The Effect of Banking Crisis on Bank-Dependent Borrowers

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Abstract

How does the banking sector's financial health affect bank-dependent borrowers' performance? We use the exogenous shock to U.S. banking system during the Russian crisis of Fall 1998 as a natural experiment to separate the effect of *borrower's demand of credit* from the *bank's ability to supply credit* and estimate the effect of U.S. bank's financial health on the U.S. borrower's stock-market performance. In an event window of 16 days starting with the Russian sovereign-debt default and ending with the flight of capital from Brazil, a period characterized with significant adverse shocks to the U.S. banking sector and without any perceptible effect on the public-debt market, bank-dependent firms earned significantly lower returns than firms with access to public-debt market. These losses were more pronounced in bank-dependent firms with higher growth opportunities and lower financial flexibility. About a month later when liquidity conditions deteriorated in the public-debt market as well, return differential between the bank-dependent and other firms became insignificant. Finally, we show that the bank-dependent firms earned significantly higher returns around the FOMC meetings in which Fed provided additional liquidity to the banking-system. Overall, we provide strong causal evidence that negative shocks to banking sector adversely affect the bank-dependent borrowers.

Keywords: Banking Crisis, Russian Default, Bank Loans.

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1 Introduction

Does the banking sector's financial health affect bank-dependent borrowers' performance? Using the Russian crisis of Fall 1998 as an exogenous negative shock to the US banking sector, we analyze the effect of bank-health on borrower's stock-market performance and provide evidence that bank's financial-health has significant valuation implications for bank-dependent borrowers.[1] While a large theoretical literature (see Bernanke and Blinder (1988), Holmstrom and Tirole (1997) and Stein (1998) for example) provide convincing arguments in support of a causal relation between bank-health and firm-performance, empirical studies face a major challenge in establishing this link due to the difficulty in separating the effect of *demand of credit by borrowers* from the *supply of credit by the banks*. We attempt to fill this gap in the literature. To the best of our knowledge this is the first paper that directly investigates the U.S. borrower's stock market performance when the U.S. banks face adverse shocks in international markets.

In a frictionless market, if banks are unable to supply enough credit to their borrowers, these borrowers can easily raise capital from other sources to meet the shortfall in their demand of credit and bank's supply of loans. However, frictions such as information asymmetry and agency costs may limit their ability to substitute bank loans with other sources of funds. A large literature in financial intermediation assumes the presence of these frictions as the key rationale behind the existence of banks (e.g., see the survey article by Gorton and Winton (2002) and James and Smith (2000)); when borrowers face high information asymmetry, banks invest resources in developing relationships with their borrowers enabling them to intermediate more efficiently.[2] In such an economy lack of funds from banks results in suboptimal investment and working-capital management decisions (such as foregoing positive NPV projects) by bank-dependent firms, leading to negative

[1] See Gatev, Schuermann and Strahan (2004) for further discussions on Russian Crisis of Fall 1998.

[2] See Petersen and Rajan (1994), Berger and Udell (1995) and Jiangli, Unal and Yom (2005) for evidence that firms with close banking relationships enjoy preferential access to credit.

valuation consequences for these borrowers.[3] Therefore, in a rational market bank-dependent firm's stock price should decline consequent to any unanticipated shock to the financial health of the banking sector. Further as argued by Rajan (1992), bank-dependent firms may face a *hold-up* problem due to the information monopoly of their bankers.[4] This in turn can aggravate the adverse impact of bank-health on firm-performance.

Slovin, Sushka, and Polonchek (1993) document negative effects of Continental Illinois Bank's failure on the stock performance of the bank's borrowers. Kang and Stulz (2000) show that the bank-dependent borrowers experienced large negative returns following the crisis in the Japanese banking sector in 1990-1993.[5] On the other hand, Ongena, Smith and Michalsen (2003) find that the near-collapse of Norwegian banking system during 1988-1991 period had only small effects on the firms maintaining a relationship with the bank.

Empirical studies seeking to establish the causation of bank-health on firm-performance face three major challenges. First, the positive correlation between bank-health and borrower-performance can simply be an outcome of the borrower's health affecting bank performance and not the reverse (see, Fama (1980) and King and Plosser (1984)).[6] Second,

[3]It is important to note that the information and/or agency friction should affect both banks and borrowers to produce this outcome. If these frictions only affect firms, then banks can raise enough money from the external market to fund their borrower's positive NPV project. However, due to the frictions faced at the level of banks, a deterioration in bank-health can affect bank's supply of loans through at least three related channels: (i) there can be a direct reduction in loanable internal funds available with them; (ii) poor bank health may limit their ability to raise external capital, which in turn can be lent to the borrowers; and (iii) due to their lower risk-appetite (e.g., due to capital adequacy constraints), banks may be inclined to change their asset-mix in favor of safer securities rather than making risky commercial and industrial (C&I) loans.

[4]Santos and Winton (2005) provide supporting evidence by showing that bank dependent borrowers pay a higher spread on their bank loans during recessions than firms with access to public debt market.

[5]In a related stream of literature, researchers have investigated the role of bank-lending channels in the transmission of monetary policy shocks to the real economy. Empirical evidence presented by Bernanke and Blinder (1992), Kashyap, Stein, and Wilcox (1993), Gertler and Gilchrist (1994) and Kashyap and Stein (2000) among others broadly support the view that bank-dependent firms suffer adverse consequences when the banking sector's ability to supply loans decreases. See also Bernanke (1983). See Klingebiel, Kroszner and Leaven (2006) for relation between banking crisis and industry growth.

[6]For example, prior to the failure of Continental Illinois Bank, some of its key borrowers such as International Harvesters and Nucorp Energy had experienced financial distress. Dahiya, Saunders, and Srinivasan (2002) show that there is a significant negative wealth effect for the shareholders of the lead bank when the borrowers of the bank experience distress. Their evidence is consistent with the notion that borrowers' health cause deterioration in the bank health.

there maybe some common economic shocks that affect the performance of both banking sector and real economy resulting in an omitted variable problem. Finally, the negative shocks to the banking sector such as the banking crisis in Japan or Norway are typically spread over several months and years. There is a greater chance of deterioration or improvement in the investment opportunity set of a borrower (and therefore the amount of credit they demand) over a longer time period, which in turn makes the task of separating the effect of firm-specific factors from bank-specific shocks more difficult.

In this paper we investigate the effect of bank-health on the stock-market performance of bank-dependent firms using the Russian crisis of Fall 1998 as a natural laboratory. The crisis started with the announcement of the Russian government's intention to default on their sovereign obligations on August 17, 1998. Subsequently, related events such as the announcement of the suspension of ruble trading on August 28, 1998, and massive flight of capital from Brazil on September 3, 1998, resulted in a severe financial crisis in the United States during mid-August and early September of 1998. Many U.S. banks had substantial exposure to these two countries exposing them to significant losses and liquidity constraints during this short period. Kho, Lee, and Stulz (2000) show that U.S. bank stocks experienced large negative returns during this period. Further, Gatev, Schuermann, and Strahan (2004) show that the overall risk of banks measured by their daily return volatility increased dramatically at the same time.

Consistent with stock market-based measures, our analysis of the bank's quarterly accounting statements show that during the crisis quarter banks made remarkably higher loss provisions, cut their cash holdings, and experienced a decrease in their liquid assets (see also FDIC's quarterly banking report for the third quarter of 1998). We also directly analyze the issuance of new bank-loans around the crisis-period using dealscan database.[7]

[7]We obtain the data on issuance of new loans from the Loan Pricing Corporation's Dealscan database. As compared to call reports, this database has two distinct advantages for our purpose. First, it allows us to capture the incremental decisions of bank by focussing on sanctions of new loans. Second, it provides the identity of the borrowers allowing us to conduct various firm-level analysis.

As compared to the six-month period before the crisis, in the six-month period after the crisis both the number and dollar volume of new bank-loans dropped by about 24-27% for all borrowers covered in the database. Thus, both market and accounting based measures as well as loan issuance data indicate that the banking sector's financial health was under tremendous pressure in late August and early September resulting in decreased supply of loans to the borrowers. In contrast, public debt markets seem to be functioning at relatively normal levels as is evident by the modest levels of paper-bill spread - a broadly used measure of overall liquidity situation in the economy (see Fig 1). Thus, this period presents a unique setting where banks suffered huge losses resulting in a decrease in the supply of bank-loans and at the same time public debt market was functioning at reasonable levels.

More important, the crisis started with a decision of the Russian government to default on their sovereign obligations. This adverse shock to the U.S. banking sector was independent of the financial health of bank-dependent borrowers in the U.S., providing us with a natural laboratory to separate the effect of *loan-supply* from *loan-demand*. To remove any demand-side impact, we exclude from our sample all firms that report business operations in either Europe or South America during the crisis year.[8] Consistent with prior literature (such as Kashyap, Lamont, and Stein (1994) and Faulkender and Petersen (2005)), we use the absence of rated public debt as a proxy for the firm's bank-dependence and investigate whether the bank-dependent firms experience relatively large negative returns during the 16-day event-window starting a day before the onset of the Russian crisis and ending a day after the flight of capital from Brazil.

We find that the median (mean) bank-dependent firm earns 5.57% (4.82%) lower market-model adjusted returns than firms with access to public market in the event window. After controlling for key firm characteristics such as size, leverage, and market-to-book ratio, this difference remains economically large and statistically significant at 2.16% (i.e., annualized value loss of over 30% for the bank-dependent firms). We use the absence of CP rating

[8]Further, to control for any industry-specific unobservable shift in the investment opportunity set in response to the crisis, we employ industry fixed-effects in all our regressions.

as an additional measure of bank-dependence and find similar results with larger differences across the two groups. To separate the effect of *poor credit-quality* from *poor access to capital*, we also estimate our model with only those firms that rank in top 50% or 25% of credit-worthiness based on Altman-Z score. In these sub-samples of relatively *safer* firms, bank dependent firms earn about 4-7% lower return than firms with access to public debt market. Thus our results are unlikely to be explained by poor credit-quality (i.e., *flight-to-quality* effects) of bank-dependent borrowers.

Next, we extend our analysis in two directions by analyzing the impact of (a) *requirement of funds* and (b) *potential availability of other sources of funds* on stock market's reaction to bank-dependent borrowers. If bank-health affects borrower's performance then the impact of bank-health should be more severe for bank-dependent firms that need funds in the near future. Consistent with this hypothesis, we find that negative returns are mainly concentrated in bank-dependent firms with higher market-to-book ratio and higher R&D expenses - our proxies for the cost of sub-optimal investment decisions due to the lack of funds. On the other hand, if bank-dependent firms have financial flexibility that reduces their reliance on banks, we expect to observe less severe effect in the stock markets. We use a proxy of financial flexibility that is related to the borrower's *unpledged collateral* i.e., collateral available for future borrowing. When information asymmetry between the lenders and the borrowers lead to credit-rationing, borrowers with higher collateral can obtain funds more easily providing them with higher financial flexibility (e.g., see Bester's (1985) extension of Stiglitz and Weiss (1981)). We find significant evidence that bank-dependent firms with higher unpledged assets perform better than their counterparts.

To lend further support to our main argument that access to capital, not a omitted risk factor, is the primary driver of the return differences between bank dependent firms and firms with access to public debt markets, we analyze the stock returns of these two groups of firms during Oct 5, 1998, to Oct 19, 1998 - a period during which public debt markets

experienced a crisis as well.[9] As seen in figure 1, CP-bill spread increased significantly during this fortnight of October, 1998. Thus unlike our event period of late August and early September, during this period availability of external credit was constrained for all firms - bank-dependent or not. Firms with access to CP market also had to *rely* on banks by drawing on their bank backup lines of credit. Second, Gatev et al. (2004) show that banks experienced larger inflow of transaction deposits during this period. Given this large inflow of funds to banking sector and tightness in the public debt market, we hypothesize that the return differential across bank-dependent and other firms should narrow, if not completely disappear, during this fortnight of October 1998. Our findings support this hypothesis - bank-dependent firms do not earn statistically lower returns than firms with access to public debt-market during this period.

Finally, we analyze the returns of these two groups of firms around FOMC meetings in Fall, 1998. There were two important meetings in September and October of that year in which Fed provided liquidity support to the banking-sector. If lacks of funds from bank were a driving force behind the initial negative returns of bank-dependent firms, we expect to find a positive response from the market around these meetings. On September 29, 1998 the Federal Reserve Bank cut the Fed Funds rate by 25 basis points, which was largely expected by the market. Subsequently on October 15, in a largely unanticipated move Fed Funds rate was decreased by 25 basis points. The discount lending rate was also cut by the same magnitude in the October meeting. We find that bank-dependent firms earn significantly higher returns than firms with access to the public debt-market around these meetings, especially around the October 15 meeting. This finding lends further support to our argument, in a reverse setting, that the market value of bank-dependent firms significantly depends on the financial health of banking-sector and its ability to supply loans to borrowers.

We perform a variety of tests to check the econometric robustness of our results. It is likely that a firm's decision to remain bank-dependent is an outcome of an optimization

[9]Gatev et al. (2004) focus on this period in their study of the bank's ability to hedge against economy-wide liquidity shock as proposed by Kashyap, Rajan, and Stein (2002).

problem unobservable to the empiricist. To account for these self-selection biases, we model bank-dependence in a treatment effect framework (see Maddala (1983)) and find that our results become much stronger as compared to the OLS regression results. In this model, bank-dependent firms earn lower returns of almost 9% as compared to firms with public debt access. Next, we show that our results are robust to various assumptions regarding the correlation structure of error terms in regression models (such as industry-clustered errors and bootstrapped estimation). Our results are also robust to alternative event windows, methods of computing return (such as Scholes-Williams market-model based abnormal returns), proxies for bank-dependence (lack of rated debt or CP rating) and industry controls (2 or 3 digit SIC codes or Fama-French industry classification).

Our paper is related to Peek and Rosengren (2000), Ashcraft (2003), Khwaja and Mian (2005) and Paravisini (2005) that employ clever ways to separate loan demand from loan supply. Ashcraft (2003) and Peek and Rosengren (2000) study the *real effects* of deterioration in bank-health. Ashcraft uses the FDIC-induced failures of healthy banks as a natural experiment to study the impact of bank failure on local-area real economic activity. Peek and Rosengren use the Japanese banking crisis as a natural experiment to identify an exogenous loan supply shock to the Japanese banks' lending in U.S. and link that shock to construction activity in the U.S. commercial real estate markets.

Khwaja and Mian (2005) and Paravisini (2005) study the lending markets in Pakistan and Argentina respectively. While Khwaja and Mian use the Nuclear tests conducted by India and Pakistan as their exogenous event, Paravisini employs a government-induced infusion of liquidity in Argentina. The exogenous variation that we employ in our paper differs from these studies in a fundamental manner. Unlike these papers, the origin of exogenous shock in our study is in a different geographical location than the location of banks and borrowers themselves, making our tests less likely to suffer from any omitted variable bias. Second and more important, both these papers focus on the *amount of debt* obtained by the bank-dependent borrowers consequent to the liquidity-shocks induced by these events. We

complement these papers, but unlike them our focus is on the market's response to exogenous shocks to the banking sector. Thus, we are able to trace the *valuation implications* of bank-dependence at the time of crisis.

In summary, Fall of 1998 presents us with an excellent setting where in a short time-period, the U.S. economy experienced three distinct shocks. First, banks were under stress whereas the public debt-market was working reasonably well (late August and early September). Second, in October liquidity dried up in the public debt-market as well. And finally, there were small bursts of positive liquidity shocks provided by the Fed to the banking sector on September 29 and October 15. Theoretical arguments provide different predictions for each of these three shocks and our results provide remarkably strong evidence consistent with the theoretical models for each one of them.

Our results have two important implications. First, we highlight the role of banking sector in the economy and partially trace the channel through which the effect of financial crisis is transmitted to the real economy. Our second implication, that the integration of financial markets has exposed bank-dependent firms to the vagaries of global financial conditions *more* than their counterparts with access to debt markets, is more suggestive in nature. More research is needed to establish potential distributional consequences of bank-dependence in the event of international crises. The rest of the paper is organized as follows. In section 2, we describe the banking crisis of Fall 1998 in more detail. Section 3 describes the data. Section 4 presents the empirical results and Section 5 concludes the paper.

2 The Banking Crisis of Fall 1998

In the Fall of 1998, several important events took place in the international financial markets. On August 17, 1998, the Russian currency was devalued and the government announced its intention to default on sovereign debt obligations. On August 28, ruble convertibility was suspended. In related events, on September 3, 1998, there was a significant outflow

of capital from Brazil, and the country experienced one of the worst financial crises in its history. At the same time, on September 2, 1998, the news about the LTCM's losses was made public. All these events caused significant losses to the U.S. banks during late August and early September of 1998 as evidenced by a sharp decline in bank stock prices over this period. There were many reasons for bank's losses including (a) direct exposure to Russian government bonds; (b) exposure to Russian private borrowers; (b) losses in derivatives market (especially in Ruble market); (c) losses on account of brokerage credit to LTCM; and (e) increased counter-party risks in the U.S. banking system. Gatev et al. (2004) show that an equally weighted bank price index fell by about 11% during this two-week period. They also show a dramatic increase in the stock return volatility, a measure of bank's overall risk, over this time period. Such a large loss in market capitalization along with dramatic increase in their risks directly compromises banks' ability to raise funds from external markets, which in turn limits their ability to supply funds to their borrowers.

Since market-based measures are forward-looking, we focus on decrease in market capitalization and increase in return volatility as the key indicators of a bank's financial health. Additionally, we also check financial statements of banks at quarterly intervals during the crisis period.[10] Accounting-based measures of bank-health are in line with the market's response to stock prices and stock return volatility. As compared to the previous quarter, during the quarter ended September 30, 1998, the median bank increased its loss provision from 0.072% of assets to 0.111% of assets - an increase of over 50% during the quarter. Unlike other accounting numbers, loss provisions reflect the bank manager's view of the credit quality of its loan portfolio and therefore it is partly a forward-looking measure. Such a large increase in loss provisions demonstrates that banks were indeed in financial

[10]Unfortunately, we could only analyze quarterly financial reports instead of weekly financial reports because banks are required to file Call reports at quarterly intervals only. We obtain data on key accounting variables for all banks with at least $100 million as of September 30, 1998, and report statistics based on these banks in this section. Our sample firms are more likely to borrow from these banks than very small banks with assets less than $100 million. All numbers reported in this section are scaled by the total assets as of the end of the respective quarter. The first half of the quarter was before crisis, the second half after it - making the accounting numbers a noisy proxy for bank-health.

crisis during this period. In addition, the median bank decreased its cash-holdings by a significant 9.65% (from 4.09% to 3.73%). We obtain similar results for mean statistics. Thus both market and accounting-based measures suggest that banks were under financial crisis during this period.

To directly analyze the effect of this crisis on supply of bank-loans, we obtain data on loan issuance from the Loan Pricing Corporation's Dealscan database. This database provides a comprehensive coverage of bank-loans and provides detailed information on the identity of banks and borrowers. It's worth noting that unlike call report data that provides quarterly information on loans disbursed to the borrowers which maybe related to prior commitments, Dealscan database allows us to capture the incremental decisions of bank-managers by focussing on sanctions of new loans around this period. We collect all loans on a monthly basis from this database and classify firms as bank-dependent or not based on their access to public debt-market. We focus on six-months period before (i.e. from February, 1998 to July, 1998) and after (i.e. from August, 1998 to January, 1999) the crisis for our analysis.[11] Next, we compute the period-by-period growth in supply of loans by simply estimating the growth in number and amount of loans for a given period as compared to the previous six-month period.

Figure 2 plots the growth in number and amount of loans during this period. There is a remarkable drop in both the number and amount of loans issued after the crisis as compared to pre-crisis period. Banks issued 24% fewer loans in post-crisis period as compared to pre-crisis. Similarly, the amount of loans dropped by about 28% after the crisis as compared to the previous six months. To account for any seasonality in lending markets, we also compute the growth in loans with respect to corresponding period in the previous year (unreported). We find that the average number and amount of loans decreased by 21% and 24% respectively in the post-crisis period as compared to the previous year. As shown in Figure 2, the decline in new loan issuance is more pronounced in the sub-sample of bank-dependent firms. Thus,

[11] Results are similar for other reasonable windows, such as 3-months or 9-months, around the crisis-period.

our evidence shows that the supply of new bank-loans indeed declined following the Russian crisis of Fall, 1998.

When we analyze the CP rates, a proxy for liquidity shock for the overall economy, we do not find any abnormal pattern during the event window (see Figure 1). Similarly, unreported analyses shows that the yields on corporate debt and outstanding volume of Commercial Papers for non-financial firms in this period remained broadly in line with the earlier periods. Thus, this period presents a unique setting where banks suffered huge losses and at the same time public debt market was not under any considerable liquidity shock. Therefore, we argue that if at all supply of credit has any real implications for the firms, it should be evident in bank-dependent firms during this period. In the remainder of the paper, we explore this hypothesis by analyzing the market returns on bank-dependent firms vis-a-vis firms with access to public debt market during the event window starting a trading day before the onset of Russian crisis till a trading day after the flight of capital from Brazil (i.e., in the event window of August 14, 1998, to September 4, 1998). Later, we take the economy-wide liquidity crisis during October 1998 as a control period to investigate returns across these two groups of firms when the entire economy (bank-dependent or not) faced the potential of non-availability of funds from the external market.

3 Data and Sample

We obtain accounting and returns data from COMPUSTAT (active and research) and CRSP tapes, respectively. We start with a sample of all firms in the intersection of these two databases. We require sample firms to have data on returns for the crisis-period on CRSP tapes, and data on sales and total assets for the prior fiscal year on COMPUSTAT tapes. We remove financial firms (SIC codes between 6000 and 6999) and utilities (SIC codes between 4910 and 4940). To remove the effect of bid-ask bounce from our analysis, we also remove firms with less than $1 stock-price as of the end of prior fiscal year. To prevent outliers from

affecting our results, we winsorize our data at 1% and 99%.[12]

Next, we remove firms with exposure to crisis-affected regions. From the COMPUSTAT Geographical Segments file, we obtain data on all geographic segments of firms for the fiscal year prior to September 1998. If a firm reports operations in Russia or Brazil, we remove them from our sample. Instead of reporting country-level segments, many firms club their operations in various countries into a bigger geographical area such as Europe or South America for the reporting purposes. Thus a firm reporting operations in Europe or Eurasia may have operations in Russia. To make sure that our results are not driven by demand side considerations, we adopt a conservative screening criteria and remove all firms that report any business activity in Russia, Brazil, Europe, Eurasia, Eastern Europe or South America.

The main variable of interest in our study is a measure of bank-dependence. As in earlier papers such as Kasyap, Lamont, and Stein (1994) and Faulkender and Petersen (2005), we use the absence of public debt as a proxy for this. This raises an important data-selection question. A firm without debt will always be classified as a bank-dependent firm since such firms do not have public debt ratings. These firms maybe either completely rationed by the debt-market due to informational frictions (Stiglitz and Weiss (1981)) or they may have chosen not to rely on debt-financing even though they could have accessed the public-debt market (Microsoft for example). Thus, for these firms it is not clear if the lack of public debt rating can be taken as a meaningful proxy for bank-dependence. To avoid any potential misclassification errors, from our sample we remove firms with zero debt in the prior fiscal year. This leaves us with a sample of 3,368 firms for our base case analysis.

All accounting and market variables used in the study are obtained as of May 1998. The accounting data is lagged so that the information is available to the market during the event period. Table 1 provides descriptive statistics for the sample. Consistent with prior studies, in our sample about 18.67% of firms have access to public debt rating. About 4.78% have access to the CP-market.

[12]Results are qualitatively similar without winsorizing the data.

4 Empirical Methodology and Results

4.1 Univariate Results

We use standard event-study methodology for our analysis (see Kothari and Warner (2005)). For every sample firm, first we estimate the market-model beta using 250 trading days, ending 50 trading days prior to the event window. Based on these beta estimates,[13] we compute the market-model adjusted returns for the event window for all firms. Table 1 (Panel A) presents the univariate comparison of event-window returns across bank-dependent firms and firms with access to public debt market. During the 16-day event window starting a trading day before the Russian debt default and ending a day after the Brazilian crisis, the median (mean) bank-dependent firms earned 5.57% (4.82%) lower market-model adjusted returns than firms with access to public debt market. The difference in both mean and median returns are statistically significant at the 1% level.

We use the absence of CP rating as an alternate proxy for bank-dependence. There are two reasons for investigating returns across firms with and without CP rating. First, these firms have access to the public-debt market and thus CP rating serves as an independent proxy for our key variable of interest. Second, almost all CP-rated firms obtain back-up lines of credit from banks (see Gatev and Strahan (2004) and Chava and Jarrow (2003)) allowing them to draw funds from banks if they fail to obtain money from the CP market. During banking-crisis, if some of the CP-rated firms approach banks for funds, then the pool of funds available for non-CP rated bank-dependent firms could become even smaller unless there are deposit inflows into the banks during this period. As shown in Panel B of Table 1, firms without a CP rating earned about 9% lower return than firms with access to CP market. It may be noted that every firm with CP rating in our sample had public debt rating outstanding as well, making CP-rated firms a subset of firms with public debt rating.

[13] We also use another measure of beta computed using Scholes-Williams methodology and obtain qualitatively similar results.

4.2 Multivariate Regressions

In Table 1 we provide mean and median characteristics of firms with and without public debt rating. Firms with access to public-debt market have different characteristics than those that rely solely on banks for their funding needs. Bank-dependent firms are smaller and have lower leverage as compared to firms with access to public debt market. Some of these characteristics can, by themselves, explain the market's differential response to firms with and without access to public debt market during the crisis. Thus, in our multivariate regressions we control for various firm characteristics to analyze the effect of bank-dependence, which is independent of these characteristics.

First we control for the firm size - smaller firms are more likely to face information asymmetry, making the wedge between the cost of internal and external funds higher for them. We proxy firm-size by log market capitalization as of May 1998. Second, we control for leverage. Since higher leverage makes a firm's earnings more sensitive to changes in economic conditions, earnings of high-leverage firms are more likely to be adversely affected by crisis than the other firms. Further, high-leverage firms may have higher default risk exposing them to larger *flight-to-quality* shocks. To control for these leverage effects, we include firm's total debt to asset ratio in our regressions. We also use a more direct measure of firm's default risk by including Altman-Z score in the regressions. Finally, we use two measures of firm's growth opportunities in our model. High-growth firms can have negative valuation effect due to two reasons. First, growth opportunity may itself disappear due to a decline in the investment opportunity set of the firms. The second reason is related to the supply side considerations. Even if the growth opportunities are not lost, firms may find it hard to obtain funds to undertake those projects. In such a scenario, market's assessment of firm value will be lower for high-growth firms due to non-availability of funds. We tease out these effects more carefully in the subsequent sections. In our base model, we control for firm's market-to-book ratio and R&D to total asset ratio to account for the overall effect of growth opportunities on market's response to the crisis.

We exclude firms with business activities in crisis-affected areas (Russia, Europe, Brazil, or South America) from our sample. Firms with operations in these geographical areas are likely to experience negative shocks in their investment opportunity set and therefore their loan-demand may be adversely affected consequent to economic downturn of these countries. By removing them from our sample, we hope to prevent demand side considerations from affecting our analysis. Firms may not be having operations in the crisis region but they may still be operating in an import-intensive industry or an industry with substantial competition from exporters. Hence, these firms can experience a shift in investment-opportunities due to the indirect impact of international crises. To control for any unobservable industry-wide shift in investment opportunity set consequent to the crisis, in all regression we include industry fixed-effects based on two-digit SIC codes. In unreported analysis, we use Fama-French (1998) industry definitions as well as three-digit SIC code-based controls and our results remain similar.

4.3 Regression Results

Table 2 provides the OLS regression results for two definitions of bank-dependence based on (a) whether a firm has public debt rating or not and (b) whether a firm has CP rating or not. We regress market-model abnormal returns on bank-dependence dummy and control variables discussed above. A consistent pattern emerges from the results of Table 2. Depending on model specification, we find that bank-dependent firms earn a statistically significant 1.96% to 4.83% lower returns than firms with access to public debt market. This results in a value loss of about 30% to 80% on annualized basis due to bank-dependence after controlling for the effect of size, leverage, and growth opportunities.

Other results show that smaller firms earn lower returns during this period. There are at least two possible interpretation for this result. First, smaller firms are presumably associated with higher information asymmetry. This makes the effect of financial constraints more binding on them resulting in larger valuation impact. Second, small firm's business can

be more volatile and therefore exposed to higher credit-risk than larger firms. Thus flight-to-quality considerations also can explain a part of this result. We find that high-growth firms earn lower returns as evidenced by a negative and significant coefficient on market-to-book ratio. Consistent with flight-to-quality hypothesis, our other results indicate that high-leverage firms earn significantly lower returns.

4.4 Poor Credit-Risk or Poor Access to Capital?

During large financial crisis investors may shift their capital from riskier to safer assets, for example, from stocks to bonds or from riskier stocks to safer stocks. Such *flight-to-quality* consideration has been one of the most widely discussed implications of the Russian crisis. We want to separate the effect of *flight-to-quality* due to *poor credit-quality* of firms from *poor access to capital*. If bank-dependent firms are significantly riskier than firms with access to public debt markets, our results maybe an outcome of poor credit-quality of these firms, which may not necessarily be linked to their poor access to credit. However, this is unlikely to be the case given our univariate results in Table 1 that show that bank-dependent firms have lower credit risk as proxied by leverage and altman-z score.

In this section, we further address this issue by conducting several robustness tests. First, we break firms with access to public debt market into two groups: (a) firms with investment grade rating (BBB and above) and (b) firms with below investment-grade rating. There are 320 firms in our sample with below investment grade rating or junk rating. Even though these firms have accessed public debt market in the past and are classified as *bank-independent* in our regressions so far, market's response to these firms maybe dominated by negative concerns about their poor credit-quality. In Table 3, we estimate our base OLS regressions with a dummy for junk-rated firms. We find negative and significant coefficient on the junk-rated firms confirming the *flight-to-quality* effect. In this regression, coefficient on the bank-dependent dummy increases significantly to -5.05% from the comparable base case estimate of -1.96% in Table 2. Thus, as compared to firms with good access to public

debt market, i.e., firms with investment grade rating, bank-dependent firms earned over 5% lower return during the event window.

A dummy for junk-rated debt only removes the effect of rated firms with poor credit-quality. However, we are interested in removing riskier firms from the sample of both bank-dependent firms and rated firms. To do this, we estimate our regressions on a sub-sample of relatively safer firms, i.e., firms with low credit-risk which are unlikely to be affected by flight-to-quality effects. To create this sub-sample, first we remove all junk-rated firms from the sample. Then we remove all firms (rated or unrated) that have below median Altman-Z score. This gives us a sample of 1,572 firms that have either investment grade rating or above average credit-risk based on Altman-Z score. To restrict our sub-sample of safe firms to an even stringent criteria, in our next specification we remove all firms that fall in bottom 75% of Altman-Z score distributions. This leaves us with a sample of 834 firms.

Table 4 provides results for these two sub-samples. Whether we focus on top 50% firms or top 25% firms in terms of their credit-quality, the difference between bank-dependent and the remaining firms remains large and significant. Within the sub-set of low credit-risk firms, bank-dependent firms earn 3.81% to 6.70% (depending on the model specification) lower returns than firms with access to public debt market. The magnitude of return differential increases considerably from the base regression results (1.96% to 4.83%). Thus when we remove firms that are potentially subject to flight-to-quality effects, our results become stronger and therefore our findings are unlikely to be driven by poor credit-quality of bank-dependent borrowers.[14] As in the base regression we find that the small firms earn lower returns even within the sample of relatively safer firms. On the other hand, the coefficient on leverage which was significant in base regression becomes insignificant now. This is not surprising given that we now focus on relatively safer firms where leverage effect may not be a first order consideration for the market participants. Similarly, market-to-book ratio

[14]In addition to Altman-Z score, we also compute the Merton-model based distance-to-default measure of all firms (see Bharath and Shumway(2005)) as a measure of their credit risk. Then we classify firms into safer firms based on this measure and obtain similar results.

loses its significance in the safe-firm sub-sample. While high growth firms experience larger decline in their market value for the entire sample, within the subset of safe firms they don't. We explore the interaction effect of bank-dependence and market-to-book ratios on stock-returns, for all firms as well as the sub-sample of safe firms, in the next section.

4.5 Requirement of Funds and Financial Flexibility

After establishing the relation between bank-dependence and negative stock returns, we extend our analysis in two directions. First, we investigate if the bank-dependent firms lose more when they have higher requirement of funds. If firms do not require funds in the first place, their bank-dependence should not have any valuation consequences. Second, we investigate if other sources of funds or financial flexibility mitigate the negative effect of bank-dependence.

Requirement of funds

If banking crisis makes the availability of funds harder for bank-dependent borrowers, a bank dependent firm with high growth opportunities is more likely to make sub-optimal investment decisions. The lack of funds may have negligible impact on a firm with low investment opportunities since it does not need funds in the first place. Thus we hypothesize that the effect of bank-dependence is likely to be concentrated in high-growth firms such as firms with high market-to-book ratio and higher investments in R&D.

Tables 5 and 6 provide the results - Panel A based on public-debt rating based definition of bank-dependence and Panel B based on CP ratings. The results reveal an interesting pattern. When we introduce the interaction of market-to-book ratio with bank-dependence in our model, we find that market-to-book ratio by itself becomes positive (significant in 3 out of 4 specifications), whereas the interaction term is negative and significant at 1% for all models. In our base regression market-to-book ratio has a negative and significant

coefficient. Taken together these results show that market doesn't view high growth firms as bad investments as long as they are not bank-dependent. It is only within the sub-set of bank-dependent firms, firms that we hypothesize would be unable to convert their growth options into real assets due to the lack of funds, that we find a negative effect of growth opportunity on stock-returns. Further, with the interaction term the coefficient on bank-dependence dummy by itself becomes insignificant. Thus bank-dependent firms lose value only when lack of funds is expected to impose a real cost on them due to the sub-optimal investment decisions. As shown in Model 2 of both Panels, our results are similar on the sub-set of low credit-risk firms (i.e., firms with above median credit risk based on Altman-Z score).

In Table 6, we use firm's investment in R&D as a measure of their growth opportunities and find similar patterns. Now R&D, that has an insignificant coefficient in base model, becomes positive and significant whereas the interaction of bank-dependence and R&D becomes negative and significant. In this model, the bank-dependence dummy remains negative and significant by itself as well. Thus the consistent pattern emerging from our analysis is that market's response to high-growth firms is significantly different across bank-dependent firms and firms with access to public debt-market. While high-growth firms earn higher returns for firms with access to public debt market, they earn significantly lower return if they are bank-dependent. These results are consistent with costly external financing theories.

Financial Flexibility

A bank-dependent firm can weaken its dependence on banks by maintaining higher financial flexibility through free borrowing capacity. We proxy a firm's free borrowing capacity as the extent of unpledged tangible assets available to firms at the time of crisis. In a lending market with adverse selection problems (such as Stiglitz and Weiss(1981)), collateral can serve as a mechanism to alleviate the lemons problem (see Bester (1985) and Besanko and

Thakor (1987)). Thus we hypothesize that a bank-dependent firm with higher fraction of *unpledged* assets should suffer less. These firms can be the first to obtain funding from banks at the time of crisis by offering their collateral. At the same time, these firms also have the potential to offer collateral to non-banking financial institutions or other private lenders in the event of refusal of credit by their own banks.

Dealscan database allows us to investigate this hypothesis since it provides information on whether a bank-loan is secured or not. By definition, bank-dependent borrowers have only borrowed from banks and therefore by observing their past borrowings in this dataset we are able to construct a reasonable estimate of total secured loans.[15] We obtain from dealscan, all bank-loans outstanding at the time of crisis and whether they are secured or not. Our sample size decreases to 643 bank-dependent firms (892 firms with no-CP rating) for this analysis. This happens due to three main reasons: (a) since Dealscan database only provides the names of the borrowers, we need to hand-match this data-set with COMPUSTAT-CRSP dataset using firm names, leading to loss of many observations, (b) many loan facilities do not have information on whether the loan is secured and finally (c) we consider only those firms that have bank loans outstanding as of Aug 1998.

We create three proxies of available collateral: (a) the fraction of past loans (out of all loans) that are unsecured, (b) one minus the ratio of dollar amount of secured loans to dollar amount of total loans and (c) one minus the ratio of dollar amount of secured loans to firms total tangible assets (COMPUSTAT item number 8). We interact bank-dependent dummy with each of these measures of available collateral and present regression results in Table 7. For each specification, we find that bank-dependent firms with higher available collateral perform significantly (at 1%) better than the remaining bank-dependent firms. Thus, higher

[15]This assumes that firms have negligible secured borrowings from non-banking private institutions. For firms that borrow from these sources and provide their assets as collateral, our proxy will be noisy. Also, for this analysis our main focus is on bank dependent firms. In the sub-sample of firms with no-CP rating, firms with public-debt rating may have their assets pledged against public-debt. To that extent, our regression results for the CP-based definition of bank-dependence suffer from a bias. Given this limitation, we focus our attention on public-debt rating based definition of bank-dependence in this sub-section.

financial flexibility weakens the effect of bank-dependence on firm valuation during the time of crisis.

4.6 Returns During CP Crisis of October 1998

The CP-bill spread, a measure of overall liquidity in the economy, increased dramatically in October 1998 (see Fig 1). Unlike our event window of late August and early September, during this period firms in general - both bank-dependent and others - faced severe liquidity crisis. Though firms with access to public debt market may still have *relatively* better access to capital than bank-dependent firms, the difference narrowed considerably during this period. Thus we expect the market's differential response to narrow or perhaps completely disappear during this period, as compared to our base period, when the wedge between access to capital across firms with and without access to public debt markets was quite high.

We regress market-model returns during the high CP-bill spread period (from October 5, 1998, to October 19, 1998) on bank-dependence dummy and other key explanatory variables. Though bank-dependent firms earn lower returns (0.33% to 1.13%) than firms with access to public debt market in this period as well, the differences are statistically insignificant. We obtain this result for all four specifications presented in Table 8.

This result shows that our main findings are less likely to be explained by any omitted variables such as a missing risk-factor. In our base event-window, when CP-bill spreads are not too high (as compared to historical levels) and banks experience considerable losses, we find a large and statistically significant difference in value drop for bank-dependent firms as compared to firms with access to public debt market. A month later when there is a systematic drop in liquidity across all firms with back-up commercial paper lines being drawn down, i.e. when all firms in a way became *bank-dependent*, this difference disappears.

4.7 Returns during FOMC Meetings

Subsequent to the Russian crisis and the collapse of LTCM, the Federal Reserve Bank held two important meetings in Fall, 1998. In these meetings several measures were undertaken by the Fed to provide liquidity support to the banking sector. Same theoretical argument that predicts a negative effect of bank-health on bank-dependent borrowers also implies that these firms should perform better when banking-system receives unexpected positive shocks from the policy-makers.

On September 29, 1998 the Federal Reserve Bank cut the Fed Funds rate by 25 basis points. This action was largely expected by the market. Subsequently on October 15, in a largely unanticipated move Fed Funds rate was decreased by 25 basis points. The discount lending rate was also cut by the same magnitude in the October meeting. Since the Fed rarely alters discount lending rate, we expect to find a larger effect of October 15 FOMC actions as compared to the September 15 meeting.

We regress the market-model adjusted return around a two-day window surrounding these meetings on bank-dependence dummy and other control variables. Results are provided in Table 9. We find that bank-dependent firms earned 0.82% higher return than firms with access to the public-debt market around the September meeting, which is only marginally significant. However, around the October meeting bank-dependent firms earned 1.22% higher return, which is both economically large and statistically very significant. These findings lend further support to our argument, in a reverse direction, that the market value of bank-dependent firms significantly depends on the financial health of banking-sector and its ability to supply loans to borrowers.

4.8 Robustness Tests and Econometric Issues

In this subsection, we address several potential econometric issues with our study. We address issues related to self-selection of debt-ratings, dependence in error-structure across

sample firms and robustness of our results to alternative econometric models, alternative event windows and alternative definitions of industry controls.

Self-Selection Model

A firm's decision to obtain public-debt rating may not be a random outcome. As discussed earlier (Table 1), we find systematic differences in the characteristics of bank-dependent firms and firms with access to debt market. When firms self-select to remain bank-dependent or not by choosing to obtain public-debt rating, OLS estimates maybe biased and inconsistent due to the well-known self-selection problem (see Maddala (1983) and Li and Prabhala (2005)). In particular, unobservable factors that affect market's response during the crisis may also be the factors that drive a firm's decision to remain bank-dependent. Thus, bank-dependence dummy can be an endogenous variable and our analysis may suffer from an omitted variable problem leading to biases in OLS estimation.[16] To account for this effect, we estimate a treatment effect model that explicitly consider the firm's choice to remain bank-dependent through a selection equation (see Appendix 1 for details). In the first stage we estimate a selection model describing a bank's decision to remain bank-dependent. Then in the second stage regression with stock-returns as dependent variable, we augment our basic regression model to include the inverse mill's ratio as an additional explanatory variable to account for any omitted-variable problem.

The variables for selection model come from Faulkender and Petersen (2005). In their model of leverage and bank-dependence they use following instruments for the firm's decision

[16]Note that the key dependent variable of interest, stock-return during the crisis-period, is not a choice variable of the firm. Thus our analysis is slightly different from models that estimate the effect of debt-rating on firm's another choice variable such as leverage (e.g. Faulkender and Petersen's (2004) study of leverage and debt-rating). In such models two choice variables are jointly determined in a two-stage setting. Our model on the other hand approaches the problem in a treatment-effect setting since we are interested in estimating the effect of an endogenously chosen explanatory variable on another dependent variable which is not necessarily a choice variable for the firm. We relegate the technical discussion of this model to the appendix. In alternative specification, we also model stock-returns and bank-dependence as a two-stage model as in Faulkender and Petersen and obtain similar results. However, for our analysis we prefer the method presented in the paper due to the aforesaid reasons.

to obtain debt-rating: membership to S&P 500, NYSE listing, percentage of rated firms in the same 3-digit SIC codes, log of firm age, market capitalization, a dummy for firms younger than three years, profitability margin, tangible asset ratio, advertising expense to sales ratio and asset volatility. We use these variables in the selection model (both for obtaining public-debt rating and CP rating) and describe their detailed construction in the Appendix 1. The results of the first stage estimation are similar to Faulkender and Petersen (2005). They are omitted in the interest of saving space but are available from the authors.

The results are provided in Table 10. Once we account for the selection bias, our results become much stronger. Bank-dependent firms earn 8.69% to 11.79% lower returns than firms with access to public debt market. At the same time, the coefficient on market capitalization comes down by a considerable margin, though still significant. Self-selection model allows us to investigate the effect of any unobservable factor (omitted variable) affecting a firm's decision to remain bank-dependent (i.e., private information as discussed in Li and Prabhala (2005)) on the market return during the crisis period. We investigate the correlation between the error term in selection equation and the return equation and find that these two errors are positively correlated. Equivalently, the bank dependence dummy is positively correlated with an omitted variable in the return regression. Hence, our results in the base OLS regressions are biased upward and therefore biased against finding the negative effect of bank-dependence on stock returns. Once we control for the selection bias, we find much stronger results.

Cross-sectional Correlation in Error-terms

A potential econometric concern with our analysis could be the assumption of independent error terms across sample firms during the event-window. First we note that in all our regressions, we control for industry fixed effects. If the source of dependence is industry specific i.e. a common shock to all firms in same industry, our baseline fixed-effect regression has already accounted for this potential bias. In alternative specifications, we allow for

clustering of errors across firms in the same industry and obtain similar results. In unreported results, we show that the bank-dependent dummy has a coefficient of -0.019605 with a t-value of 2.25 in our baseline model (i.e., model 1 of Table 2) that accounts for industry-cluster instead of industry fixed-effects. Other results are similar to our base model.[17] Next, we also allow for unstructured correlation in error-terms across all bank-dependent firms and across all bank-independent firms in the sample and obtain similar results.

Finally, we address the issue of any sample correlation, skewness and other potential non-normality assumptions by a bootstrapping model. The advantage of the bootstrap estimation is that it generates an empirical distribution of the parameter estimate keeping all the *biases* in the data and then compares the observed parameter estimate against the standard deviation estimated using empirical distribution. Thus, the t-statistics obtained from this model is robust to any potential biases present in our sample. We run our bootstrap model with 1000 iterations with replacement and obtain the empirical standard errors for *bankdep* variable. For our base model (model 1 of Table 2) the bootstrapped t-statistics is estimated at 2.30 for the *bankdep* dummy which is similar in magnitude to the original estimate of 2.29.

Other Robustness Tests

In other unreported robustness tests, we perform a median regression[18] that is more robust to outliers. The results are qualitatively similar, both statistically and economically, to the OLS regression results reported earlier. In unreported analysis, we confirm that the results are robust to different industry classification methods. The results are qualitatively similar whether we control for 2-digit SIC codes, 3-digit SIC codes or Fama-French 48 industry codes for the industry fixed effects. Our results are also robust to alternate trading windows

[17]To save space, we do not produce results of several robustness tests in this paper. All the results are available upon request from the authors.

[18]Median regression finds the regression plane that minimizes the sum of the absolute residuals rather than the sum of the squared residuals.

around the event date that doesn't include LTCM crisis (September 2, 1998). In unreported results, we consider cumulative stock returns around a seven day trading window around ruble trading suspension (Aug 27, 1998) and find similar results. We also find similar results if we limit our analysis to very large firms such as firms with more than $500 million market capitalization.

5 Discussion and Conclusion

The Russian crisis of Fall 1998 was caused by an exogenous event, namely the Russian government's decision to default. This had a severe adverse affect on the U.S. banking sector *independent* of the U.S. borrower's financial health. This allows us to investigate the effect of bank-health on bank-dependent firms' value in a natural experiment setting. Our results strongly support the hypothesis that bank-dependent firms face adverse valuation consequences when banking sector's financial health deteriorates. Among bank-dependent firms, firms with higher growth opportunities and lower financial flexibility suffer larger value losses. Our results are not explained by the differences in credit-quality of bank-dependent and other borrowers or by self-selection biases. Further, policy interventions by the Fed had a large positive effect on bank-dependent borrowers. Overall, we document a causal relation between bank-health and borrower performance in this study.

Our results have important implications for understanding the role of corporate-bond market in the economy. In the past, the Fed chairman Alan Greenspan has noted the importance of corporate bond markets during the time of banking crisis in emerging markets. As quoted from The Economist (November, 17, 2005)

> ".....Financial crises have a cruel way of revealing what an economy lacks. When many emerging markets suffered a sudden outflow of capital in the late 1990s, one painful lesson was that their financial systems had relied too heavily on bank lending and paid too little attention to developing other forms of finance. *The*

> *lack of a spare tyre*, said Alan Greenspan, chairman of America's Federal Reserve, in 1999, "is of no concern if you do not get a flat. East Asia had no spare tyres." If a functioning capital market had existed, remarked Mr Greenspan, the East Asian crisis might have been less severe. Developing deep and liquid corporate-bond markets, in particular, could make emerging economies less vulnerable...."

Our results support this *spare tyre* view noted by Chairman Greenspan by demonstrating that corporate bond markets can have a positive impact even in developed economies such as the U.S. At a broader level, our results can be taken as evidence in support of costly external financing - an assumption frequently made in various theoretical models of corporate finance and macroeconomics.

Appendix I: Econometric Model for Endogenous Debt-Rating

In this appendix, we describe the endogenous debt-rating model in more detail. The econometric exercise presented here is adapted from the STATA manual version 7. Our main regression model is:

$$R_i = x_i\beta + \delta B_i + \epsilon_i \tag{1}$$

where, R_i denotes the event-window stock-return for the i^{th} firm;
x_i is the vector of control variables described in the paper;
B_i is the bank-dependent dummy.

We assume that the binary bank-dependent dummy is obtained from an unobservable latent variable B_i^* described as follows:

$$B_i^* = w_i\gamma + u_i \tag{2}$$

where, w_i represents the observable factors that lead to a firm's decision to remain bank-dependent. Following Faulkender and Petersen (2005), we use following variables for w_i: membership to S&P 500; NYSE listing; percentage of rated firms in the same 3-digit SIC codes; log of firm age; market capitalization; a dummy for firms younger than three years; EBIDTA/Sales profitability margin (defined as COMPUSTAT item 13 scaled by item 12); tangible asset ratio (COMPUSTAT item 8 scaled by item 6); advertising expense to sales ratio (COMPUSTAT item 45 scaled by item 12); and asset volatility (measured as annual stock return volatility over the prior one year, multiplied by (book value of equity/ total assets)).

The decision to remain bank-dependent (equivalently, one minus the decision to obtain public debt rating) is governed by the following selection equation:

$$\begin{aligned} B_i \quad &= 1, if B_i^* > 0 \\ &= 0, otherwise. \end{aligned} \tag{3}$$

If ϵ_i and u_i are uncorrelated with each other, then OLS estimation provides consistent and unbiased estimates. However, if the decision to obtain public debt-rating is endogenous in the sense that some common set of unobservable factors drive both the market's reaction to firm's stock R_i (i.e., our key dependent variable) and firm's choice to remain bank-dependent B_i, then ϵ_i and u_i will be correlated. In these cases, the OLS estimation will be biased and we need to endogenously model B_i. This is what we do in our estimation exercise. Let ϵ_i and u_i be bivariate normal random variables with mean zero and following covariance matrix:

$$\Sigma_{\rho\sigma} = \begin{pmatrix} \sigma & \rho \\ \rho & 1 \end{pmatrix}$$

We use a two-step approach as suggested in Maddala (1983) to estimate the model. In the first stage, we obtain *probit* estimation of the selection equation:

$$Pr(B_i = 1|w_i) = \Phi(w_i\gamma) \tag{4}$$

where Φ represents the cdf of a standard normal distribution. From these estimates, the hazard function h_i for each observation i (for both bank-dependent and other firms) is computed as follows:

$$\begin{aligned} h_i &= \phi(w_i\hat{\gamma})/\Phi(w_i\hat{\gamma}), B_i = 1 \\ &= -\phi(w_i\hat{\gamma})/(1-\Phi(w_i\hat{\gamma})), B_i = 0 \end{aligned} \tag{5}$$

where ϕ is the pdf of a standard normal distribution. Let us define:

$$d_i = h_i(h_i + \hat{\gamma}w_i) \tag{6}$$

Following Maddala (1983), we obtain the following model:

$$E(R_i|B_i) = x_i\beta + \delta B_i + \rho\sigma h_i \tag{7}$$

$$Var(R_i|B_i) = \sigma^2(1-\rho^2 d_i) \tag{8}$$

In the second step, we run the augmented regression given by the above equation. Thus the two-step parameters of β and δ are obtained by augmenting the regression equation with hazard function h. The hazard rate controls for the omitted variable bias due to self-selection. A consistent estimate of the regression disturbance variance is obtained using the residuals from the augmented regression and the parameter estimate of the hazard as follows:

$$\hat{\sigma^2} = \frac{e\prime e + \beta_h^2 \sum_{i=1}^{1=N} d_i}{N} \tag{9}$$

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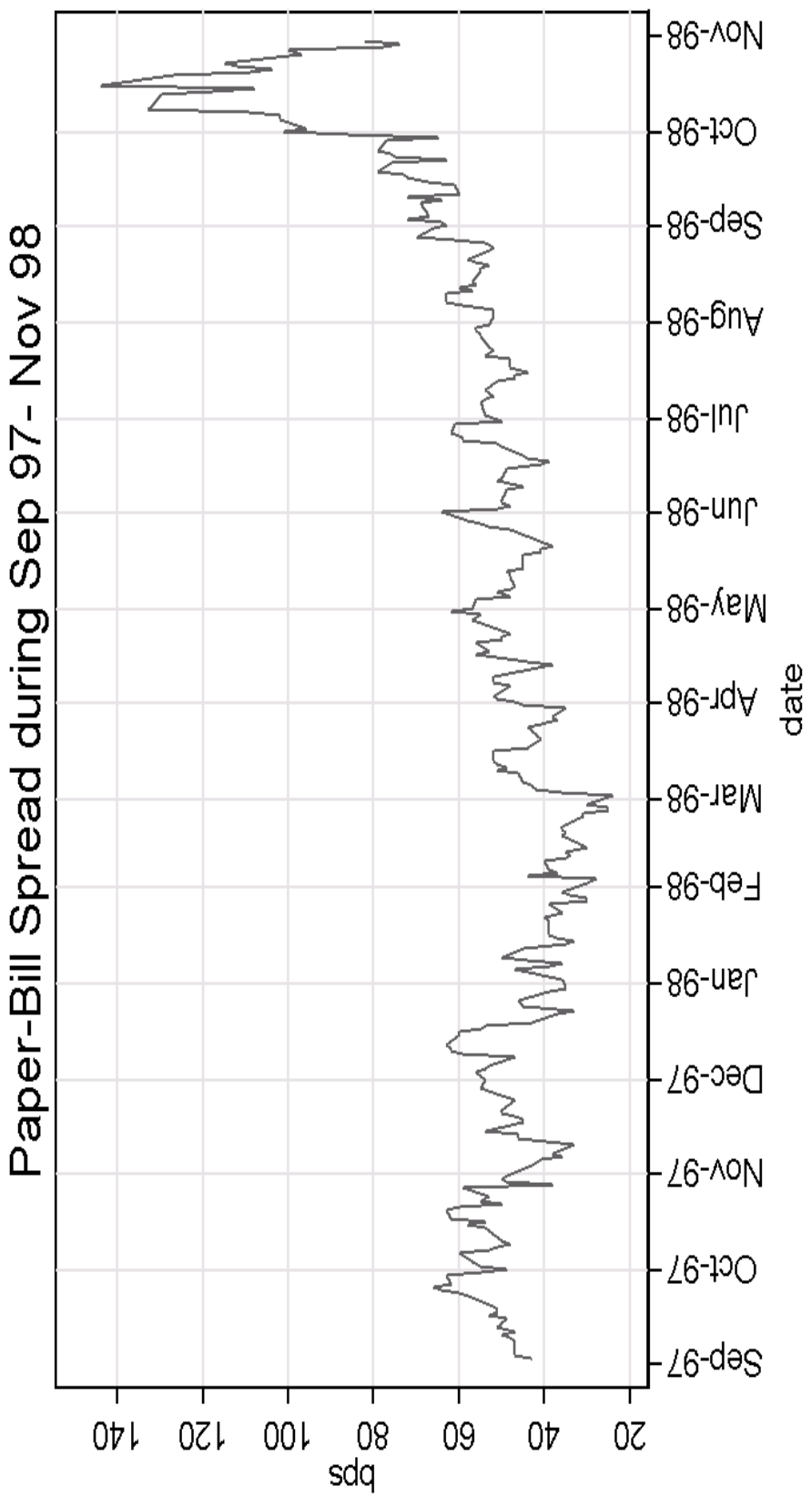

Figure 1: **Paper-Bill spread during** $1997 - 98$

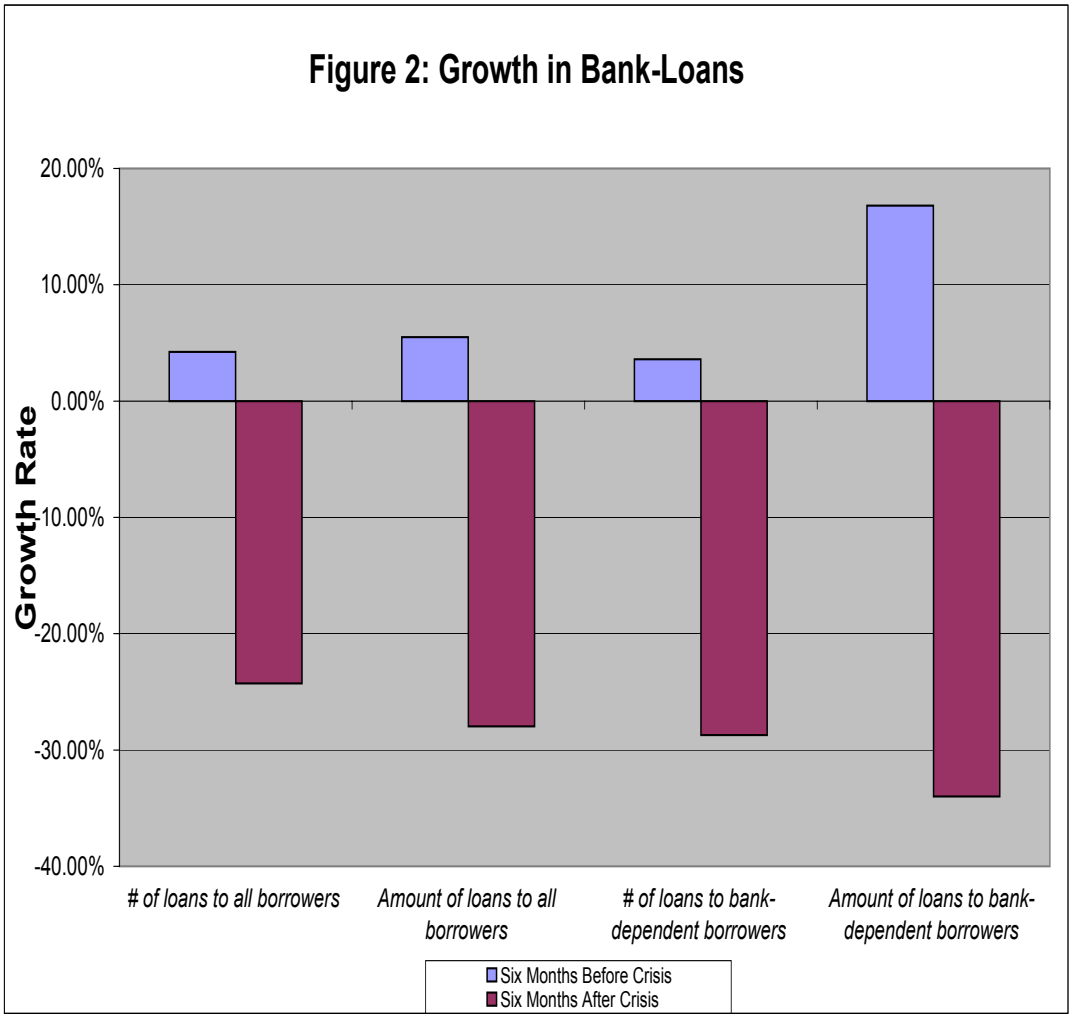

Figure 2: **Growth in Bank Loans**

This figure plots the growth rates in number and amount of loans around the crisis-period. We obtain data from the Dealscan database for all loans made during six months before the crisis (i.e., from February 1998 to July 1998) and six months after the crisis (i.e., during August 1998 to January 1999). We plot the growth in number and amount of loans during these two periods as compared to previous six months. Thus, pre-crisis numbers are compared with loan data from August 1997 to January 1998 and the post-crisis numbers are compared with the pre-crisis numbers. We provide the growth rates for all firms as well as the sub-set of bank-dependent firms - firms without access to public debt-market.

Table 1: **Summary Statistics**

This table reports summary statistics of key variables. Panel A presents summary statistics with the presence or absence of long-term credit rating as a proxy for bank-dependence. Panel B presents summary statistics with the presence or absence of CP rating as a proxy for bank dependence. **mktcap** is the market capitalization of the firm as of May-98 in millions of US dollars, except where noted (b stands for billions of dollars). **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **mtb** is the ratio of market value of assets to its book value computed as the ratio of (total assets - book equity + market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **CAR** is the firm's market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998. **CAR-VW** stands for value-weighted average of market-model adjusted return, where firm's market capitalization is used as the weighting variable.

Panel A: Credit Rating as proxy for bank dependence

	With credit rating ($N = 634$)				Without Credit Rating ($N = 2871$)			
	Mean	25% pcntl	50% pcntl	75% pcntl	Mean	25% pcntl	50% pcntl	75% pcntl
mktcap	6.28b	353.44	1.16b	4.02b	305.47	29.44	84.88	252.45
mtb	1.81	1.21	1.52	2.06	2.48	1.21	1.66	2.51
lever	0.39	0.24	0.36	0.51	0.23	0.06	0.19	0.35
altman-z	3.01	1.60	2.61	3.88	5.44	2.17	3.69	6.02
CAR	-5.93%	-13.47%	-4.01%	2.54%	-10.75%	-20.68%	-9.57%	-0.11%
$CAR - VW$	2.71%				-7.32%			

Panel B: CP Rating as proxy for bank dependence

	With CP rating ($N = 161$)				Without CP rating ($N = 3344$)			
	Mean	25% pcntl	50% pcntl	75% pcntl	Mean	25% pcntl	50% pcntl	75% pcntl
mktcap	17.7b	2.75b	6.55b	16.3b	601.30	34.69	106.35	383.31
mtb	2.30	1.48	1.95	2.51	2.36	1.19	1.60	2.35
lever	0.26	0.17	0.25	0.34	0.26	0.07	0.22	0.38
altman-z	4.14	2.62	3.66	4.92	5.04	1.98	3.38	5.56
CAR	0.35%	-4.96%	-0.25%	6.58%	-10.37%	-20.08%	-9.16%	0.10%
$CAR - VW$	3.87%				-3.31%			

Table 2: **Impact of Russian Crisis on Bank-Dependent Borrowers**

This table presents regression results relating the firm's stock-return around the Russian crisis to its characteristics. The dependent variable is the market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May,1998 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets -book equity + market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. Industry fixed effects using two digit SIC codes are included in all regressions. Panel A presents results with **bankdep** as a proxy for bank dependence and Panel B presents the results with **nocprating** as a proxy for the bank dependence. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy						Panel B: With CP rating dummy					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value
bankdep	-0.0196	(-2.29)	-0.0212	(-2.36)	-0.0216	(-2.40)						
nocprating							-0.0469	(-4.85)	-0.0483	(-4.84)	-0.0483	(-4.84)
log(mktcap)	0.0150	(7.04)	0.0147	(6.71)	0.0144	(6.52)	0.0148	(7.65)	0.0146	(7.30)	0.0144	(7.14)
lever	-0.0402	(-2.43)	-0.0396	(-2.26)	-0.0413	(-2.35)	-0.0309	(-1.96)	-0.0288	(-1.74)	-0.0301	(-1.81)
log(mtb)	-0.0143	(-1.90)	-0.0150	(-1.88)	-0.0132	(-1.56)	-0.0152	(-2.07)	-0.0162	(-2.07)	-0.0147	(-1.77)
altman-z			0.0001	(0.35)	0.0001	(0.22)			0.0002	(0.49)	0.0001	(0.38)
r&d					-0.0003	(-0.57)					-0.0002	(-0.48)
$AdjR^2$	5.2%		5.0%		5.0%		5.3%		5.1%		5.1%	
N	3368		3252		3252		3368		3252		3252	

Table 3: **Is There a Flight to Quality During the Russian Crisis?**

This table presents regression results for the 'flight to quality' model. In this regression, we analyze whether the **junk rated** firms and **bank dependent** firms earned lower returns than investment grade firms around the Russian crisis. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **junkrated** is a dummy if the firm has a non-investment grade debt rating. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets -book equity + market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. Industry fixed effects using two digit SIC codes are included in all regressions. Panel A presents results with **bankdep** as a proxy for bank dependence; Panel B uses **nocprating** as the proxy. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy				Panel B: With CP rating dummy			
	Model 1		Model 2		Model 1		Model 2	
	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value
bankdep	-0.0505	(-5.23)	-0.0518	(-5.16)				
nocprating					-0.0478	(-4.80)	-0.0500	(-4.86)
junkrated	-0.0535	(-4.88)	-0.0527	(-4.58)	-0.0101	(-1.01)	-0.0077	(-0.73)
log(mktcap)	0.0129	(5.79)	0.0125	(5.42)	0.0152	(7.64)	0.0147	(7.05)
lever	-0.0307	(-1.83)	-0.0304	(-1.70)	-0.0265	(-1.59)	-0.0264	(-1.48)
log(mtb)	-0.0136	(-1.81)	-0.0134	(-1.58)	-0.0162	(-2.17)	-0.0157	(-1.86)
altman-z			0.0001	(0.44)			0.0001	(0.42)
r&d			-0.0002	(-0.47)			-0.0002	(-0.44)
$AdjR^2$	5.5%		5.3%		5.4%		5.2%	
N	3368		3252		3364		3248	

Table 4: **The Impact of Russian Crisis on Firms With Altman-*z* score in top 50% and 75%**

This table reports regression coefficients from the multivariate regression relating the abnormal return on the firm's stock around the Russian crisis to the firm characteristics in the sample of *safe* firms. To construct the sample of safe firms, we remove (a) all rated firms with below investment grade rating; and (b)all firms with below median (in Model 1) or below 75% (in Model 2) *altman-zscore*. Thus, Model 1 is based on the sample of firms that fall in top 50% of credit-worthiness; whereas Model 2 is based on firms that fall in top 25%. Firm's market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998 is the dependent variable. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets - book equity + market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. Industry fixed effects using two digit SIC codes are included in the regression. Panel A presents results with **bankdep** as a proxy for bank dependence; Panel B uses **nocprating** as the proxy. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy				Panel B: With CP rating dummy			
	Model 1		Model 2		Model 1		Model 2	
	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value
bankdep	-0.0429	(-3.21)	-0.0474	(-2.19)				
nocprating					-0.0381	(-2.72)	-0.0670	(-3.04)
log(mktcap)	0.0147	(4.61)	0.0204	(4.22)	0.0166	(5.74)	0.0214	(4.93)
lever	-0.0394	(-1.30)	-0.0523	(-1.18)	-0.0332	(-1.10)	-0.0429	(-0.99)
log(mtb)	-0.0069	(-0.68)	-0.0028	(-0.19)	-0.0089	(-0.88)	-0.0047	(-0.34)
r&d	0.0002	(0.34)	-0.0002	(-0.20)	0.0003	(0.38)	-0.0001	(-0.15)
$AdjR^2$	6.7%		4.9%		6.5%		4.9%	
N	1572		834		1572		834	

Table 5: **The Impact of Growth Opportunities - Market-to-Book Ratio Model**

This table reports regression coefficients from the multivariate regression relating the abnormal return on the firm's stock around the Russian crisis to the firm's **market-to-book** ratio and other firm characteristics. Firm's market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998 is the dependent variable. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. *nocprating* is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets - book equity + market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. **bankdep*mtb** is the product of **bankdep** and **log(mtb)**. **nocprating*mtb** is the product of **nocprating** and **log(mtb)**.Industry fixed effects using two digit SIC codes are included in all regressions. Panel A presents results with **bankdep** as a proxy for bank dependence and Panel B presents the results with **nocprating** as the proxy. Model 1 is estimated using all observations, whereas Model 2 only uses firms that fall in top 50% of credit-worthiness (as described in Table 4). Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy				Panel B: With CP rating dummy			
	Model 1		Model 2		Model 1		Model 2	
	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
$bankdep$	0.0005	(0.04)	0.0103	(0.48)				
$bankdep * mtb$	-0.0455	(-3.00)	-0.0584	(-3.22)				
$nocprating$					-0.0254	(-1.61)	0.0097	(0.39)
$nocprating * mtb$					-0.0318	(-2.04)	-0.0501	(-2.47)
$log(mtb)$	0.0277	(1.94)	0.0488	(2.76)	0.0161	(1.09)	0.0409	(2.07)
$log(mktcap)$	0.0136	(6.11)	0.0140	(4.15)	0.0143	(7.11)	0.0158	(5.05)
$lever$	-0.0394	(-2.23)	-0.0358	(-0.91)	-0.0301	(-1.80)	-0.0315	(-0.80)
$altman\text{-}z$	0.0001	(0.42)	-0.0003	(-0.75)	0.0001	(0.41)	-0.0003	(-0.79)
$r\&d$	-0.0002	(-0.38)	0.0003	(0.44)	-0.0002	(-0.44)	0.0003	(0.41)
$AdjR^2$	5.1%		5.7%		5.1%		5.5%	
N	3252		1476		3252		1476	

Table 6: **The Impact of Growth Opportunities - R&D expenditure Model**

This table reports regression coefficients from the multivariate regression relating the abnormal return on the firms stock around the Russian crisis to the **r&d** and other firm characteristics. Firm's market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998 is the dependent variable. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets - book equity + market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item* 46*/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. **bankdep*r&d** is the product of **bankdep** and **r&d**. **nocprating*r&d** is the product of **nocprating** and **r&d**.Industry fixed effects using two digit SIC codes are included in all regressions. Panel A presents results with **bankdep** as a proxy for bank dependence; Panel B presents the results with **nocprating** as the proxy. Model 1 is estimated using all observations, whereas Model 2 only uses firms that fall in top 50% of credit-worthiness (as described in Table 4). Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy				Panel B: With CP rating dummy			
	Model 1		Model 2		Model 1		Model 2	
	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
$bankdep$	-0.0170	(-1.84)	-0.0342	(-2.32)				
$bankdep * r\&d$	-0.0036	(-2.47)	-0.0035	(-1.69)				
$nocprating$					-0.0416	(-3.91)	-0.0254	(-1.62)
$nocprating * r\&d$					-0.0032	(-2.18)	-0.0044	(-2.44)
$log(mktcap)$	0.0141	(6.32)	0.0141	(4.16)	0.0143	(7.06)	0.0157	(5.01)
$lever$	-0.0413	(-2.35)	-0.0367	(-0.93)	-0.0303	(-1.82)	-0.0323	(-0.82)
$log(mtb)$	-0.0135	(-1.59)	-0.0064	(-0.55)	-0.0149	(-1.78)	-0.0076	(-0.65)
$altman\text{-}z$	0.0001	(0.26)	-0.0003	(-0.82)	0.0001	(0.39)	-0.0003	(-0.81)
$r\&d$	0.0032	(2.20)	0.0037	(1.72)	0.0030	(1.91)	0.0046	(2.42)
$AdjR^2$	5.0%		5.6%		5.1%		5.4%	
N	3252		1476		3252		1476	

Table 7: **Impact of Financial Flexibility: Collateral**

This table analyzes the impact of financial flexibility (as measured by collateral availability) on the stock market reaction during the Russian crisis. The sample is restricted to bank-dependent firms with coverage on Dealscan Database. Firm's market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998 is the dependent variable. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **loansec** is (1-number of firm's loans that are secured divided by total number of firm's outstanding loans in the dealscan database). **amtsec** is (1-the amount of firm's loans that are secured divided by total amount of firm's outstanding loans). **sectan** is (1-the amount of firm's loans that are secured divided by the firm's tangible assets (as proxied by the net plant, property and equipment)). **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets - book equity + market cap) to the total assets of the firm. Industry fixed effects using two digit SIC codes are included in the regression. Panel A presents results with **bankdep** as a proxy for bank dependence and Panel B presents the results with **nocprating** as the proxy. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy						Panel B: With CP rating dummy					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
loansec	0.0366	(2.48)					0.0418	(3.45)				
amtsec			0.0398	(2.75)					0.0416	(3.47)		
sectan					0.0026	(2.80)					0.0017	(2.77)
log(mktcap)	0.0074	(1.24)	0.0070	(1.17)	0.0098	(1.75)	0.0089	(2.21)	0.0089	(2.19)	0.0128	(3.39)
lever	-0.0346	(-0.84)	-0.0339	(-0.82)	-0.0251	(-0.60)	-0.0028	(-0.10)	-0.0030	(-0.10)	-0.0059	(-0.21)
log(mtb)	0.0081	(0.46)	0.0082	(0.46)	0.0062	(0.36)	0.0143	(0.92)	0.0141	(0.91)	0.0121	(0.78)
$AdjR^2$	7.5%		7.7%		8.2%		7.6%		7.7%		7.6%	
N	643		643		641		892		892		889	

Table 8: **Returns During the CP market Crisis of October, 1998**

This table presents the regression results analyzing the firms' stock-market return during the CP crisis of October, 1998. Firm's market model adjusted stock return from 5-Oct-1998 to 19-Oct-1998 is the dependent variable. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets-book equity+market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. Industry fixed effects using two digit SIC codes are included in the regression. Panel A presents results with **bankdep** as a proxy for bank dependence and Panel B presents the results with **nocprating** as the proxy. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy				Panel B: With CP rating dummy			
	Estimate	t-value	Estimate	t-value	Estimate	t-value	Estimate	t-value
bankdep	-0.0094	(-1.04)	-0.0113	(-1.22)				
nocprating					-0.0060	(-0.61)	-0.0033	(-0.33)
log(mktcap)	0.0137	(6.08)	0.0134	(5.74)	0.0145	(7.07)	0.0146	(6.85)
lever	-0.0620	(-3.80)	-0.0616	(-3.51)	-0.0577	(-3.69)	-0.0562	(-3.35)
log(mtb)	-0.0158	(-1.92)	-0.0162	(-1.79)	-0.0168	(-2.07)	-0.0177	(-1.97)
altman-z			0.0006	(1.48)			0.0006	(1.49)
r&d			-0.0007	(-1.12)			-0.0006	(-1.08)
$AdjR^2$	3.2%		3.3%		3.2%		3.3%	
N	3306		3191		3306		3191	

Table 9: **Returns During the FOMC Meetings in Fall, 1998**

This table presents the regression results analyzing the firms' stock-market return during the FOMC meetings of September 29 and October 15, 1998. Firm's market model adjusted stock return in (-1,0) day window is the dependent variable, where day 0 corresponds to the meeting date. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets-book equity+market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. Industry fixed effects using two digit SIC codes are included in the regression. Panel A presents results for the meeting on September 29, whereas Panel B for October 15, 1998. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Estimate	t-value	Esimate	t-value
	Panel A		Panel B	
bankdep	0.0082	(1.60)	0.0122	(2.25)
$log(mktcap)$	0.0002	(0.14)	0.0058	(4.42)
lever	-0.0108	(-0.95)	0.0073	(0.73)
$log(mtb)$	-0.0006	(-0.12)	-0.0089	(-1.84)
altman-z	0.0001	(0.15)	-0.0001	(-0.44)
r&d	-0.0002	(-0.85)	-0.0005	(-1.75)
$AdjR^2$	0.01%		1.60%	
N	3201		3174	

Table 10: **Robustness - Treatment Effects for Bank Dependence**

This table reports regression coefficients from the second stage treatment-effect regression model relating the firm's abnormal return around the Russian crisis to its key characteristics. First, a probit regression with **bankdep** (or **nocprating**) as the dependent variable is performed and the hazard from this regression is used in the second stage OLS (see Maddala (1983) and Woolridge (2003)). We follow Faulkender and Petersen (2005) in selecting the variables for the first stage Probit regression. The variables used in the Probit for bank dependence (as proxied by absence of either the long-term rating or CP rating) are membership to S&P 500, NYSE listing, percentage of rated firms in the same 3-digit SIC codes, log of firm age, market capitalization, a dummy for firms younger than three years, profitability margin, tangible asset ratio, advertising expense to sales and asset volatility. Firm's market model adjusted stock return from 14-Aug-1998 to 4-Sep-1998 is the dependent variable in second stage. **bankdep** is a dummy that takes a value of one if the firm is not rated by S&P and zero otherwise. **nocprating** is a dummy that takes the value of one if the firm doesn't have CP rating and zero otherwise. **log(mktcap)** is the market capitalization of the firm as of May-98 in millions of US dollars. **lever** is the ratio of total debt (sum of long-term debt and short-term debt) to the total assets of the firm. **log(mtb)** is the (log of) ratio of (total assets-book equity+market cap) to the total assets of the firm. **altman-*z*** score is computed as 1.2*working capital/ta + 1.4* retained earning/ ta + 3.3* EBIT/ta + 0.6* market cap/total liabilities + 1* sales/ta. **r&d** is the research and development expenditure as given by *log(1+compustat item 46/ta)*. We set missing values of r&d expenses to zero and use log transform in regressions to remove skewness bias from the data. Industry fixed effects using two digit SIC codes are included in the regression. Panel A presents results with treated **bankdep** as a proxy for bank dependence, whereas Panel B presents the results with treated **nocprating** as the proxy. Robust t-statistics computed using Huber/White/sandwich estimate of variance are reported in brackets. Adjusted R^2 and the number of observations are reported in the last two rows.

	Panel A: With credit rating dummy						Panel B: With CP rating dummy					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value	Estimate	*t*-value
bankdep	-0.0869	(-4.07)	-0.0877	(-4.00)	-0.0883	(-4.03)						
nocprating							-0.1147	(-5.00)	-0.1178	(-5.05)	-0.1179	(-5.06)
log(mktcap)	0.0068	(2.21)	0.0067	(2.13)	0.0063	(2.00)	0.0112	(5.37)	0.0108	(5.03)	0.0105	(4.84)
lever	-0.0419	(-2.67)	-0.0398	(-2.40)	-0.0418	(-2.50)	-0.0310	(-2.05)	-0.0280	(-1.76)	-0.0297	(-1.85)
log(mtb)	-0.0050	(-0.70)	-0.0066	(-0.91)	-0.0045	(-0.58)	-0.0137	(-2.15)	-0.0149	(-2.24)	-0.0131	(-1.85)
altman-z			0.0002	(0.69)	0.0002	(0.52)			0.0002	(0.70)	0.0002	(0.54)
r&d				-0.0004	(-0.87)						-0.0003	(-0.78)
N	3352		3243		3243		3352		3243		3243	