strength of lending relationships. If firms differ on the costs and benefits of lending relationships, in equilibrium, firms with the strongest relationships will be the ones for which lending relationships create the highest marginal value. Under reasonable conditions, these will also be the firms with the most valuable lending relationships in equilibrium, and likewise the most impacted by relationship bank distress.

Consistent with this view, we find that our results are important only for the firms with the strongest lending relationships. When we analyze the other side of this relationship, from the viewpoint of the banks (Dahiya, Saunders, and Srinivasan (2003)), we find that our results are stronger for the firms that are the least important bank clients (i.e., firms with the lowest share of the bank portfolio of loans). When we look at firm characteristics that are likely to predict the value of lending relationships, we find that our results are important only for the firms most likely to face information asymmetry problems (the smallest firms and the firms with the least analyst coverage), which are the ones expected to rely the most on information produced by banks.

If distress by relationship banks affects firms through an increase in the cost of external financing, then the financial position of firms at the time of a shock should matter. Recent work supports this view, as firms rolling over a larger fraction of their debt during the financial crisis have been the most affected by the aggregate change in the supply of capital (Almeida, Campello, Laranjeira, and Weisbenner (2009)). We find the effect of bank distress to be concentrated in firms that most need to roll over their debt in the year of the shock to their relationship banks. We also provide evidence that firms with little leverage and high cash holdings at the time of the shock are not affected by relationship bank distress.

Finally, our results are more important for firms that rely more on credit lines from their relationship banks. This finding is consistent with the view that losses to firm value occur because banks are trading-off greater financial capital and lower reputation capital by repudiating unenforceable contracts with firms.

Overall, our results suggest that the lending relationship channel is economically important for the average firm in our sample, but its importance differs across firms. The effects are economically significant for smaller firms in the sample, while larger firms do not seem to be significantly affected. It is important to recall that our sample consists of large publicly traded firms, most with access to the syndicated loan market. This is consistent with evidence in Bharath, Dahiya, Saunders, and Srinivasan (2007, 2009) suggesting the importance of lending relationships for publicly traded firms accessing the syndicated loan market. It is also consistent with evidence that net debt issuance during the financial crisis dropped to extreme outlier low levels only for smaller publicly traded firms (Kahle and Stulz (2010)). As we document that the lending relationship channel is economically important for the smallest publicly listed firms in our sample, our results suggest that this channel can explain a significant aggregate loss of value *in the economy* overall (considering the presence of private firms).

Our evidence altogether provides direct support for a foundation linking the financial health of financial intermediaries such as banks and the real economy. Firms cannot switch to alternative sources of capital when banks are distressed because they have value tied in their relationships with banks due to information accumulated over time. While these relationships allow firms to reduce their cost of borrowing during periods where banks have a strong financial position, they also expose firms to deterioration in their banks' financial conditions. Moreover, these links are important at a local level. Firms are exposed to the financial health of their relationship banks. Therefore, the distribution of distress across banks matters, and shocks to the financial health of only a few institutions can have sizeable consequences.

Our results also provide direct support for models emphasizing the importance of financial conditions of informed capital for the macroeconomy (Holmstrom and Tirole (1997)). Most loans in our sample are syndicated, and we focus primarily on the relationship between firms and lead arrangers. Our results suggest that shocks to these certifiers have economically important

consequences for firms, which is consistent with the importance of lead arrangers as certifiers that need to have large financial stakes in the transactions (Sufi (2007), Ivashina (2009)).

Our study is related to event studies that link the failure of banks or shocks to banks to the value of their customers. Slovin, Sushka, and Polonchek (1993) provide evidence that the near collapse of Continental Illinois negatively impacted 29 clients with which the bank had a relationship as a direct lender or lead arranger. Based on larger samples of firms and reports listing the main clients for banks, Bae, Kang, and Lim (2002) and Ongena, Smith, and Michalsen (2003) find mixed evidence that bank distress negatively affected bank clients in Korea and Norway.

Our work differs from these studies in several ways. We examine a much larger sample of firms and banks across 34 countries in very different stages of financial market development. We also use more detailed measures of the strength and nature of the relationship between firms and banks. To the extent that we can do so accurately, we provide evidence on the channels through which relationship bank distress impacts firms. Moreover, characteristics of the 2007-2008 financial crisis help us to address several identification concerns. The unusually large shocks to the financial health of banks then were determined mostly by banks' exposure to mortgage and real estate assets instead of the performance of their corporate loans.

A related study by Chava and Purnanandam (2009) uses the 1998 Russian crisis to estimate how an adverse shock to the aggregate supply of capital by banks affected value of bank-dependent borrowers overall. Our focus on one specific mechanism through which bank distress impacts firms—the loss in the value of lending relationships—allows us to analyze *why* bank distress imposes costs on firms and what explains differences across firms in the importance of this cost. Our results also provide additional evidence, based on a different identification strategy, that banking sector distress imposes economically important costs on bank-dependent borrowers.

Our work also contributes to the literature examining how the financial conditions of banks impact lending supply and the real economy (Peek and Rosengreen (2000), Ashcraft (2005), Kwhaja and Mian (2008), and Paravisini (2008)), as well as the transmission of monetary policy and the importance of the credit channel (Kashyap, Stein and Wilcox (1993), Gertler and Gilchrist (1994), Stein (1998), and Kashyap and Stein (2000)).

## 2. Conceptual Framework

Unexpected shocks to the financial health of banks will impact the value of non-financial firms through an increase in the cost of external financing under two conditions. First, it must be the case that these shocks affect the supply of loans. Recent evidence supports the importance of a reduction in the supply of bank lending during the 2007-2008 financial crisis (Ivashina and Scharfstein (2010)).

Second, it must be the case that firms have an imperfect ability to substitute between bank loans and other sources of external financing. Diamond (1984, 1991), Fama (1985), Rajan (1992), Holmstrom and Tirole (1997), and Bolton and Freixas (2000) describe how financial intermediaries such as banks can reduce the cost of lending to firms, by producing information that makes the monitoring and screening of borrowers more efficient.

If past lending interactions allow banks to accumulate information about firms, and this information is not easily transferred, multiple lending interactions can create value for firms by reducing their cost of borrowing (Petersen and Rajan (1994, 1995)). If this information cannot be verified by new lenders, past lenders acquire some information monopoly over the firm and might be able to expropriate the firm ex-post, capturing part of the value created by the relationship (Sharpe (1990), Rajan (1992)). Switching will be costly because new banks have less information about borrowers and will face an adverse selection problem: switching firms might be less desirable clients.

However, the ability of firms to switch banks and of banks to establish reputations can allow borrowers to capture some benefits from repeated lending interactions. While information reusability is central to the value of these relationships, they can also generate further benefits for firms such as smoothing prices over several transactions (Petersen and Rajan (2005)), greater discretion in loan contract terms (Boot, Greenbaum, and Thakor (1993)) and greater relief during times of financial distress (Hoshi, Kashyap and Scharfstein (1990)).[2]

We examine the effects of bank distress on the value of lending relationships for firms. First, given the cost of switching banks, changes in the overall availability, price or conditions of new loans from relationship banks should matter for firms. Second, distress by relationship

[2] Evidence from loan announcements supports that banks with a relationship with a firm have an informational advantage (James (1987), Lummer and McConnell (1989)). See Boot (2000) for a review of the literature.

banks might alter their incentives and change their bargaining power in established relationships with firms. A distressed bank can more credibly liquidate borrowers (Diamond and Rajan (2000)). A distressed bank may also trade off greater financial capital at the cost of lower reputational capital by repudiating unenforceable contracts with firms such as credit lines or implicit promises not to use their ex-post monopoly power (Boot, Greenbaum and Thakor (1993)).[3]

The impact of relationship bank distress on the value of borrower firms can be better understood in the form of a decomposition of firm value:

$$V = V_{\text{no bank access}} + V_{\text{overall banking sector}} + V_{\text{banking relationships}} \quad (1)$$

The first term on the right-hand side of equation (1) represents the value of a firm if it has no access to the banking sector. The second term is the value added by the banking sector in the absence of any lending relationship, while the third term represents the value added by having access to *current* lending relationships. The third term will be relevant only if there are benefits from multiple interactions. In a world where information is not reusable and firm value is not tied to current lenders, the third term will be zero.

If there is an unexpected change in the financial health of banks, we can write the change in firm value as:

$$\Delta V = \Delta V_{\text{no bank access}} + \Delta V_{\text{overall banking sector}} + \Delta V_{\text{banking relationships}} \quad (2)$$

The first term on the right-hand side of equation (2) captures changes in the value of the firm that are not driven by a change in cost of bank financing, such as changes in the firm's investment opportunities. The second term captures a change in the net benefit from having access to bank financing in the absence of *prior* lending relationships. We are interested in analyzing and quantifying the importance of the last term, i.e., the impact on firm valuation that reflects changes in the value of their *current* lending relationships. This is the term that we are estimating if we hold everything else constant, including the overall financial condition of the banking

[3] Santos and Winton (2008) provide evidence that banks exploit their information monopoly power by charging higher interest rates to bank-dependent borrowers than to non-bank-dependent borrowers in recessions vis-à-vis expansions.

sector, and compare firms with *relationship* banks that experienced different degrees of financial distress.

We determine lending relationships using a large set of bank loans in several countries. Most loans in our sample are syndicated, often involving several banks as lead arrangers and lenders. Although lead arranger banks retain only a part of the loan, they take primary responsibility for ex-ante due diligence and ex-post monitoring of the borrower. Given the moral hazard and adverse selection problems between lead arrangers and other participants, firms are able to obtain financing from third parties only after informed parties (lead arrangers) take large financial stakes (Sufi (2007)). When relationship banks are distressed, firms have a limited ability to adjust by reducing the share of lead arrangers in the loan (Ivashina (2009)). This leads us to formulate the first hypothesis:

*Hypothesis 1: Greater distress by relationship banks negatively impacts the value of borrower firms, all else constant, including the overall health of the banking sector.*

The effect of bank distress on relationship borrowers should depend on the strength of the lending relationships between firms and their lenders. If there are scale economies in information production, such as fixed costs that can be spread over several transactions or products, there are benefits for firms from concentrating more of their lending in few banks or even one bank. In equilibrium, the benefit of these stronger lending relationships with banks will be balanced against a cost, such as greater information monopoly by banks or greater exposure to the banks' liquidity problems. In such an equilibrium, lending relationships create higher marginal value for firms with stronger lending relationships. Under reasonable conditions, these will also be the firms with the most valuable lending relationships in equilibrium. Therefore, the costs of bank distress should be more important for firms with stronger lending relationships.

Previous research has shown that firms differ in terms of how much they rely on relationship lending in the syndicated loan market (Dennis and Mullineaux (2000), Sufi (2007)). At one end of the spectrum, there are firms that use few lenders with large stakes held by lead arrangers, and syndicated loans are similar to relationship-driven bank loans. At the other end, there are firms where several lenders retain small shares, and syndicated loans are similar to public debt. This leads to the second hypothesis:

*Hypothesis 2: Relationship bank distress will have a more pronounced effect on the value of the borrower firm when the firm has a stronger lending relationship with the bank.*

While the strength a lending relationship might be a sufficient statistic for firm characteristics that determine the value of the lending relationship, it is useful to test if firms with characteristics that should predict higher value from lending relationships may lose more after relationship bank distress.[4] One important determinant of the value of lending relationships should be the degree of information asymmetry a borrower faces. Firms facing greater information asymmetry problems would likely rely more on information produced by banks. Recent evidence from the syndicated loan market shows that firms facing greater information asymmetry problems are more likely to have repeated loan interactions with the same lead arranger banks (Bharath, Dahiya, Saunders, and Srinivasan (2007)). They also obtain better loan rates in repeated transactions (Bharath, Dahiya, Saunders, and Srinivasan (2009)). Bank distress may also have stronger effects on the supply of lending to these firms because of capital requirements or reduced incentives to lend to riskier borrowers. This leads to the third hypothesis:

*Hypothesis 3: The effect of relationship bank distress on the value of the borrower firm is more pronounced for firms facing greater information asymmetry problems.*

If relationship bank distress affects firms through an increase in the cost of external financing, we should expect the financial position of firms at the time of the shock to matter. Firms with less leverage at that time should be less impacted. First, they will not need to roll over their debt at a time of increased costs for external financing (Almeida, Campello, Laranjeira, and Weisbenner (2009)). Second, if firms face constraints on their debt capacity, firms starting with less debt might be more able to accommodate an increase in the cost of external financing.

The level of firm cash holdings before the shock should also matter. Previous work (Opler, Pinkowitz, Stulz, and Williamson (1999) and Almeida, Campello, and Weisbach (2004)) has emphasized the use of cash holdings as a protection against future adverse cash flow shocks. In

[4] This will be the case if any (unobservable) firm characteristic related to the value of lending relationships is also related to the marginal value of having stronger lending relationships and therefore, in equilibrium, is already reflected in the strength of these relationships.

the presence of financing frictions, firms with larger cash holdings will be less affected by a shock increasing the cost of external financing. Consistent with this view, Duchin, Ozbas, and Sensoy (2010) show that firms with larger cash holdings before the 2007-2008 crisis were less affected by the aggregate change in the supply of capital.

These effects can be amplified if bank distress has a stronger effect on lending to borrowers with weaker financial positions. Distress by relationship banks might lead to a greater increase in their bargaining power in relationships with firms that have a weaker financial position (Diamond and Rajan (2000)).

*Hypothesis 4: The effect of relationship bank distress on the value of the borrower firm is more pronounced for firms with a weaker financial position at the time of the shock. These are firms with higher leverage at the time of the shock, especially firms needing to roll over debt around the shock, and firms with lower cash holdings at the time of the shock.*

Finally, distressed banks may free up financial capital by repudiating unenforceable contracts such as lines of credit even if it might impact a bank's reputational capital. Suffi (2009) has shown that lines of credit are contingent on binding covenants. Given that covenants are intentionally set tightly and included to shape ex-post renegotiation (Roberts and Sufi (2008)), lenders have some discretion ex-post. Indeed, there is evidence that firms increased drawdowns on their credit lines early in the 2007-2008 crisis in anticipation of potential bank liquidity problems (Ivashina and Scharfstein (2010)).

*Hypothesis 5: The effect of relationship bank distress on the value of the borrower firm is more pronounced for firms that rely more on credit lines from relationship banks.*

## 3. Empirical Methodology

We would like to analyze what happens to the value of borrower firms if, everything else constant, their relationship banks experienced greater distress. Figure 1 illustrates the empirical approach. We would like to compare firms (firms A and B in Figure 1) with different relationship banks (Bank 1 and 2), but that are otherwise identical. The ideal test would then be to find a period when relationship bank 1 experienced more unexpected distress than bank 2. We

would then compare whether the change in the value of firm A is more negative than the change in the value of B over that same period.

### 3.1. Identification Strategy

In our tests, we compare changes in the value of firms in the same country and period, conditional on several firm-level characteristics, and relate them to changes in the equity value of relationship banks in the same period. We implement this analysis around dates when relationship banks experienced unexpected shocks to their financial health.

We estimate the following equation:

$$Firm\_Return_{itc} = \alpha_{tc} + \beta \times Bank\_Return_{itc} + \delta \times X_{itc} + \varepsilon_{itc} \quad (3)$$

where *Firm_Return* is the market-model adjusted abnormal return of firms over period *t*; $\alpha_{tc}$ is a country and time fixed-effect; *Bank_Return* is the average market-model adjusted abnormal return of the main lead arranger bank or banks; and $X_{itc}$ are firm-level controls. The main lead arranger banks are the banks with the strongest lending relationship to each firm and are defined more precisely in the next section. When we estimate equation (3), we are relating firm returns to bank returns for each country and date separately, and then averaging these effects across all countries and dates.

Since we are comparing firms over the same period and country, our methodology requires that we find periods of major unexpected financial losses affecting multiple banks operating in the same market. We use the significant events surrounding the 2007-2008 financial crisis. We base our analysis on two types of events.

First, we use the systemic events during 2007-2008 when major aggregate shocks affected the financial health of most banks around the world. We focus on the collapse of the investment banks Bear Stearns in March 2008 and Lehman Brothers in September 2008, and explore how these events impacted other banks. We interpret these events as providing new information on the quality of assets held by other financial institutions, their financial health and their counterparties' risk, as well as generating uncertainty about the financial sector, and getting

amplified through mechanisms such as asset fire sales, liquidity problems and complexity in financial networks.[5]

There are many reasons for heterogeneous bank losses, including different asset holdings, exposure to different counterparties and different financial positions at the time of the shock (e.g., reliance on different types of short-term funding). Building an empirical model to explain expected losses across banks can be challenging. To focus on consequences for firms, we use changes in banks' equity value during this period to capture changes in bank distress. We then estimate equation (3) for systemic shock event dates. An additional test uses the announcement of the U.S. bailout plan in October 2008 as a systemic event (in this case reducing bank distress, and potentially more so for U.S. banks).

The second type of event is a bank-specific event, or the reporting of individual bank losses (write-downs). While the occurrence of a write-down (or not) can provide the market with information about the health of a bank, it is reasonable to think that the market anticipated some of these write-downs and their levels. If this is the case, at least near an event, we should not see large *average* effects on bank abnormal returns around write-down dates but instead see substantial variation in bank abnormal returns. A low mean would reflect the fact that expectations on average were close to the target. The variation would be explained by the gap between expected and realized losses, and would embody most of the new information about banks' financial health. In section 4.3 we discuss how the distribution of bank abnormal returns around write down events supports this view.

We focus on weeks when there are write-downs by several banks. For each of those weeks, we restrict the sample to firms with at least one main bank experiencing a write-down during the week. In this sample, changes in banks' equity value are likely to reflect new information about their financial health. By estimating the relation in this sample, we are comparing only firms dealing with banks that experienced write-downs during the same period. Identification comes from the fact that the market reacts differently to the write-downs of banks. In an additional test, we estimate the relation using the sample of banks/weeks during the financial crisis when there were no write-downs as a benchmark. We implement this idea by estimating:

[5] See Brunnermeier (2009), Gorton and Metrick (2010) and Krishnamurthy (2010) for more detailed discussions.

$$Firm\_Return_{itc} = \alpha_{tcw} + \beta_1 \times Bank\_Return_{ict} \times Write\text{-}down_{it} + \beta_0 \times Bank\_Return_{ict} \times No\_Write\text{-}down_{it} + \delta \times X_{itc} + \varepsilon_{itc} \quad (4)$$

where *Firm_Return* and *Bank_Return* are weekly returns over the entire financial crisis period. $X_{itc}$ are firm-level characteristics. *Write-down* is an indicator variable that equals one for a firm in a given week if the firm had at least one main lead arranger bank that experienced a write-down in that week; *No_Write-down* is an indicator that equals one otherwise. For each week, we construct two write-down groups based on *Write-down.* $\alpha_{tcg}$ are week/country/write-down group fixed-effects. In each country/week, our results are estimated only within each of the two write-down groups. Estimation of this specification relates firm returns to bank returns separately for banks with write-downs and banks without write-downs.

Finally, we exploit the cross-sectional implications of hypotheses 2 through 5. We estimate the regressions for different groups of firms depending on a given firm characteristic, and compare the effects across groups. More specifically, we estimate:

$$Firm\_Retur\,n_{itc} = \alpha_{tcg} + \sum_{g=1}^{k} Bank\_Retur\,n_{itc} \times Group(g)_i \times \beta_g + X_{itc} \times \delta + \varepsilon_{itc} \quad (5)$$

where *Firm_Return, Bank_Return* and $X_{itc}$ are the same as in equation (3), $\alpha_{tcg}$ are time/country/group fixed-effects and *Group(g)* is an indicator variable that equals one if a firm belongs to group *g* of this firm characteristic. Estimation of this specification relates firm returns to bank returns within each country/period/group separately, and then averages effects across all countries and dates for each group. For example, in some results we sort firms into three size groups. The estimated coefficient for the smallest size group is based on relating firm returns to bank returns for the smallest firms within each country and date, and then averaged across all dates and countries for the smallest firms.

We estimate equation (5) only for the sample of systemic events. This is motivated by sample size considerations. In order to implement our results using the write-down sample, we would need to have firms in the same country and group, both exposed to different banks that had a write-down in the same week.

### 3.2. Challenges

The major concern with our empirical approach is the possibility that firm and bank abnormal returns are related for reasons other than bank distress across firms in the same country/period and during the periods of large shocks to the financial health of banks. In terms of equation (2), it must be the case that changes in the equity value of banks are related to the first two terms ($\Delta V_{\text{no bank access}}$ or $\Delta V_{\text{overall banking sector}}$).

The first challenge stems from the possibility that firms borrowing from banks that experience greater losses are inherently different from other firms (*selection problem*). If banks experience greater losses because they made poorer-quality loans in the first place, we expect that firms with relationships with these banks are at greater risk of default. Or, these firms might have had higher growth opportunities, and their value may have dropped more because of aggregate market conditions.

We deal with this concern in several ways. We control for the total abnormal cumulative return of banks over the financial crisis period, in addition to other firm-level controls. The idea is that, once we have controlled for the total loss of banks, the cross-sectional relationship between firms' and banks' abnormal returns in *this period* depends on the timing of bank losses. The write-down results also address this concern. It is hard to see that a selection problem would be more important in the sample of banks experiencing a write-down. Note that we define this sample according to the specific dates on which banks experienced write-downs. The cross-sectional implications of our hypothesis also help us deal with this concern. Is also hard to see why this concern should be more important precisely for all the groups of firms where our hypotheses predict a stronger link between banks' and firms' returns.

The second challenge comes from the possibility that banks are affected by losses that their clients experience. Dahiya, Saunders, and Srinivasan (2003) provide evidence that financial distress by borrowers can negatively affect the value of relationship banks. There is not necessarily a conflict between our identification strategy and this evidence. We are relating bank returns to firms' returns across all firms and during a period of major shocks that started in the financial sector. Banks can be adversely affected by the financial distress of large and important clients, but marginal changes in the value of the average client might not have an economically important effect on banks, especially when compared to other large shocks to the financial health

of banks occurring at the same time. Still, there is a possibility that losses to banks' corporate loan portfolios affect banks, and this drives a relation between firm returns and bank returns over these periods. In principle, this concern could be relevant even for our write-down results, as some write-down events may have been triggered by losses in banks' portfolios of corporate loans.

This interpretation of the results, however, would have different cross-sectional implications; it would predict a more pronounced effect for banks with higher exposure to firms (Dahiya, Saunders, and Srinivasan (2003)). Our hypotheses predict to the contrary that the effects should be more pronounced for smaller firms, which represent lower percentages of banks' loan portfolios. Our results should also be more important for firms with stronger lending relationships and firms renewing debt at the time of the shock. We exploit these cross-sectional implications to address this concern.

Finally, the third challenge is the possibility that the market can learn something about the quality of firms. If banks experience greater losses because they have made poorer-quality loans, the market can learn about the quality of these loan portfolios and therefore bank corporate clients following bank losses. In this case, the change in the value of firms is not driven by the effect of a change in the value of lending relationships, but instead by the negative reaction in the market's perception of the quality of firms.

We address this concern by looking at a period of positive shocks to several banks, the U.S. bailout plan in October 2008. The learning story lets us explain why firm value drops when banks are in distress, but cannot explain why firm value increases in response to government intervention. There should be not much learning about the quality of the banks' past lending decisions in such an event. We compare the magnitude of the effects across these events to address the importance of the learning interpretation.

## 4. Data

This section presents data sources, sample, variable construction and the choice of the event dates for the bank-specific shocks and systemic shocks.

### 4.1. Data Sources and Sample

We use data from several sources, including Loan Pricing Corporation's Dealscan, SDC Platinum, Worldscope and Datastream databases. We start by identifying publicly listed firms that have large bank loans using Dealscan. We include all loans initiated before the financial crisis, between January 2003 and December 2006. We treat all loans granted by a subsidiary or a branch of a bank as loans originating from the same parent bank. For example, we classify loans arranged by bank branches like Santander Brasil and wholly owned subsidiaries like Abbey National as loans made by Banco Santander Central Hispano.

To determine the most important banks worldwide, we manually merge the parent banks with the list of "Top World Banks" published by "The Banker" in 2005, which ranks the world's leading commercial banks by Tier 1 capital. For tractability, we restrict the sample to the top 500 banks. Of a total of 1,232 different lead arrangers in syndicated loans during 2003-2006, 852 are affiliated with and matched to 237 of the top 500 banks. The lead arrangers included in the top 500 banks are responsible for 90% of the volume and 88% of the number of syndicated loans during 2003-2006.

We focus on large loans to publicly listed non-financial borrowers. We exclude from the sample: (1) loans in which the borrower is a financial firm (SIC 6000-6999), a utility company (SIC 4910 and 4940) or a company in the public sector (SIC 9000-9999); (2) deals with amounts below $100 million for the sum of the tranches (amounts converted to U.S. dollars when they are in a different currency) and (3) loans without information on all-in drawn spread. This provides us with an initial sample of 21,806 facilities between January 2003 and December 2006.

We focus on the lead arranger banks, which usually hold the largest share of the syndicated loan and whose responsibilities best fit the description of a relationship lender. The lead arranger is frequently the administrative agent, with a fiduciary duty to other syndicate members to provide timely information about the default of the borrower. We classify banks as lead arrangers in a given loan according to the variable "Lenders – Lead Arrangers" from Dealscan. We include only loans for which this variable is available, which comes to 21,727 facilities.[6]

[6] This approach is the same as the one used by Sufi (2007) except for the fact that we do not use other information to classify the lead arranger when "Lenders – Lead Arrangers" is missing. However, the number of observations for which this is an issue in our sample is less than 0.4% of the overall sample.

In order to make the data collection manageable but still retain most of the loans, we choose the top 20 lead arranger banks operating in each country, as ranked by volume of loans arranged for firms headquartered in that country. The final sample consists of 136 different banks among the top 20 banks in the countries where borrower firms in our sample operate. We see if a bank is publicly listed using the Bankscope database. This leaves us with 20,775 facilities during the 2003-2006 period.

We restrict our sample of firms to publicly traded firms that have accounting information from Worldscope as of the end of 2006. We merge the Dealscan and Worldscope datasets using the firm's country and ticker; when these data fields are unavailable, we manually match the item "borrower-parent" in Dealscan with the company names in Worldscope. Only firms that we are able to identify using this procedure are included in our sample.

The next step is to determine the main lenders for each firm during the pre-crisis period (2003-2006). Since loan shares are not available for most of our sample, for each individual loan in which the share is missing, we compute the amount of the loan allocated to lead arranger bank *b* by allocating the total value of the loan equally across all lead arrangers in the loan. This gives us the share of each lead arranger in each loan. For each firm *i* and lead arranger bank *b* in our sample, we compute the total amount of loans to firm *i* from lead arranger bank *b* by adding the shares during the 2003-2006 period.

We define the lending share (*i*, *b*) as the ratio of this amount to the total amount of loans to firm *i* during that period. For each firm, we identify the *Main Lead Arranger* as the bank *b* that has the higher value of share (*i*, *b*). If two lead arranger banks have equal amount of loans we count them as multiple main lenders. For 64.1% of the firms in our sample, we identify only one *main* lead arranger in the 2003-2006 period (34.1% of the firms have only one lead arranger). For 22.3% of our sample we identify two main lead arrangers, and for 13.6% we identify more than two main lead arrangers. Our results are robust to alternative approaches to defining the lending share (*i*, *b*), and main lead arrangers, such as using numbers of loans or allocating loan amounts entirely to all lead arrangers.

Finally, we use Datastream to obtain stock return data for borrower firms and main lead arrangers during the crisis period (July 2007–October 2008). For each firm and period, we compute abnormal returns as the market-model adjusted returns. For firms with more than one

main lead arranger, we compute bank abnormal returns as the equally weighted average among all *main* lead arrangers. The results are robust to using raw returns for banks and firms.[7]

The final sample consists only of firms with at least one main lead arranger that is publicly traded. This leaves us with a final sample of 1,564 publicly listed non-financial borrower firms from 34 countries, of which 906 are U.S. firms and 658 are non-U.S. firms.

### 4.2. Variables and Summary Statistics

Panel A of Table 1 provides information on the number of firms in our sample and the top three lead arranger banks operating in the syndicated loan market in each country. We see that there are both local and global banks operating in different national markets.

Panel B provides summary statistics for the sample of borrower firms. All firm variables are measured at the end of 2006, except for short-term leverage 2007 and total leverage 2007, which are measured at the end of 2007. *Assets* is defined as total assets in millions of U.S. dollars (Worldscope item 02999). *Leverage* is defined as total debt divided by total assets (Worldscope item 03255 / item 02999). *Cash/Assets* is cash and short-term investments (Worldscope item 02001) divided by total assets (Worldscope item 02999). *Dividend Payer* is a dummy variable that takes a value of one if total cash dividends (Worldscope item 04551) are positive and zero otherwise. *Number of Analysts* is the number of equity analysts following the firm's stock at the end of 2006 (the source is IBES). *Bond Issue* is a dummy variable that takes a value of one if the firm issued a public debt security in the 2003-2006 period (issues are drawn from the SDC Platinum database).

The average firm in our sample is larger, and has more leverage and less cash than the average firm in Compustat. *Number of Main Lead Arrangers* is the number of main lead arrangers during 2003-2006. The median number in the sample of main lead arrangers is one, but the average number of main lead arrangers in the sample is greater than one. *Lending Share from Main Lead Arrangers* for firm *i* is the ratio of the total amount of loans to firm *i* from *main* lead arrangers to the total amount of loans to firm *i* during 2003-2006. Main lead arrangers represent

[7] We follow standard event-study methodology to compute the market-model adjusted return (Kothari and Warner (2007)). For each firm and window, we estimate the market-model beta using 250 trading days, ending 50 trading days before the window. We then compute abnormal returns as raw return – (beta) × (market return). We use local market returns to estimate the market-model but have tested the robustness to other approaches. Since our identification is based on comparing returns for multiple firms over the same period, we find that our results are not sensitive to the choice of approach.

the large majority of the loans in our sample used by the firm (sample mean for *Lending Share from Main Lenders* is 85.2%). *Share of Credit Lines* is the fraction of loans (in volume) from main lead arrangers that take the form of credit lines.

### 4.3. Identifying Weeks with Significant News on Bank Losses

The overall period of analysis is between July 27, 2007 (Friday) and October 10, 2008 (Friday). The period is bracketed by July 30, 2007, when two Bear Stearns hedge funds that had invested in subprime mortgages filed for bankruptcy, and October 13, 2008 (Monday), when the U.S. Secretary of the Treasury announced the intention to buy senior preferred stock and warrants in the largest American banks. This effectively started the so-called bailout of the financial system as a period of significant government intervention ensued in the U.S. and around the world.

In our approach we first isolate systemic events producing unexpected shocks to the financial health of most banks. Figure 2 describes the evolution of credit default swap (CDS) spreads for selected banks during the crisis period.[8] The CDS spread as an indication of the level of credit risk illustrates the significant negative effect that the failures of Bear Stearns and Lehman Brothers had on the top five banks in the world according to "The Banker" rankings (Citigroup, JP Morgan Chase, HSBC Holdings, Bank of America, Credit Agricole). These two events seem to have produced the most significant negative shocks during the period, as evidenced by the spikes in the CDS spreads.

We specify five trading–day periods to make the analysis comparable to our other results, which are based on weekly returns. For the failure of Bear Stearns, we use the period from 03/13/2008 (Thursday) to 03/20/2008 (Thursday). This period centers on the weekend when officials from the Federal Reserve Bank of New York helped broker a deal for JPMorgan Chase to acquire Bear Stearns. For the failure of Lehman Brothers, we use two periods: 09/04/2008 (Thursday) to 09/11/2008 (Thursday) and 09/11/2008 (Thursday) to 09/18/2008 (Thursday). The first period captures the substantial fall in Lehman's stock price before the last attempts to save it, especially as it became clear on September 9, 2008, that the state-controlled Korea Development Bank would not buy the firm. The second period is centered on the weekend

[8] The spread is for a CDS contract on senior secured debt with a maturity of five years for these banks. The data source is Datastream (which itself sources its data from CMA).

leading to the announcement of bankruptcy early Monday morning, when the president of the Federal Reserve Bank of New York convened a meeting with all major banks' top executives.

Finally, we use the U.S. bailout for an additional test. For this test, we use the period from 10/09/2008 (Thursday) to 10/16/2008 (Thursday). This period brackets the announcement of the U.S government intervention in the financial market, announced on Monday, October 13, 2008. This U.S. Treasury–FDIC plan included a $125 billion preferred equity infusion into the ten largest U.S. commercial banks and a three-year government guarantee on new unsecured debt issues. Veronesi and Zingales (2009) provide evidence that this plan reduced bank financial distress.

The choice of weekly returns is motivated by two issues. On the one hand, since we are looking at consequences of bank distress for relationship clients, we do not want to use very short windows, as the market might be slow to incorporate these effects (Cohen and Frazzini (2008)). On the other hand, shorter windows allow us to use higher frequency information on the financial conditions of banks. For example, over a ten-trading day period, the market perceptions about the financial health of bank might worsen or improve to original levels (see Figure 2). While we estimate our main results with five-trading day windows, in untabulated results we find that the results are robust to longer windows such as ten trading days.

In our second approach we isolate bank-specific events. We rely on public announcements of asset write-downs by individual banks during the crisis period. The data source is the WDCI function in Bloomberg, which was introduced for investors to track financial firms' asset impairments during the crisis. According to Bloomberg (2008), this function was so popular that, on some days in 2008, more than 10,000 Bloomberg users monitored WDCI. The total losses amounted to $1,073 billion from the first quarter of 2007 through the fourth quarter of 2008. The majority of these losses are related to mortgage-backed securities (e.g., collateralized debt obligations, subprime residential mortgage-backed securities and commercial mortgage-backed securities). We then merge the financial firms in the Bloomberg WDCI data with the list of 136 banks in our sample that acted as top lead arrangers. Of these 136 banks, 73 have write-down data, for a total of 167 write-down announcements. Figure 3 plots the total number of write-down announcements by individual banks per calendar week. In the 64 calendar weeks between July 27, 2007, and October 10, 2008, there are 50 weeks with announcements and 14 weeks

without announcements. The week of 8/4/2008 to 8/10/2008 saw the most announcements, with a total of 17 individual banks in our sample announcing asset write-down news.

For each write-down, we compute the market-model adjusted abnormal return of the bank between the day before and the day after the event. Figure 4 plots the entire distribution of write-down abnormal returns. This distribution supports the view that most of the new information on banks is captured by the variation of returns across events, as opposed to an average effect. The mean and median abnormal returns are, respectively, -0.73% and -0.15%. The standard deviation of returns is 7.19%. The conditional means, given a positive or negative return, are, respectively, 3.50% and -4.51%.

## 5. Results

This section presents the results of our tests on the relation between firm and relationship bank stock returns (Hypothesis 1). We first present our main results using both systemic and bank-specific shocks. We then investigate the heterogeneity of the relation between firm and relationship bank stock returns by groups of firms (Hypotheses 2-5). Finally, we perform robustness checks of the primary findings and discuss in greater detail the economic magnitudes implied by our results.

### 5.1. Basic Results Using Systemic Events

Table 2 presents regression results for systemic shocks around the failures of Bear Stearns and Lehman Brothers. We estimate equation (3) using the three one-week event windows we have described. These events capture unexpected shocks to the financial health of most banks. Firms' market-model adjusted stock returns are regressed on their main lead arranger banks market-model adjusted stock return in each window/country. Control variables include firm size, market-to-book, cash, leverage and industry indicators, measured before the crisis period at the end of 2006, and the share of the main lead arranger banks in the firm's total syndicated loan market borrowings in 2003-2006. All reported standard errors are adjusted for heteroskedasticity and within-firm correlation using clustered standard errors.

In column (1), Panel A, we find a positive and statistically significant relation between firms' abnormal stock returns and the abnormal return of their main lead arrangers. This finding

indicates that borrowers whose relationship bank has been more negatively affected by the systemic events earn lower returns than borrowers whose relationship bank has been less affected. This result provides support for Hypothesis 1. The regression coefficient implies that a 100% decline in main lead arrangers' valuations is associated with a reduction in firms' valuation by 5.70%. To evaluate the economic significance of the effect we can take the average stock return of lead arranger banks in our sample during the 2007-2008 crisis period. A 40% decline in the main lead arrangers' valuation is associated with a reduction in borrower valuation of 2.53% for the average firm in our sample. This is an estimate of the loss in value of established lending relationships to firms.

Columns (2) and (3) present the results of similar regressions for the samples of U.S. and non-U.S. firms. We find economically and statistically significant results in both samples. The point estimate is 0.0496 in the sample of U.S. firms and 0.0913 in the sample of non-U.S. firms. This finding shows that the effects are important both in the U.S. and elsewhere in the world, highlighting the global nature of the banking and financial system. Although the original losses originated mostly in U.S. mortgage-backed securities, the shocks spread to affect firms globally through banks.

In column (4) we estimate the results using an alternative set of controls. We control for non-linearities in the relation between firm-level controls and the firm's stock abnormal return by using indicator variables based on the terciles of the distribution of each firm characteristics. We also include alternative industry controls, indicators at the two-digit SIC level, instead of indicators at the one-digit level. We again find a positive and significant coefficient on bank abnormal return.

In column (5) we control for lead arranger total valuation loss during the financial crisis. For each firm, we compute the average cumulative abnormal return of the firm's main lead arrangers from July 30, 2007 through October 11, 2008. We then include indicator variables based on the quartiles of the distribution of this total bank loss. In this specification, we are identifying the effect based on the timing of bank losses. In a given period, we are comparing only firms with banks that experienced a similar *overall* loss during the financial crisis, but that experienced different losses *this period.* As we have noted, this approach lets us address the concern that firms borrowing from banks that experience greater losses are inherently different.

The average quality of the firms that borrow from a bank should be a function of the overall losses of the bank during the financial crisis, which we control for. We find a positive and significant coefficient on banks' abnormal return, and reduced only slightly relative to the base case in column (1).

The second panel of Table 2 presents the results of the same regressions using the U.S. bailout as a systemic event that represented a positive shock to the financial health of a variety of U.S. banks. We have observed that this event allows us to assure that our results are not driven by the market's learning about firm quality, because in this case bank distress was mitigated by a government intervention. These tests indicate an effect similar in size to the effect of the Bear Stearns and Lehman events. This provides direct evidence against a learning interpretation of our results.

Columns (2) and (3) reveal an interesting asymmetry between the U.S. and the non-U.S. firm samples. While there is a positive and significant relation in the sample of U.S. firms, there is no relation in the sample of non-U.S. firms. This indicates that the U.S. bailout represents positive news affecting mainly U.S. banks. Results in columns (4) and (5) with alternative control variables confirm the base case results in column (1).

### 5.2. Results Using Bank-Specific Shocks

Table 3 presents regression results using the announcements of write-downs of bank assets. The results are based on the estimation of equation (4). We regress firms' market-model adjusted stock returns on their main lead arranger banks' market-model adjusted stock return for all weeks in the financial crisis. We then interact bank return with an indicator that equals one if one of the firm's main lead arrangers has a write-down in that week (Write-down) and an indicator that equals one if none of the firm's main lead arrangers has a write-down in that week (No_Write-down).

In column (1), we find a positive and significant relation between the borrower stock return and the return of its main bank when the bank had a write-down that week. There is no relation between firm and bank returns when banks did not have a write-down that week. The point estimate for the first group, 0.0632, implies that a 100% change in the valuation of relationship banks is associated with a decline in the value of firms of 6.32%. The magnitude of this effect is

similar to the one in the sample of systemic events in Table 2. Column (2) reports the difference in coefficients between the two groups, which is economically and statistically significant.

In columns (3)-(6) we estimate the same results using the two sets of control variables in Table 2, as well as industry controls. The coefficient for the effect in the sample of banks with a write-down is slightly higher than in the base case. In untabulated results we find that these effects are equally important in samples of U.S. and non-U.S. firms.

These results provide additional support for Hypothesis 1. There is an insignificant relation between firms' returns and their main lead arrangers' returns, except for the banks/weeks where we have identified banks' distress news. These tests address the selection problem discussed earlier. That is, firms borrowing from banks that experienced greater losses may be inherently different from other firms, and it is this that drives the relation between firm and bank returns. If this is the case, it is unlikely that we would see a relation between firm and bank returns only in the weeks when banks experienced write-downs but not in the other weeks. Notice that the write-down sample is based on more than the choice of weeks. In a given week with write-downs, only the firms with a relationship to the specific banks that have a write-down in that week are included. As we explained in Section 3.1, this is exactly what we would expect if we are capturing the effect of bank distress on relationship firms' value.

In column (7) we address this selection concern further. For each firm/week, we compute the average cumulative abnormal return of the firm's main lead arrangers in all other weeks. This allows us to control for the overall loss of banks over the financial crisis, while linking firm returns and bank returns today. Consistent with the view that our results are not driven by selection, we find that what matters for firm returns this period is their banks' return this period not their banks' return in other periods.

### 5.3. Cross-Sectional Results

This subsection presents the tests of Hypotheses 2-5. We examine how the relation between firm and relationship bank stock returns differs according to the strength of the lending relationship, bank exposure and borrowers' asymmetric information and financial position.

*5.3.1. Strength of Lending Relationship*

Hypothesis 2 predicts that bank distress should have a stronger effect on borrowers who have a stronger lending relationship with a bank. We test this by analyzing the relation between a firm's stock return and its main lead arrangers' stock return for different groups of firms. We restrict the analysis to the sample of systemic events for sample size reasons.

We estimate equation (5) for different groups according to the strength of lending relationships in the 2003-2006 period. The first group (strong lending relationships) consists of firms that use only one lead arranger in the syndicated market. The second group (middle lending relationships) consists of firms that use more than one lead arranger but have only one *main* lead arranger in the syndicated market (i.e., there is one bank that represents the greatest share of the firm's loans). The third group (weak lending relationships) consists of firms that have more than one *main* lead arranger in the syndicated market (i.e., there are multiple banks that represent the greatest share of the firm's loans). These groups represent, respectively, 33.25%, 28.84% and 37.92% of the firms in our overall sample. Firms in the second group have more reliance on one single lender than firms in the third group. An alternative definition of groups based on the share of firms' past lending with their most important bank produces similar results.

Table 4 shows a statistically significant relation between firms' and their main banks' abnormal stock returns only for firms with strong lending relationships. The coefficient of 0.1110 for firms in this group implies that a decline of 40% over the crisis period in the main lead arrangers' valuation is associated with a decline in borrower valuation of 4.44% for firms with strong lending relationships. The effect is close to zero for firms with the weaker lending relationships. In columns (2) and (3) we see that the difference between the effects for firms with stronger lending relationships and firms with weaker relationships is statistically significant. This is true both when we compare firms with strong and weak relationships (column (2)) and when we compare firms with either strong or middle relationships to firms with weak relationships (column (3)). In columns (4)-(6) we include leverage, cash, size controls, as well as interactions of those variables with bank returns and industry indicators, measured in 2006. The basic findings are unchanged.

The results support Hypothesis 2; relationship bank distress has a more pronounced effect for firms that rely more on lending relationships. The absence of an effect for firms with weak

lending relationships suggests that lending relationships in the syndicated market are not important for these firms. This supports the view that syndicated loans are closer to public debt than to relationship-driven bank loans in the case of firms with weak lending relationships.[9]

### *5.3.2. Bank Exposure*

There is some concern that our results could reflect a reverse channel: the distress of important client firms leads to loss of value for banks. We test for this reverse channel by testing whether the relation between bank and firm returns is more important for the firms to which banks are more exposed. We measure the exposure of bank *b* to firm *i* using the ratio of total lending of bank *b* to firm *i* to total lending of bank *b* in 2003-2006. We then define a firm-level measure of bank exposure for each firm *i* as the average of the exposure to firm *i* across all banks *b* in the set of main lead arrangers. This measure is intended to capture the average exposure of main lead arrangers to each of the firms in our sample.

Table 5 reports the results. We sort firms in our sample into three groups on the basis of the terciles of the bank exposure measure, and estimate equation (5) using these three groups. The relation between bank and firm returns is statistically significant only for the firms with lower bank exposure. The point estimate on the lower exposure group is more than twice the size of the point estimate on all other groups, both for specifications with and without firm controls. The results for firms with moderate or higher bank exposure are weaker and statistically different from the effect for firms with low bank exposure. This provides additional support that our results are driven by the effect of relationship bank distress on firms and not the reverse.

### *5.3.3. Borrowers' Asymmetric Information*

Hypothesis 3 predicts that bank distress will have a stronger effect on relationship firms that face greater information asymmetry problems. We consider two proxies for the level of borrower information asymmetry: firm size (book value of assets), and analyst coverage (number of

[9] One concern with the effect for the firms with weak lending relationships is the measurement error as to the identity of lead arrangers. We might be missing the identity of the main relationship bank in the loans and relating firm returns to several non-relationship banks. This concern cannot explain the absence of an effect since most firms in this group have only two main lead arrangers, and less than 25% of firms in the group have more than three main lead arrangers. If the true relationship bank is among the lead arrangers that we are able to identify, this means that we should see at least some economically important effect in this group if the correct estimate (in the absence of measurement error) is similar to the one for the firms with strong relationships.

analysts following a firm). We measure these variables at the end of 2006. We rank firms into three groups on the basis of terciles of distribution of firm size and analyst coverage. We then estimate equation (5) for the interactions of bank returns with the group indicators.

Table 6 presents the results. They show a positive and significant relation between firm and lead arranger bank abnormal stock returns for borrowers in the small and medium firm size groups, but an insignificant and slightly negative relation for big firms. The point estimate for the smallest firms is 0.0877, which is statistically significant. In columns (3) and (4) we show that the economic and statistical significance of the results is not affected when we include control variables.

Table 7 presents results using analyst coverage as a proxy for the borrower's level of asymmetric information. These results show a positive and significant relation between firm and bank abnormal stock returns for low- and moderate-coverage borrowers, but again an insignificant and slightly negative relation for firms in the top analyst coverage group. The point estimate for the least covered firms is 0.1164, which is statistically significant.

These results provide additional support for the hypothesis that firms are more impacted by relationship bank distress when lending relationships are more valuable to them. They also suggest that lending relationships in the syndicated market are not important for firms less likely to face information asymmetry problems.

#### *5.3.4. Borrowers' Financial Position*

Hypothesis 4 predicts a stronger effect of relationship bank distress on firm value for firms in a weaker financial position at the time of the shock. We test this hypothesis by analyzing firms with higher leverage at the time of the shock, especially firms rolling over more debt around the shock, as well as firms with smaller cash holdings at the time of the shock.

Table 8 presents the results sorting firms into low-, medium- and high-leverage groups according to their leverage in 2006. Firms' leverage in 2006 is unlikely to have been influenced by any anticipation of the financial crisis. The results show a positive and significant relation between firm and bank abnormal stock returns for borrowers in the medium and high-leverage groups, while the relation is insignificant and slightly negative for firms in the low-leverage group. The results are economically and statistically similar when we include control variables.

The results support the prediction that firms with more leverage at the time of the shock were more impacted by relationship bank distress. Firms with low leverage at the time of the shock, and therefore with little need to roll over their debt and greater ability to accommodate an increase in the cost of external financing, are not impacted by relationship bank distress. However, the results suggest a non-monotonic relation between leverage and the importance of the effect as the effect is stronger for medium-leverage firms than for the high-leverage firms. There are several explanations for this finding.

One possibility is that differences in leverage are driven by (unobservable) differences in debt capacity. For example, firms with high leverage might simply be firms with a high percentage of tangible assets. If this is the case, high-leverage firms might be less impacted than medium-leverage firms simply because, despite the fact that they have higher leverage, they still have greater ability to accommodate an increase in the cost of external financing.[10] Another possibility is that differences in leverage are explained by the timing of firms' financing decisions. Firms with high leverage might be firms that have drawn down more on their lines of credit before the crisis. Firms with medium leverage might be firms that are expecting to draw on lines of credit in the future. When banks get distressed and the value of untapped credit lines gets reduced, medium-leverage firms are more impacted.

We address these challenges by looking into the debt maturity structure of firms. We are interested in capturing the need of firms to roll over their debt around the shock. We follow an approach similar to Almeida, Campello, Laranjeira, and Weisbenner (2009) and use firms' short-term debt outstanding at the end of 2007 to capture the need of firms to roll over their debt during the crisis. Firms with considerable debt due in 2008 are likely to be more affected by relationship bank distress than firms with little debt due in 2008. To the extent that firms are not systematically timing their maturity choice in anticipation of the crisis, this approach allows us to deal with previous challenges.

Table 9 presents the results of sorting firms into low-, medium- and high-leverage groups on the basis of their short-term leverage (ratio of short-term debt to book value of assets) as of the end of 2007. The results show a positive and significant relation between firm and bank abnormal stock returns only for borrowers in the top leverage group. Once we add controls,

[10] In other words, what matters is firms' leverage relative to their debt capacity and we can observe only the first one of these. Firms with high leverage, as opposed to firms with medium leverage, might have more spare debt capacity.

including firms' total leverage in 2006, the effect for firms with low short-term leverage is statistically insignificant and not economically important. The economic and statistical significance of the results for firms with high short-term leverage is not affected when we include control variables. These results support the view that firms with high levels of debt maturing in 2008 are the most affected by relationship bank distress.

The major disadvantage of using firms' leverage in 2007 is the possibility that firm managers might have made some changes to debt in anticipation of or in reaction to the start of the financial crisis. If this possibility matters for our results, our findings should be different depending on whether we use firms' financial positions in 2006 or 2007. To address this concern, we estimate the results from Table 8 using firms' total leverage in 2007. Columns (6)-(9) of Table 9 report the results.

We find very similar results to the results based on firms' total leverage in 2006. In untabulated results, we implement a robustness check similar in spirit to the one implemented by Almeida, Campello, Laranjeira, and Weisbenner (2009). We use firms' debt maturity structure in 2006 to predict their need to roll over debt during 2008 or 2009. We obtain this information from Compustat for U.S. firms. Unfortunately, this information is not available for non-U.S. firms in Worldscope. We find additional support for the hypothesis that firms rolling over debt around the shock are more impacted by relationship bank distress.

We then test whether the relation between bank and firm returns is stronger for firms that rely more on credit lines from relationship banks (Hypothesis 5). Table 10 presents the results for sorted firms into groups based on the fraction of loans (in volume) from main lead arrangers in the form of credit lines in the 2003-2006 period. Because this share is equal to one for more than one-third of the firms in our sample, we sort firms in two groups. We first compare firms in the bottom tercile to firms in the middle and top terciles. We then compare firms above and below the median. In both cases we estimate equation (5).

The results in columns (1)-(4) show that a statistically significant relation between firm and relationship bank returns only for firms in the top or medium group. The results for firms below and above the median support similar conclusions; even if less precisely estimated, the interaction in the specification with controls is still significant at the 10% level. These results support the view that an important part of the loss in firm value after relationship bank distress

comes from banks repudiating unenforceable contracts. They also support the interpretation that medium-leverage firms lose more in value than firms with high leverage, because the former have more untapped lines of credit.

We also estimate the results based on firms' cash holdings at the time of the shock. We sort firms into low-, medium- and high-cash groups on the basis of cash holdings at the end of 2006. Results in Table 11 show statistically significant effects only for the middle- and low-cash groups. The economic effect for these two groups is similar and substantially greater than the economic effect for the high-cash group. The difference between the effect for the low- or medium-cash group and the high-cash group is also statistically significant at 10%. When we add controls, the economic importance of the effect for the high-cash groups becomes close to zero. The effect for the medium- and high-cash groups is still economically important and similar, but the effects are statistically significant only for the medium-cash group. The difference in the statistical significance of the effect for these groups comes mostly from the precision of the estimates. The difference between the effect for the low- or medium-cash group and the high-cash group is still statistically significant at 10%. These results support the view that firms holding more cash are less impacted by relationship bank distress, suggesting that only firms in the top of the distribution of cash holdings can completely protect themselves against a shock to their relationship banks.

Finally, in Table 12 we examine whether the relation between firm and bank returns is different depending on the access of firms to public debt markets. Firms could rely on public debt markets to offset the effect of relationship bank distress. For each firm, we compute the ratio of total public bond issues (volume) to total issues of public bonds plus loans (volume) over 2003-2006. The public bond sample comes from SDC Platinum and the loan sample comes from LPC Dealscan. Because more than a third of firms in our sample do not have a public bond issue, we sort firms into two groups in each specification. We first compare firms with and without any public bond issue during 2003-2006. We then compare firms in the top tercile in terms of the share of public bonds to the other firms.

The first set of results is reported in columns (1)-(4). The relation between firm and relationship bank returns is economically important for both groups. The effects for the two groups are similar. When we add controls, only the effect for the firms that have bond issues is

statistically significant. The results comparing firms in the top tercile to the other firms are reported in columns (5)-(8). The effects for the two groups are also economically similar, but the effect is now marginally smaller for the group relying more on bond issues. These results suggest that greater access to public markets did not help firms to offset the effect of relationship bank distress. This finding is consistent with the view that the public debt markets were also disrupted during the 2007-2008 financial crisis, and the option for firms to substitute new bond issues for bank loans did not have much value during this period. These findings also suggest that underwriting relationships in public debt markets are not driving our results.[11]

### 5.4. Robustness

We perform several robustness tests (results not tabulated here). First, we test whether bank distress is associated with changes in the pricing of new loans for the firms in our sample. If relationship bank distress matters for firms because of an increase in the cost of borrowing, we should see firms that rely on distressed banks borrow less or borrow in different terms. Showing the importance of such an effect is challenging. Our results suggest that an important part of this effect might operate through firms' reduced ability to draw on credit lines. As we do not observe drawdowns for our sample of firms, we cannot test this prediction. We observe only new loans, and firms do not initiate new loans very often, so we cannot observe terms in loans to the same firm just before and after relationship bank distress.

Other researchers examining the supply-side determinants of lending during the financial crisis have attempted to deal with these issues. Ivashina and Scharfstein (2010) examine two stresses on bank liquidity, banks' access to deposit financing, and co-syndication of loans with Lehman Brothers. They provide evidence that banks facing greater liquidity problems reduced lending by a greater amount. Santos (2009) shows that past bank losses predict higher loan spreads during the crisis period. Following Santos (2009), we test whether bank losses prior to new loans predict higher loan spreads in our sample of firms. Since our sample of banks includes banks from several countries, we cannot use data from the Federal Reserve Bank Call Reports as in Santos (2009). Using the equity return of banks in the period prior to new loans to capture

[11] If our measures of lending relationships are simply capturing underwriting relationships in the public debt markets, we should not expect to see the relation between bank and firm returns to be equally important for firms with no access (or little access) to public debt markets and other firms.

bank losses, we find evidence that bank losses also predict higher loan spreads during the crisis in our sample.

We also estimate our main specification that relates banks' returns to firms' returns using weekly returns for periods around the financial crisis, between January and July 2007, for example. Our motivation is to provide alternative benchmarks for the importance of this relation in the absence of significant news on the health of banks (a placebo test). Outside the crisis period, we find no evidence that this benchmark relation is economically or statistically important.

Finally, we also test for the importance of alternative links between firms and banks that may explain our results. Our examination of the importance public debt issues for firms suggests that underwriting relationships in public debt markets are not driving our results. We examine two alternative links between firms and banks. First, we exploit equity underwriting relationships. Consistent with the view that our results are not driven by equity underwriting relationships, we find that the relation between firm and bank returns is statistically important only for firms that did not issue equity through seasoned equity offerings during 2003-2006. Second, we look at the presence of bankers on firms' boards of directors (Kroszner and Strahan (2001), Ferreira and Matos (2009)). We find that the relation between firm and bank returns is less statistically important for firms when at least one main lead arranger holds a seat on the firm's board.[12] This also suggests that our results are not driven by relationships through bankers on the boards of firms.

### 5.5. Economic Magnitudes

To conclude the analysis, we discuss in greater detail the economic magnitudes implied by our estimates. We use the change in the market value of banks' equity during the entire financial crisis period (July 30, 2007 to October 13, 2008) as a benchmark to quantify the importance of the relationship banking channel. For each group of firms, we multiply the estimated effect of relationship bank returns on firm returns by the average realized change in equity value of relationship banks in that group. This provides the implied loss to firms attributable to a reduction in the value of their lending relationships.

[12] Data on board members are drawn from BoardEx. For more details see Ferreira and Matos (2009).

Table 13 presents the results. The top panel shows that the implied average effect for the firms in our sample is -2.21%. The effect is stronger when we look at subgroups. The effect is -4.23% for firms with strong lending relationships, -4.98% for firms in the top tercile of short-term debt at the end of 2007, and -4.08% for firms in the bottom tercile of firm size. This shows that there is substantial heterogeneity in the importance of the effect across firms. This is confirmed in the bottom panel, which compares the extent of the effect across different groups.

Since the estimated effect for smaller firms is substantially stronger than the effect for larger firms, a value-weighted average effect (as opposed to an equally weighted effect) would lead to average effects in our sample of below -2.21%. This suggests that the lending relationship channel can explain economically large losses of firm value following banking sector distress for several subgroups of firms, as well as cross-sectional differences in firms' losses of value, but is more limited in explaining an aggregate loss of value for firms in our sample.

It is important to recognize, however, that our sample consists of large publicly traded firms. Even within this sample, the effects are economically important for firms in the bottom tercile of size. Therefore, our results suggest that the lending relationship channel can explain an economically large aggregate loss of value for the *overall* economy (considering the presence of private firms).

## 6. Conclusion

We study the role of lending relationships in the transmission of bank distress to the real economy. We take the 2007-2008 financial crisis as a laboratory and use a comprehensive sample of publicly listed firms around the world. We identify periods when relationship banks experienced major but different levels of unexpected distress stemming from systemic events (the failures of Bear Stearns and Lehman Brothers) that impacted the financial health of most banks and bank-specific events (write-downs).

We find a strong link between unexpected shocks to bank distress and losses to the market value of borrower firms. This effect is concentrated in firms with the strongest lending relationships, with the highest information asymmetry, and with the weakest financial position at the time of the shocks. Our findings, robust to several additional tests, provide support for the

view that the loss in the value of lending relationships is an important channel through which bank distress imposes costs on firms.

Our paper provides evidence for a foundation linking the financial health of banks and the real economy. Firms cannot switch to alternative sources of capital when the financial health of banks is affected because they have value tied in relationships with banks due to information accumulated over time. While lending relationships allow firms to reduce their cost of borrowing when banks have a strong financial position, they also expose firms to high costs when financial conditions deteriorate. Moreover, this link works at the local level. Firms are exposed to the financial condition of *their* particular relationship banks. Therefore, the distribution of distress across banks matters, and shocks to the financial health of only a few institutions can have sizeable consequences.

Our findings suggest new directions for future research. They suggest the importance of building models of financial market equilibrium where firms establish lending relationships over multiple interactions, and banks acquire some information monopoly power over time. This can be relevant not only for understanding the consequences of shocks to the financial health of banks, but also for analyzing the effects of monetary policy and business cycles, as well as for understanding the choice of financial policies and contracts by firms in the first place.

Our results provide evidence that the effect of bank distress on relationship firms is important mostly for firms relying on credit lines from relationship banks. This suggests that an important source of value for firms from multiple interactions with banks is the possibility to write contracts that allow for greater discretion. Understanding in greater detail this relation between lending relationships and discretion in financial contracts is an interesting area for future research.

Finally, our results also have policy implications. Since firms have economic value tied to their relationship banks, changes in the financial conditions of banks can have sizeable externalities. Since these externalities are not likely to be internalized by those financing the banks, regulators should consider these costs for the economy when they set policy.

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**Table 1**
**Summary Statistics**

This table provides ummary statistics from the main sample used in the analysis. See Section 4.1 for the construction of this sample. Panel A provides the number of firms and top banks based on in the syndicated loans arranged in 2003-2006 in each country. Panel B provides summary statistics for the sample of firms. Assets, Leverage, Cash/Assets, Dividend Payer and Number of Analysts are based on Worldscope and measured at 2006. Leverage_2007 and Short-term Leverage_2007 are also based on Worldscope but measured at 2007. Bond issue is based on SDC Platinum and equals one if the firm has issued public bonds between 2003-2006. See section 4.2 for the definition of main lead arrangers. Lending Share from Main Lead Arrangers is based on Dealscan and measures the ratio of total borrowing with main lead arragers in the syndicated market (2003-2006)/ total borrowing in the syndicated market (2003-2006). Share of credit lines is also based on Dealscan and measures the ratio of credit lines with main lead arragers in the syndicated market (2003-2006)/ total borrowing with main lead arragers in the syndicated market (2003-2006).

**Panel A: Number of Firms and Top Lead Arranger Banks in the Syndicated Loan Market**

| Country | Number of firms | Top Lead Arranger Banks | | |
|---|---|---|---|---|
| | | #1 | #2 | #3 |
| Australia | 40 | National Australia Bank | Commonwealth Bank | ANZ Banking Group |
| Brazil | 13 | ABN AMRO Bank | Santander Central Hispano | UBS |
| Canada | 50 | Royal Bank of Canada | Citigroup | Scotiabank |
| Finland | 17 | Nordea Group | Citigroup | Barclays Bank |
| France | 64 | BNP Paribas | Credit Agricole Groupe | Societe Generale |
| Germany | 40 | Citigroup | Deutsche Bank | JP Morgan Chase & Co |
| Hong Kong | 15 | HSBC Holdings | BNP Paribas | Credit Agricole Groupe |
| India | 15 | Credit Agricole Groupe | ABN AMRO Bank | Standard Chartered |
| Italy | 18 | UniCredit | Banca Intesa | JP Morgan Chase & Co |
| Japan | 22 | Citigroup | Royal Bank of Scotland | Mitsubishi Tokyo Fin. |
| Korea (South) | 26 | Citigroup | Kookmin Bank | Woori Bank |
| Malaysia | 14 | Barclays Bank | Standard Chartered | HSBC Holdings |
| Mexico | 12 | Citigroup | Banco Bilbao Vizcaya Arg. | HSBC Holdings |
| Netherlands | 26 | ABN AMRO Bank | ING Bank | Citigroup |
| Norway | 12 | DnB NOR Groufo | Nordea Group | Citigroup |
| Spain | 25 | Santander Central Hispano | Royal Bank of Scotland | Citigroup |
| Sweden | 27 | Nordea Group | Skandinaviska Enskilda B | Svenska Handelsbanken |
| Switzerland | 13 | Deutsche Bank | JP Morgan Chase & Co | Barclays Bank |
| Taiwan | 32 | Chinatrust Financial H | Fubon Financial Holding | Cathay United Bank |
| Thailand | 10 | Deutsche Bank | Citigroup | ABN AMRO Bank |
| United Kingdom | 110 | Royal Bank of Scotland | Barclays Bank | HSBC Holdings |
| United States | 906 | JP Morgan Chase & Co | Citigroup | Bank of America Corp |
| Other Countries | 57 | | | |
| Total | 1564 | | | |

**Panel B: Summary Statistics on Sample of Firms**

| | All Firms | | | US Firms | | | Non-US Firms | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Obs. | Mean | Std. Dev. | Obs. | Mean | Std. Dev. | Obs. |
| Assets (US$ millions) | 9446 | 24400 | 1564 | 7433 | 21600 | 906 | 12200 | 27600 | 658 |
| Leverage | 0.289 | 0.206 | 1563 | 0.290 | 0.237 | 905 | 0.289 | 0.237 | 658 |
| Leverage_2007 | 0.299 | 0.195 | 1398 | 0.306 | 0.216 | 790 | 0.291 | 0.1625 | 608 |
| Short-term Leverage_2007 | 0.057 | 0.079 | 1298 | 0.044 | 0.080 | 706 | 0.073 | 0.075 | 592 |
| Cash/Assets | 0.093 | 0.096 | 1563 | 0.086 | 0.097 | 905 | 0.102 | 0.097 | 658 |
| Dividend Payer | 0.674 | 0.469 | 1564 | 0.554 | 0.497 | 906 | 0.839 | 0.497 | 658 |
| Number of Analysts | 10.247 | 7.820 | 1564 | 9.535 | 6.944 | 906 | 11.226 | 8.798 | 658 |
| Bond Issue | 0.496 | 0.500 | 1564 | 0.395 | 0.489 | 906 | 0.568 | 0.496 | 658 |
| Number of Main Lead Arrangers | 1.773 | 1.537 | 1564 | 1.240 | 0.442 | 906 | 2.509 | 0.442 | 658 |
| Lending Share from Main Lead Arrangers | 0.852 | 0.232 | 1564 | 0.887 | 0.187 | 906 | 0.805 | 0.187 | 658 |
| Share of Credit Lines | 0.612 | 0.396 | 1564 | 0.704 | 0.343 | 906 | 0.486 | 0.427 | 658 |

## Table 2
## Systemic Events Results

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's main lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. The US Bailout sample includes one window: 10/09/2008 to 10/16/2008. The basic results linearly control for size, market-to-book, cash ,leverage, the share of main lead arrangers over total lending, as well as indicators for industries based on 1-digit SIC codes, measured at 2006. The alternative controls sorts firms into three groups for each of the previous variables, and uses indicators for each group as controls, as well as indicators for industries based on 2-digit SIC codes, measured at 2006. The Bank_Total_Loss FE sorts firms into four groups, based on the average cumulative abnormal return of their lead arranger(s) between 07/30/2007 and 10/11/2008, and constructs indicators for each group. Standard erros are heteroskedasticity robust and clustered at the firm level.

**Panel A: Bear Stearns & Lehman Events**

| | All Firms | US | Non-US | All Firms | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Bank_Abnormal_Return | 0.0570*** | 0.0496** | 0.0913*** | 0.0527*** | 0.0536*** |
| | (0.0197) | (0.0222) | (0.0359) | (0.0192) | (0.0215) |
| Time FE | | Yes | | | |
| Country x Time FE | Yes | | Yes | Yes | |
| Country x Bank_Total_Loss x Time FE | | | | | Yes |
| Alternative Controls | | | | Yes | |
| Observations | 4635 | 2673 | 1962 | 4617 | 4617 |
| R-squared | 0.01 | 0.02 | 0.01 | 0.05 | 0.04 |

**Panel B: US Bailout**

| | All Firms | US | Non-US | All Firms | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Bank_Abnormal_Return | 0.0772*** | 0.0920** | 0.0129 | 0.0762*** | 0.0809** |
| | (0.0309) | (0.0351) | (0.0423) | (0.0309) | (0.0368) |
| Time FE | | Yes | | | |
| Country x Time FE | Yes | | Yes | Yes | |
| Country x Bank_Total_Loss x Time FE | | | | | Yes |
| Alternative Controls | | | | Yes | |
| Observations | 1545 | 891 | 654 | 1545 | 1545 |
| R-squared | 0.03 | 0.05 | 0.03 | 0.11 | 0.04 |

**Table 3**
**Write-down Results**

This table presents regressions results relating firms' weekly stock returns to the stock return of their main lead arrangers in the syndicated market. The dependent variable is the weekly market-model adjusted return. The independent variable of interest is the weekly average market-model adjusted return of the firm's lead arranger(s) over the same period. Weekly returns are computed from Friday closing prices to Friday closing prices. The overall sample goes from the week ending at Friday August 3 2007 to the week ending at Friday October 11 2008. The overall sample includes all firms described in Table 1 over this time period. For each week, firms are sorted into write-down firms and no write-down firms. The write-down group includes only firms with at least one main lead arranger in the syndicated market experiencing a write-down that week. The no write-down group includes the remaining firms. Write-down FE correspond to fixed-effects for each of these two groups. The controls linearly control for size, market-to-book, cash, leverage, the share of main lead arranger(s) over total lending, as well as indicators for industries based on 1-digit SIC codes, measured at 2006. The alternative controls sorts firms into three groups for each of the previous variables, and uses indicators for each group as controls, as well as indicators for industries based on 2-digit SIC codes, measured at 2006. Bank abnormal returns in other weeks are the average cumulative abnormal returns of the firm's main lead arranger(s) in all other weeks. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | -0.0098 | | 0.0063 | | 0.0063 | 0.0058 |
| | | (0.0181) | | (0.0069) | | (0.0069) | (0.0070) |
| Bank_Abnormal_Return x Write-down | 0.0632** | 0.0730** | 0.0645** | 0.0581** | 0.0641** | 0.0577** | 0.0590** |
| | (0.0287) | (0.0334) | (0.0293) | (0.0296) | (0.0293) | (0.0296) | (0.0297) |
| Bank_Abnormal_Return x No_Write-down | -0.0098 | | 0.0063 | | 0.0063 | | |
| | (0.0181) | | (0.0069) | | (0.0069) | | |
| Bank_Abnormal_Return_OtherWeeks | | | | | | | 0.0011 |
| | | | | | | | (0.0007) |
| Bank_Abnormal_Return_OtherWeeks x Write-down | | | | | | | -0.0035 |
| | | | | | | | (0.0025) |
| Country x Write-down x Week FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | Yes | Yes | | | Yes |
| Alternative Controls | | | | | Yes | Yes | |
| Observations | 96939 | 96939 | 95389 | 95389 | 95389 | 95389 | 95389 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

**Table 4**
**Systemic Events Results: Effect of Strength of Lending Relationship**

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's main lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Weak lending relationship firms are firms with multiple main lead arrangers in the syndicated market. Medium lending relationship firms are firms with one main lead arranger but more than one lead arranger in the syndicated market. Strong lending relationship firms are firms with only one lead arranger in the syndicated market. LendRel FE include indicators for each of those groups. The lending relationships are defined based on all loans available at Dealscan during 2003-2006. The sample includes the sample of all firms described in Table 1. The three groups respectively correspond to 37.9%, 28.8% and 33.3% of the overall sample. Controls include linear controls for market-to-book, cash, size, leverage, as well as interactions of those variables with bank abnormal returns and industry indicators based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | 0.0095 | 0.0095 | | 0.0082 | 0.0016 |
| | | (0.0021) | (0.0021) | | (0.0305) | (0.0303) |
| Bank_Abnormal_Return x Weak_LendRelationship | 0.0095 | | | 0.0082 | | |
| | (0.0021) | | | (0.0305) | | |
| Bank_Abnormal_Return x Medium_LendRelationship | 0.0303 | 0.0208 | | 0.0427 | 0.0344 | |
| | (0.0299) | (0.0372) | | (0.0389) | (0.0389) | |
| Bank_Abnormal_Return x Strong_LendRelationship | 0.1110*** | 0.1015*** | | 0.1143*** | 0.1060*** | |
| | (0.0304) | (0.0376) | | (0.0449) | (0.0407) | |
| Bank_Abnormal_Return x Strong_or_ Medium _LendRelationship | | | 0.0588* | | | 0.0670* |
| | | | (0.0324) | | | (0.0344) |
| Country x LendRel x Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes |
| Observations | 4695 | 4695 | 4695 | 4638 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

**Table 5**
**Systemic Events Results: Effect of Bank Exposure**

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's main lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Bank exposure is computed in two steps. First, for each lead arranger *i* and firm *j*, we calculate the share that *j* represents for *i* by computing (firm *j* total issues (US$) with bank *i*/ total issues (US$) by bank *i* ) over the 2003-2006 period. For each firm, we then average this value across all main lead arrangers. High, Medium and Low Bank exposure correspond to firms in the top, medium and bottom terciles of bank exposure. Bank_Exposure FE includes indicators for each of those terciles. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, cash, size, leverage, the share of main lead arrangers over total lending, as well as interactions of those variables with bank abnormal returns and industry indicators based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | 0.1188** | 0.1188*** | | 0.1304** | 0.1317** |
| | | (0.0021) | (0.0021) | | (0.0617) | (0.0617) |
| Bank_Abnormal_Return x Low_Bank_Exposure | 0.1188*** | | | 0.1304** | | |
| | (0.0021) | | | (0.0617) | | |
| Bank_Abnormal_Return x Medium_Bank_Exposure | 0.0250 | -0.0939** | | 0.0425 | -0.0879* | |
| | (0.0229) | (0.0447) | | (0.0331) | (0.0499) | |
| Bank_Abnormal_Return x Top_Bank_Exposure | 0.0452 | -0.0736 | | 0.0633 | -0.0671 | |
| | (0.0340) | (0.0513) | | (0.0416) | (0.0577) | |
| Bank_Abnormal_Return x Top_or_ Middle _BankExposure | | | -0.0876** | | | -0.0822* |
| | | | (0.0428) | | | (0.0486) |
| Country x Bank_Exposure x Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes |
| Observations | 4695 | 4695 | 4695 | 4638 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

**Table 6**
**Systemic Events Results: Effect of Firm Size**

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's banks over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Small, Medium and Big Size correspond to the first, second and third terciles of firm size (book value of assets at 2006), respectively . Size_Group FE correspond to fixed-effects for each of these terciles. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, leverage, cash, the share of loans from main lead arranger(s) in the syndicated market, as well as interactions of those variables with bank abnormal returns and industry indicators based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | -0.0152 | -0.0152 | | -0.0042 | -0.0088 |
| | | (0.0205) | (0.0205) | | (0.0292) | (0.0272) |
| Bank_Abnormal_Return x Big_Size | -0.0152 | | | -0.0042 | | |
| | (0.0205) | | | (0.0292) | | |
| Bank_Abnormal_Return x Medium_Size | 0.0560** | 0.0712** | | 0.0660** | 0.0702** | |
| | (0.0431) | (0.0329) | | (0.0327) | (0.0341) | |
| Bank_Abnormal_Return x Small_Size | 0.0877*** | 0.1029*** | | 0.1010* | 0.1052** | |
| | (0.0328) | (0.0386) | | (0.0546) | (0.0439) | |
| Bank_Abnormal_Return x Small_or_Medium _Size | | | 0.0904*** | | | 0.0898*** |
| | | | (0.0304) | | | (0.0325) |
| Country x Size_Group x Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes |
| Observations | 4695 | 4695 | 4695 | 4638 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

**Table 7**
**Systemic Events results: Effect of Analyst Coverage**

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Bottom, Medium and Top correspond to the first, second and third terciles of the firm's number of analysts at 2006, respectively. NAnalysts FE correspond to indicators for each of these terciles. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, leverage, size, cash and the share of loans from main lead arranger(s) in the syndicated market, as well as interactions of those variables with bank abnormal returns and indicators for industries based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | -0.0219 | -0.0219 | | -0.0101 | -0.0166 |
| | | (0.0168) | (0.0168) | | (0.0248) | (0.0238) |
| Bank_Abnormal_Return x Top_NAnalysts | -0.0219 | | | -0.0101 | | |
| | (0.0168) | | | (0.0248) | | |
| Bank_Abnormal_Return x Medium_NAnalysts | 0.0443** | 0.0661** | | 0.0609** | 0.0711*** | |
| | (0.0196) | (0.0258) | | (0.0277) | (0.0255) | |
| Bank_Abnormal_Return x Bottom_NAnalysts | 0.1164*** | 0.1382*** | | 0.1621** | 0.1723*** | |
| | (0.0426) | (0.0458) | | (0.0688) | (0.0570) | |
| Bank_Abnormal_Return x Bottom_or_Medium _NAnalysts | | | 0.0987*** | | | 0.1065*** |
| | | | (0.0279) | | | (0.0297) |
| Country x NAnalysts x Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes |
| Observations | 4692 | 4692 | 4692 | 4638 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 |

## Table 8
## Systemic Events Results: Effect of Leverage

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's main lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Low, Medium and High correspond to the first, second and third terciles of leverage at 2006, respectively. Leverage_Group FE correspond to fixed-effects for each of these terciles. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, size, cash and the share of loans from main lead arranger(s) in the syndicated market, as well as interactions of those variables with bank abnormal returns and industry indicators based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | -0.0081 | -0.0081 | | 0.0093 | 0.0063 |
| | | (0.0322) | (0.0322) | | (0.0381) | (0.0381) |
| Bank_Abnormal_Return x Low_Leverage | -0.0081 | | | 0.0093 | | |
| | (0.0322) | | | (0.0381) | | |
| Bank_Abnormal_Return x Medium_Leverage | 0.1175*** | 0.1256** | | 0.1274*** | 0.1181** | |
| | (0.0431) | (0.0537) | | (0.0487) | (0.0534) | |
| Bank_Abnormal_Return x High_Leverage | 0.0605** | 0.0686* | | 0.0702** | 0.0661 | |
| | (0.0251) | (0.0408) | | (0.0316) | (0.0416) | |
| Bank_Abnormal_Return x High_or_ Medium _Leverage | | | 0.0815** | | | 0.0754** |
| | | | (0.0389) | | | (0.0391) |
| Country x Leverage_Group x Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes |
| Observations | 4689 | 4689 | 4689 | 4635 | 4635 | 4635 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

## Table 9
## Systemic Events Results: Effect of Debt Maturity

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's main lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Low, Medium and High leverage correspond to the first, second and third terciles of the leverage variable at 2007. Leverage_Group FE correspond to fixed-effects for each of these terciles. The sample includes the sample of all firms described in Table 1. The controls in the short-term leverage at 2007 specification include linear controls for total leverage, market-to-book, size, cash and the share of loans from main lead arranger(s) in the syndicated market, as well as interactions of those variables with bank abnormal returns and industry indicators based on 1-digit SIC codes, measured at 2006. The controls in the specification with total leverage at 2007 are the same except for the total leverage control at 2006, which is dropped. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | Short-Term Leverage 2007 | | | | | Total Leverage 2007 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Bank_Abnormal_Return | | 0.0337 | 0.0337 | | 0.0151 | 0.0166 | | 0.0016 | 0.0166 |
| | | (0.0237) | (0.0237) | | (0.0415) | (0.0413) | | (0.0337) | (0.0413) |
| Bank_Abnormal_Return x Low_Leverage | 0.0337 | | | 0.0151 | | | 0.0016 | | |
| | (0.0237) | | | (0.0415) | | | (0.0337) | | |
| Bank_Abnormal_Return x Medium_Leverage | 0.0379 | 0.0042 | | 0.0298 | 0.0147 | | 0.1178** | 0.1161** | |
| | (0.0465) | (0.0522) | | (0.0597) | (0.0539) | | (0.0521) | (0.0551) | |
| Bank_Abnormal_Return x High_Leverage | 0.1347** | 0.1009* | | 0.1271** | 0.1120* | | 0.0611* | 0.0594 | |
| | (0.0545) | (0.0594) | | (0.0601) | (0.0634) | | (0.0307) | (0.0386) | |
| Bank_Abnormal_Return x High_or_ Medium _Leverage | | | 0.0391 | | | 0.0501 | | | 0.0737** |
| | | | (0.0441) | | | (0.0462) | | | (0.0367) |
| Country x Leverage_Group x Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3897 | 3897 | 3897 | 3873 | 3873 | 3873 | 4173 | 4173 | 4173 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

**Table 10**

**Systemic Events Results: Effect of Credit Lines**

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. For each firm, we computed the average of (total issuance of credit lines 2003-2006/total issuance of loans 2003-2006) among the firm's main lead arrangers. Credit_Lines_Group FE correspond to fixed-effects for each of these groups in the estimation. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, size, leverage, cash, the share of loans from main lead arrangers in the syndicated market, as well as interactions of those variables with bank abnormal returns and indicators for industries based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | 0.0230 | | -0.0118 | | 0.0381 | | 0.0141 |
| | | (0.0221) | | (0.0386) | | (0.0209) | | (0.0360) |
| Bank_Abnormal_Return x Bottom_Credit_Lines | 0.0230 | | -0.0118 | | | | | |
| | (0.0221) | | (0.0386) | | | | | |
| Bank_Abnormal_Return x Top_or_Middle_Credit_Lines | 0.0970*** | 0.0741* | 0.0850** | 0.0968** | | | | |
| | (0.0345) | (0.0410) | (0.0385) | (0.0446) | | | | |
| Bank_Abnormal_Return x Below_Median_Credit_Lines | | | | | 0.0381 | | 0.0141 | |
| | | | | | (0.0209) | | (0.0360) | |
| Bank_Abnormal_Return x Above_Median_Credit_Lines | | | | | 0.1130** | 0.0749 | 0.1170** | 0.1029* |
| | | | | | (0.0480) | (0.0524) | (0.0360) | (0.0548) |
| Country x Credit_Lines_Group x Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | Yes | Yes | | | Yes | Yes |
| Observations | 4695 | 4695 | 4638 | 4638 | 4695 | 4695 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

## Table 11

## Systemic Events Results: Effect of Cash

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's main lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Low, Medium and High correspond to the first, second and third terciles fo cash at 2006, respectively. Cash_Group FE correspond to fixed-effects for each of these terciles. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, size, leverage and the share of loans from main lead arranger(s) in the syndicated market, as well as interactions of those variables with bank abnormal returns and industry indicators based on 1-digit SIC codes, measured at 2006. Standard errors are heteroscedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | 0.0230 | 0.0230 | | 0.0082 | 0.0082 |
| | | (0.0210) | (0.0210) | | (0.0271) | (0.0271) |
| Bank_Abnormal_Return x High_Cash | 0.0230 | | | 0.0082 | | |
| | (0.0210) | | | (0.0271) | | |
| Bank_Abnormal_Return x Medium_Cash | 0.0845*** | 0.0615* | | 0.0690** | 0.0608* | |
| | (0.0431) | (0.0358) | | (0.0338) | (0.0357) | |
| Bank_Abnormal_Return x Low_Cash | 0.0759* | 0.0528 | | 0.0653 | 0.0571 | |
| | (0.0251) | (0.0480) | | (0.0463) | (0.0486) | |
| Bank_Abnormal_Return x Low_or_ Medium _Cash | | | 0.0575* | | | 0.0591* |
| | | | (0.0328) | | | (0.0324) |
| Country x Cash_Group x Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | | Yes | Yes | Yes |
| Observations | 4692 | 4692 | 4692 | 4638 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

**Table 12**

**Systemic Events Results: Effect of Public Debt Access**

This table presents regressions results relating the firm's stock return around event dates to the stock return of the firm's main lead arranger(s) in the syndicated market. The dependent variable is the market-model adjusted return in the window. The independent variable of interest is the average market-model adjusted return of the firm's lead arranger(s) over the same period. The sample of Bear Stearns & Lehman Events includes three windows: 03/13/2008 to 03/20/2008, 09/11/2008 to 09/18/2008 and 09/18/2008 to 09/25/2008. Any_Bond_Issue equals one if firms have a public bond issuance during 2003-2006 recorded in SDC platinum. No_Bond_Issue equals one if firms have no public bond issuance during 2003-2006. Top_Bond_Issue equals one if firms are in the top tercile of public bond issuance/(public bond issuance + syndicated loans issuance) during 2003-2006. Bond_Group FE correspond to fixed-effects for each of these groups in the estimation. The sample includes the sample of all firms described in Table 1. Controls include linear controls for market-to-book, size, leverage, cash, the share of loans from main lead arranger(s) in the syndicated market, as well as interactions of those variables with bank abnormal returns and indicators for industries based on 1-digit SIC codes, measured at 2006. Standard errors are heteroskedasticity robust and clustered at the firm level.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Bank_Abnormal_Return | | 0.0652*** | | 0.0661** | | 0.0579** | | 0.0565* |
| | | (0.0225) | | (0.0329) | | (0.0240) | | (0.0339) |
| Bank_Abnormal_Return x Any_Bond_Issue | 0.0652*** | | 0.0661** | | | | | |
| | (0.0225) | | (0.0329) | | | | | |
| Bank_Abnormal_Return x No_Bond_Issue | 0.0547** | -0.0105 | 0.0589 | -0.0072 | | | | |
| | (0.0250) | (0.0282) | (0.0375) | (0.0273) | | | | |
| Bank_Abnormal_Return x Top_Bond_Issue | | | | | 0.0579** | | 0.0565* | |
| | | | | | (0.0240) | | (0.0339) | |
| Bank_Abnormal_Return x No_or_Bottom_Bond_Issue | | | | | 0.0653*** | 0.0074 | 0.0702** | 0.0136 |
| | | | | | (0.0234) | (0.0280) | (0.0360) | (0.0276) |
| Country x Bond_Group x Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | | | Yes | Yes | | | Yes | Yes |
| Observations | 4695 | 4695 | 4638 | 4638 | 4695 | 4695 | 4638 | 4638 |
| R-squared | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |

## Table 13
## Estimating the Magnitude of the Lending Relationship Channel using the 2007-2008 Financial Crisis

This table uses realized changes in the equity value of firm's main lead arranger(s) from July/30/2007 to October/10/2008 to compute the predicted changes in firm equity value implied by the estimates in this paper. For each group, the predicted change in firm equity value is obtained as the product of the previous point estimate for the group and the average change in the equity value of lead arranger(s) in the group. All Firms includes all firms described in Table 1. Strong_LendRel restricts the sample to firms with only one lead arranger in the syndicated loan market during 2003-2006. Weak_LendRel restricts the sample to firms with multiple main lead arrangers in the syndicated loan market during 2003-2006. High_ST_Leverage_2007 restricts the sample to firms in the top tercile of short-term leverage at 2007. Low_ST_Leverage_2007 restricts the sample to firms in the bottom tercile of short-term leverage at 2007. Top_Size restricts the sample to firms in the top tercile of size (book value of assets) at 2006. Bottom_Size restricts the sample to firms in the bottom tercile of size (book value of assets) at 2006. Group 1 vs. Group 2 presents the predicted change for Group 1 minus the predicted change for Group 2.

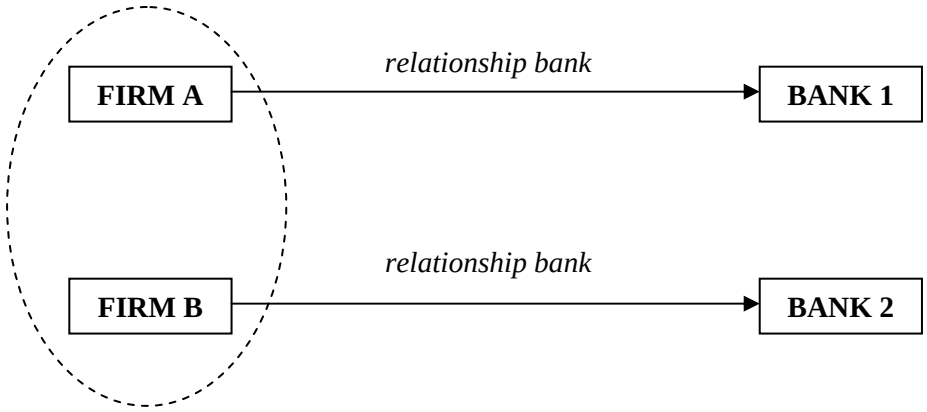
**Panel A: Aggregate Changes in Firm Value**

| | Predicted Change in Firm Equity Value |
|---|---|
| All Firms | -2.21% |
| Strong_LendRelationship | -4.23% |
| High_ST_Leverage_2007 | -4.98% |
| Bottom_Size | -4.08% |

**Panel B: Cross-Sectional Differences in Firm Value Change**

| | Predicted Change in Firm Equity Value |
|---|---|
| Strong_LendRelationship vs. Weak_LendRelationship | -3.87% |
| High_ST_Leverage_2007 vs. Low_ST_Leverage_2007 | -4.40% |
| Bottom_Size vs. Top_Size | -4.25% |

## Figure 1: Empirical Methodology




Main test:

$$\Delta V_{FIRM\ A,t} - \Delta V_{FIRM\ B,t} = f\left(\Delta V_{BANK\ 1,t} - \Delta V_{BANK\ 2,t}\right)$$

where: $t \in \{systemic\ shocks,\ \ bank-specific\ shocks\}$

**Figure 2: Identifying Systemic Shocks to the Financial Health of Banks**

This figure provides the weeks selected as "systemic events" on the financial health of banks. The graph depicts the levels of Credit Default Swap (CDS) spreads for selected banks. The CDS spread captures the level of credit risk and the graph below illustrates the significant negative effect of the failure of Bear Stearns and Lehman Brothers, as well as the positive effect of the US Bailout announcement on the credit risk of top 5 banks in the world according to The Banker magazine rankings. The spread is for a CDS contract on senior secured debt with a maturity of 5 years for these banks and the data source is Datastream (which itself sources its data from CMA).

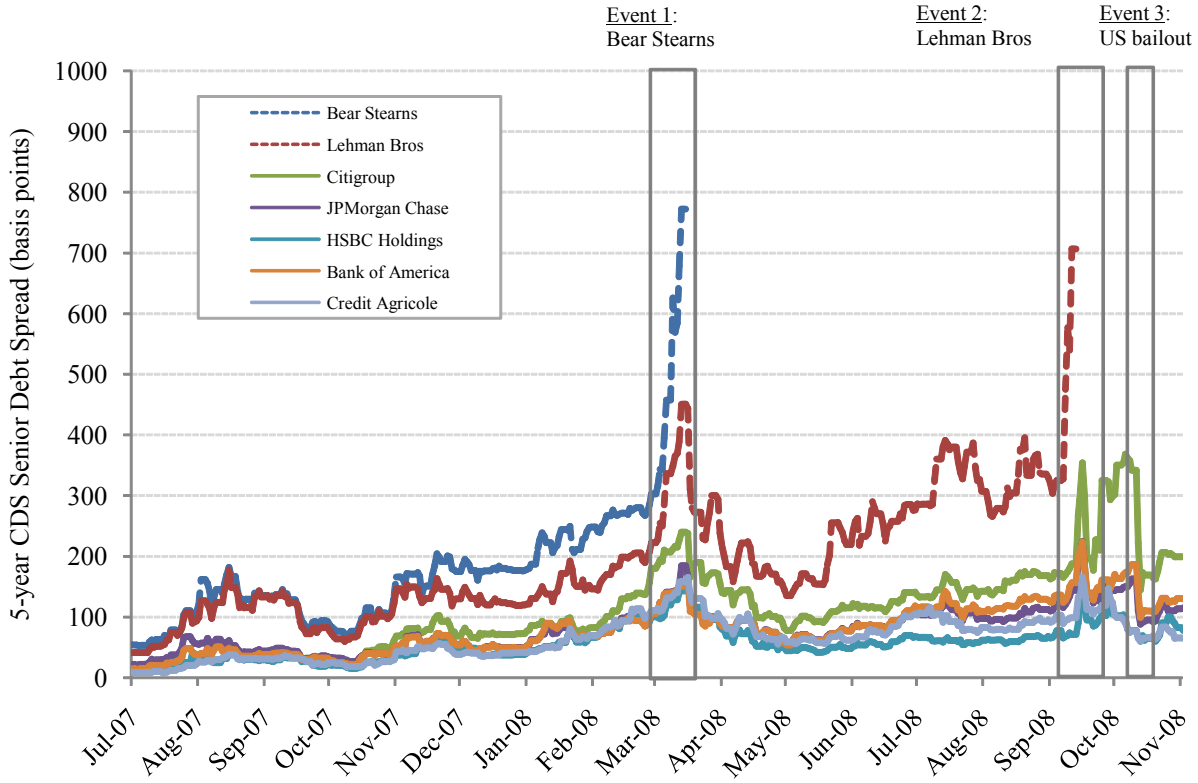


**Figure 3: Identifying Bank-Specific Shocks to the Financial Health of Banks**

This figure provides the weeks selected as "bank-specific events" based on announcements of writedowns during the crisis period. The data source is the WDCI function in Bloomberg, which was introduced for investors to track financial firms' asset impairments and credit losses during the crisis. The graph plots the total number of write-down announcements per calendar week.

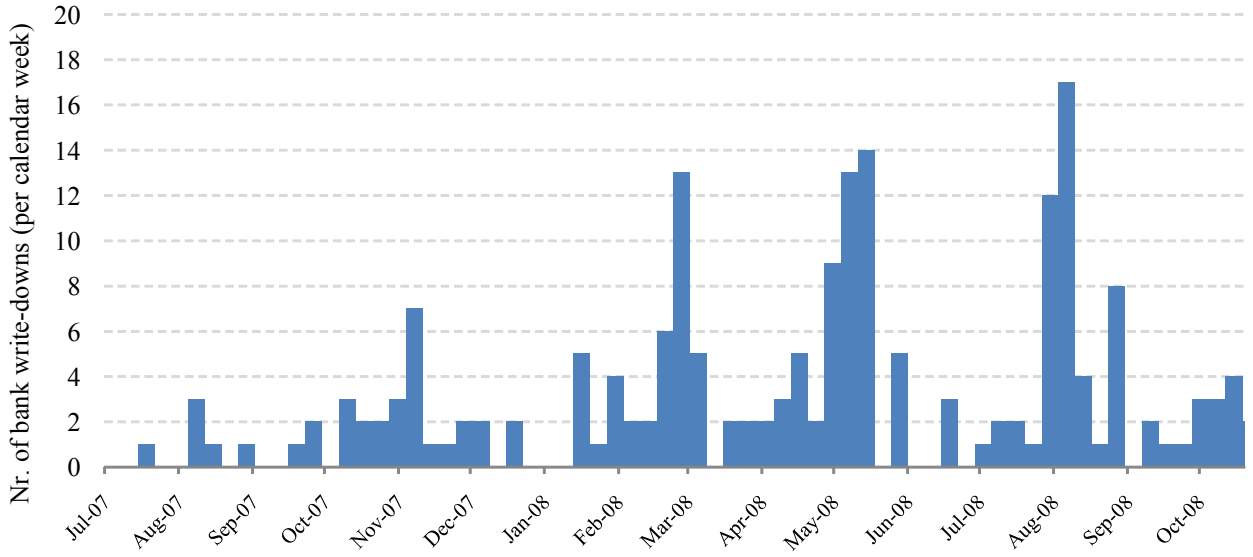


**Figure 4: Market Reactions to Announcements of Bank-Specific Shocks**

This figure shows the bank abnormal returns around bank-specific shocks (write-downs). We compute these as the market-model adjusted abnormal returns of the bank that announced a write-down in Bloomberg as measured between the day before and the day after the event. The figure provides the cumulative distribution function of all the 159 bank abnormal returns for our sample.