Real Effects of Firm Debt Structure and Bank Health

Manisha Goel* Michelle Zemel†
Pomona College

May 2017

Abstract

We examine the real effects of firm debt choice during a contraction in the supply of bank credit. Choosing between bank loans and public bonds involves a tradeoff between cost and flexibility, so that firms systematically sort into these types of debt. A decline in bank credit supply, however, forces some bank-dependent firms into the sub-optimal financing choice of bonds. We examine the effect of such a switch during crises on firms' real outcomes. Our empirical analysis shows the following: (1) More firms issue bonds when bank credit availability falls, with a significant fraction being smaller, lower credit quality firms that previously relied primarily on bank-loans. (2) The sub-optimality of this switch is reflected in the cost of debt choice, which is higher for bank-dependent firms than for others. (3) Several switching firms' output, investment, and employment grow by less in response to the debt compared to other firms. Others are able to avoid similar adverse consequences by dipping into their cash holdings.

JEL Classifications: E44, G01, G30
Keywords: Financial Crises, Corporate Finance, Banks, Bonds, Employment, Output, Investment

*manisha.goel@pomona.edu

†michelle.zemel@pomona.edu. We have benefitted from valuable feedback received at several conferences and seminar participants at Pomona College, Davidson College, and Claremont Graduate University. Discussions with Matthew Botsch and Lamont Black were also helpful. We acknowledge financial support from Pomona College.

1 Introduction

Bank lending supply was severely disrupted during the Great Recession.[1] Recent studies show that this credit crunch had a significant negative impact on employment in small and medium-sized firms, and that large firms remained relatively unscathed. The conjecture put forth for the small, if any, effect of the credit crunch on employment, investment, and output in large firms is that these firms can easily switch to bonds as an alternative source of debt, i.e., loans and bonds are substitutes for these firms.[2] However, in this paper, we provide evidence to caution against the quick conclusion that bank loans and public bonds are perfect substitutes for large firms. In particular, we show that firms that switch to bonds in crises incur higher costs of debt and shorter maturities, and that these adverse terms negatively affect real firm outcomes several quarters into the future. To the best of our knowledge, we are the first to systematically examine the effects on firms that switch to bonds during periods of bank credit supply shocks.

We expect heterogeneous effects of financial crisis on borrowing firms depending on their choice of debt, bond or bank loans, for two reasons. First, as previous studies have argued, in their choice between bank loans and market debt, firms face a tradeoff between the cost and flexibility of credit. Bank loans offer the flexibility of restructuring when a firm is financially distressed. On the other hand, market debt cannot be renegotiated, exposing the firm to a greater risk of costly liquidation during distress. Thus, bank loans are a more flexible source of credit. However, they also tend to be more costly compared to bonds since banks charge for this flexibility and for their monitoring of the investment projects financed by their loans. This tradeoff means that firms systematically consider several factors in making their choice of the optimal debt structure. Firms with lower (higher) expected bankruptcy costs and lower (higher) marginal benefits of monitoring will prefer bonds (loans). In fact, Rauh and Sufi (2010) show empirically that firms with higher credit quality issue more market debt while those with lower credit quality are bank-dependent.[3] Thus, bonds and bank loans are not perfectly substitutable sources of credit. Second, this imperfect substitutability is further evident in the fact that firms tend to specialize in debt, persistently choosing only one of these sources (Adrian et al. (2013)). In our sample, of the 5,590 unique firms issuing new debt, 82% issue only one type of debt over the entire sample period (4,456 firms issue loans only and 141 firms issue bonds only). Given these two facts, if firms that choose bank loans as their primary source of credit are forced to switch to bonds during crises, it may prove to be "sub-optimal" for them in terms of both financial and real outcomes.

This is indeed what we find. We confirm empirically that a firm is more likely to switch from loan to bond issuance when a credit supply shock strikes the aggregate banking sector and

[1] Ivashina and Scharfstein (2010) and Adrian et al. (2013).

[2] Chodorow-Reich (2014), Karabarbounis (2015), and De Fiore and Uhlig (2015).).

[3] Several other factors have been shown to determine firms' choice of debt structure, which we review briefly in the paper.

also when a credit supply shock strikes only that firm's individual relationship bank. Next, we find that debt contract terms are adversely affected for firms forced to switch to bond issuance in crisis when compared to firms that issue loans in crisis. Specifically, borrowing costs increase and maturities decrease for all debt issuing firms in times of crisis, but these terms worsen more so for firms that switched to bond issuance at this time. We also find that a worsening of debt contract terms, namely increased borrowing cost and decreased maturity, adversely affects real firm outcomes (employment, output, and investment) for several quarters after the onset of a crisis. Taken together, these findings suggest that bank dependent firms forced to issue bonds in crisis should experience decreased real outcomes relative to firms that were able to secure bank loans. Surprisingly, we find that on average, the firms forced to issue bonds do not exhibit decreased real performance relative to loan issuing firms. However, upon deeper examination, we find that the firms that switched to bond issuance in crisis experience significant decreases in their cash holdings relative to loan issuing firms, suggesting that dipping into the cash reserves helped these firms maintain their real outcomes in the presence of increased debt costs. We conclude that loans and bonds are not perfect substitutes for these firms because in order to achieve the same level of real outcomes, firms forced into a sub-optimal bond issue are forced to deplete their cash reserves.

We build our dataset for the period 1990Q1-2012Q4 by combining data on publicly traded firms (Compustat) and their debt, either as bank loans (LPC DealScan) or as bond issues (Thomson One Banker). Following Becker and Ivashina (2014), we include only those firms that have positive credit demand in a quarter, measured as those who either issued public debt or obtained bank loans.[4] This enables us to isolate the impact of credit supply shocks on firm outcomes from concurrent effects of changes in credit demand. We identify two kinds of credit supply shocks to firms. A firm can face a decline in loan availability either during a macroeconomic crisis, as during the Great Recession, or if the health of the banking sector declines outside of an economy-wide recession. To measure the former, we use NBER business cycle indicators and the crisis periods dated by Berger and Bouwman (2013). To measure banking crises more generally, we use a continuous measure proposed by Becker and Ivashina (2014). This measure indicates the percentage of debt demanding firms in any quarter that receive loans from banks. We also examine credit supply shocks to *individual banks*. Due to the stickiness of firm-bank relationships, a decrease in bank credit from a firm's relationship bank might force a sup-optimal bond issue even if the rest of the banking system is healthy. We use information on bank-firm relationships to observe firm outcomes in response to a change in the credit supply of its most likely lender(s).

We conduct our analysis in four steps, with four key takeaways. First, we examine whether firms' choice between bank loans and bonds is affected by a credit supply shock. Consistent with previous evidence, we find an increase in the proportion of debt-demanding firms that

[4]Consistent with Becker and Ivashina (2014), we find that few firms simultaneously issue debt and obtain a bank loan in the same quarter.

issue bonds during crises. Further, even otherwise bank-dependent firms are also more likely to issue bonds in these periods. We also find that otherwise bank-dependent firms are more likely to issue bonds when their *individual relationship bank* suffers a credit supply shock. Second, we compare the contract terms of bonds and bank loans and find that, although cheaper in normal times, bonds become more expensive than bank loans during crises, with their basis points rising by 78 basis points (44%) compared to a 20 basis point (10%) increase in that of bank loans. The maturity periods of bond issues also fall more than that of bank loans In absolute terms, bond maturities fall by 28 months compared to a drop of 8 months for loans. Moreover, both cost and maturity become particularly unfavorable for bank-dependent firms that switch to issuing bonds during crises. We take these two findings to indicate that bank credit supply shocks force firms that generally prefer bank loans to switch to their less preferred or "sub-optimal" debt source of bonds. Thus, as far as financial outcomes are concerned, bonds and bank loans are not perfectly substitutable, even for firms with access to bond markets.

Next, we shift our focus to the real effects of these debt choices during crises. In the third step of our analysis, we show that debt contract terms significantly impact firms' real outcomes several quarters into the future. In the final step, we investigate whether the higher cost of bonds during crises and the perverse real effects of high debt cost together translate into real outcomes of bond issuing firms comparing unfavorably to those of firms that are able to obtain bank loans during crises. Surprisingly, we do not find robust evidence supporting this expected outcome, suggesting that in spite of choosing their less preferred debt source, and incurring higher cost for it, firms that switch to bonds do not suffer in terms of their real outcomes. This "absence" of real effects seems to confirm the suggestion in previous work that large firms do not suffer output and employment losses since they can easily substitute to bonds. However, this average result masks the underlying heterogeneity in firm outcomes. We show that among the bond-issuing firms, the smaller ones are indeed hurt in their real outcomes. The larger firms tide over the high costs of public debt by employing several strategies so that their output, investment, and employment do not suffer perverse consequences. We find, for example, that when firms switch from loans to bonds during crises, their cash holdings drop significantly while firms continuing to access loans exhibit no such decline in cash holdings.

Whether and how credit disruptions affect real outcomes along business cycles has been a long standing question in macroeconomics. A large theoretical literature (Bernanke and Gertler (1989), Holmstrom and Tirole (1997), Kiyotaki and Moore (1997), and Diamond and Rajan (2005)) shows that credit supply significantly impacts economic outcomes. Establishing this empirically has proved challenging since credit is highly pro-cyclical, making it difficult to distinguish changes in credit demand from those in its supply. However, recent studies have used the events of the Great Recession to distinguish between the two, and show that bank lending decline during the recession was attributable largely to credit supply decline (Ivashina and Scharfstein (2010) and Adrian et al. (2013), DeYoung et al. (2015)). Studies further demonstrate that this had a significant negative impact on employment (Chodorow-

Reich (2014), Popov and Rocholl (2016), Greenstone et al. (2014), Glancy (2016)), investment (Amiti and Weinstein (2013), Garicano and Steinwender (2016), Karabarbounis (2015)), and output (Crouzet (2014), De Fiore and Uhlig (2015)).[5] Most of these studies focus only on bank loans. Those that also consider bonds argue that large firms with access to the public bond market do not suffer negative economic consequences (Adrian et al. (2013),Chodorow-Reich (2014), Karabarbounis (2015), and De Fiore and Uhlig (2015)). However, Crouzet (2014) develops a model to show that firms that switch to bonds when bank loans become more expensive do so less than proportionately, likely attributable to precautionary behavior as they lose the flexibility of bank loans and are exposed to greater risk of liquidation. He shows that this less than one-for-one substitution accounts for a third of the decline in investment and output. Contributing to this literature, we are the first to establish empirically that bank credit conditions do impact even the least credit constrained large firms that can substitute towards bonds. We also show that reduced credit supply by a relationship bank, and not the whole system, affects financing costs for firms that switch to bonds sup-optimally.

Our paper also relates to the literature on the determinants of firms' choices between obtaining bank loans and issuing bonds in the public debt market. Several studies show that firms issuing bonds have higher credit quality than those relying on bank loans (see Diamond (1991), Denis and Mihov (2003), Bolton and Freixas (2000), Rauh and Sufi (2010), and De Fiore and Uhlig (2011), among others).[6] We take the evidence presented in this strand of literature as indicative of imperfect substitution between bank and public debt. Our paper contributes to this vein of research by showing how these determinants interact with credit supply conditions to determine firms' debt choices. We further show that the imperfect substitution between bank loans and public debt entails differences in costs incurred by the borrowing firms as well as their real outcomes.

The rest of the paper is organized as follows. Section 2 describes the empirical strategy. In section 3, we provide an overview of our data sources, with more detail available in the Data Appendix. Section 4 presents descriptive statistics. Results are presented in section 5. In section 6, we examine robustness of our results to alternative measures of key variables and sample selection criteria. Section 7 concludes.

2 Empirical Strategy

We examine firm choice between loans and bonds and its consequences for real outcomes in four steps. First, we analyze how this choice differs in times of crisis versus normal times.

[5]Other outcomes have also been examined. See Bassetto et al. (2015) for impact on growth of entrepreneurial firms, Duygan-Bump et al. (2015) for unemployment dynamics, Ramcharan et al. (2016) for consumer credit supply, Lagaras (2014) for corporate innovation, and Siemer (2014) for firm entry. Real outcomes of credit crunch have also been studied in other contexts. See Kalemli-Ozcan et al. (2016), Benmelech et al. (2011), Acharya et al. (2016) and Hansen and Ziebarth (2017).

[6]Other factors impacting firms' debt structures include managerial discretion (Denis and Mihov (2003)), managerial incentive compensation (Meneghetti (2012)), corporate governance (Aldamen and Duncan (2012)), and collateral value (Lin (2015)).

Second, we investigate whether firms that are forced to switch to bonds during crises face more unfavorable contract terms relative to firms that do not display a similar switching behavior. Third, we estimate the effects of debt contract terms on firms' real outcomes. Finally, we examine how debt choices differentially impact firms' real outcomes (investment, output, and employment) during crises. In this section, we describe our strategy for these four analyses.

Step 1: Choice between bank loan and bond:

In this first analysis, our objective is to understand whether changes in bank credit supply influence firms' choice of debt type, specifically between loans and bonds. We estimate the following regression using a linear probability model:

$$D_{it} = \beta_0 + \beta_1 C_t + \beta_2 X_{i,t-1} + \eta_i + \gamma_j + \epsilon_{it} \tag{2.1}$$

where D_{it} is a binary outcome value that equals 1 when firm i issues bonds in quarter t, and zero if it obtains a bank loan. C_t represents bank credit availability in quarter t. We use three measures of this variable – an indicator for whether the economy is in a recession (dated according to either NBER dates or as measured by Berger and Bouwman (2013)), aggregate bank health defined as the fraction of debt demanding firms that are able to obtain a bank loan (this follows Becker and Ivashina (2014)), and credit availability at the bank(s) that firm i has taken loans from in the past, i.e. relationship banks. This last measure is described in detail later.[7] In some specifications, we simultaneously include the aggregate crisis indicators along with the measure of relationship bank health. This helps us assess whether firms' debt choices are influenced by the health of their relationship bank even beyond the effect of the macroeconomic crisis. $X_{i,t-1}$ is a vector of time varying firm characteristics as measured in the previous quarter, including size (log assets), Tobin's Q, tangibility, credit rating (in quarter t), and profitability.[8] F_i represents a vector of firm fixed effects and I_j represents a vector of industry fixed effects. In this regression, the key variable of interest is C_t. The estimated coefficient on C_t provides us a measure of the effect of bank credit availability on the likelihood of firms issuing bonds instead of obtaining loans.

Step 2: Loan and bond contract terms:

Next, we examine the effects of crises on debt contract terms and whether they differ systematically between between loan and bond issuing firms. To do this, we estimate regressions

[7] In the last measure of crisis, the variable is appropriately denoted as C_{it} as it varies both across *firms* and over time.

[8] All variables definitions are described in appendix Table A.1.

of the following form:

$$B_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 C_t + \beta_3 C_t \times D_{i,t} + \beta_4 X_{i,t-1} + \beta_5 B^c_{i,t} + \eta_i + \gamma_j + \epsilon_{i,t} \tag{2.2}$$

where $B_{i,t}$ represents debt contract terms (maturity, spread, or log of real amount) and $B^c_{i,t}$ denotes contract terms other than the regressand. These are included to account for the fact that contract terms are jointly determined. As in step 1, in some specifications, we additionally include the health of the firm's relationship bank along with its interaction with debt choice to assess whether exposure to a weak relationship bank affects a firm's contract terms beyond the impact of the aggregate crisis. The estimated coefficient on the interaction term $C_{i,t} \times D_{i,t}$ provides a measure of the effect of the bond/loan choice on contract terms *in times of crisis*. Note that the presence of fixed effects allows us to capture the effect of a *change in* debt choice (relative to the firm's average behavior) on debt terms in times of crisis. In additional tests, we add the variable $S_{i,t}$, an indicator variable that equals 1 when the firm is a "switcher," i.e., if the firm issues a bond in quarter t for the first time in the last five years, and $S_{i,t} \times C_t$, an interaction term between switching behavior and crisis. These variables identify likely "sub-optimal" switchers directly and measure their contract terms in crisis.

Step 3: Effect of Debt Contract Terms on Real Outcomes:

In the third step, we examine the implications of debt contract terms for firms' real outcomes, namely investment, output, and employment.

$$P_{i,t+n} = \beta_0 + \beta_1 P_{i,t+n-1} + \beta_2 C_t + \beta_3 B_{i,t} + \beta_4 C_t \times B_{i,t} + \beta_5 D_{i,t} + \beta_7 X_{i,t-1} + \eta_i + \gamma_j + \epsilon_{i,t} \tag{2.3}$$

where $P_{i,t+n}$ denotes firm i's performance in terms of investment, output, and employment up to four quarters after the debt choice. We include all debt contract terms (cost, maturity, and log(real amount)) together in this regression. In addition, we include the type of debt issued ($D_{i,t}$) to capture additional effects of the type of debt issued beyond those that operate through the measured contract terms. Note that the only measure of crisis we use in this specification is the Berger and Bouwman (2013) indicator.

Step 4: Effect of Loan/Bond Choice on Real Outcomes:

Finally, we examine the implications of "sub-optimal" debt choices of firms on their real outcomes – investment, output, and employment.

$$P_{i,t+n} = \beta_0 + \beta_1 D_{it} + \beta_2 C_t + \beta_3 C_t \times D_{it} + \beta_4 S_{it} + \beta_5 S_{it} \times C_t + \beta_6 Q_{it} + \beta_7 X_{i,t-1} + \eta_i + \gamma_j + \epsilon_{i,t} \tag{2.4}$$

where P_{it+n} denotes firm i's performance in terms of investment, output, and employment up to four quarters after the debt choice. Q_{it} represents the real value of the debt taken by firm i in quarter t.

Note that while we can observe output and investment at a quarterly frequency, employment is available only annually. Thus, when the dependent variable is employment, t represents a year. In all regressions, standard errors are clustered by year-quarter and are corrected for arbitrary heteroskedasticity. Finally, the presence of firm fixed effects in all of our specifications allows us to identify the effects of *within firm* variation in bond/loan choice on the various outcome measures.

As described in section 5, the analyses in steps 2 and 3 reveal that firms issuing bonds during crises face more unfavorable contract terms than those obtaining bank loans, and that such unfavorable terms adversely impact firms' real outcomes. Yet, estimations in step 4 suggest that bond issuing firms do not suffer in real terms. We explain this puzzling finding by demonstrating that this absence of real effects on average hides the underlying heterogeneity in firm outcomes and strategies used to tide over the higher cost of issuing bonds during crises. To do this, we first document that the choice of debt during crises affects the composition of firms that primarily obtain bank loans, primarily obtain bonds, or regularly choose between both. Previous research informs us that larger and higher credit quality firms tend to issue bonds compared to those that are bank-dependent. Therefore, if some otherwise bank-dependent firms are forced to issue bonds when faced with reduced bank credit supply, this may have a systematic impact on the composition. For example, the bank dependent firms that issue bonds in such periods must be those that have access to the bond markets, and hence, likely to be larger and higher quality firms than those that do not switch to bonds. This would bring down the average quality of firms in both groups, those that primarily rely on banks and those that primarily issue bonds. We analyze if this is indeed the case by documenting in detail the composition of firms in each group along several firm characteristics.

Next, we disaggregate firms along several characteristics to find if there are any sub-groups among the bond issuing firms are indeed adversely affected in their real outcomes by choosing the costly option of issuing bonds during crises. Finally, we examine why some sub-groups that do not witness negative real effects. In particular, we explore the strategies they may have employed to tide over the potentially adverse consequences of costly debt.

3 Data and Sample Selection

To examine the financial costs and real effects of loan-bond substitution in the presence of a bank credit supply shock, we construct a dataset of new debt issues, both loans and bonds, by US firms during the period 1990 to 2010. Our focus on debt *issues* allows us to compare within firm variation in contract terms between loan and bond issues in the presence of a bank credit supply shock and further lets us examine the fate of firms depending on the type of debt

issued *conditional on the time of issue*. In addition, using only issues, we only include firms demanding debt and can, therefore, isolate shocks to bank credit supply. Our chosen sample period includes four sub-periods of financial crises,[9] allowing for a comparison of the causes and consequences of loan/bond substitution between normal and crisis times. To construct this dataset, we combine data from three main sources: quarterly firm level data from Compustat, loan issue data from the Loan Pricing Corporation Dealscan database (henceforth LPC), and public bond issue data from the Thomson One Banker new issues database.

Our sample selection criteria for firms and issues follows that of Becker and Ivashina (2014) who identify a measure of supply side shifts in bank credit and that of Adrian et al. (2013) who focus on separating demand side and supply side shocks to credit in both the banking sector and public loan markets. We first identify all non-financial Compustat firms incorporated in the United States in all quarters in which they report positive assets. We then identify the subset of these firm-quarters in which new debt, either a bank loan or a public loan, is issued. Using the Compustat North America Fundamentals Annual, Fundamentals Quarterly, and Ratings files, we collect firm level balance sheet and income statement variables that measure real outcomes (employment, investment, and output) and firm quality.

We obtain loan level data from a March 2015 extract of the Loan Pricing Corporation Dealscan database (henceforth LPC). These data consist of loan contract information for dollar denominated private syndicated loans made to U.S. corporations over the period 1990 to 2012. The database covers 50% - 75% of the value of all commercial loans in the U.S. (Chava and Roberts (2008)). [10] Following Adrian et al. (2013), we include all loans issued over the sample period with non-missing values for the following contract terms: maturity, amount, lender identification, loan cost, loan type, and stated loan purpose. We consider only those loans whose stated purpose is for real investment activity.[11] Finally, we include only loan issues for which the issuing firm can be mapped to Compustat using the 2012 Dealscan-Compustat link data provided by Chava and Roberts (2008). Using this database, we obtain specific loan terms for the new issues, notably loan amount, cost, and maturity. We are also able to identify the borrowing firms and lending banks and track their lending/borrowing behavior over time. We also use the LPC database to identify the lead lenders for a given loan. To this end, we follow Bharath et al. (2009) and define a lead lender if at least one of the following conditions is met: 1) LeadArrangerCredit = "Yes", 2) LenderRole = "Agent," "Admin agent," "Arranger," or "Lead Bank" and 3) the lender is the sole lender. For our main results, we use all loan issues meeting the above criteria; this includes both term loans and revolvers (lines of credit). In

[9]The four periods of financial crises, as identified in Berger and Bouwman (2013), are: the Russian debt crisis and Long Term Capital Management bailout of 1998, the credit crunch of 1990-1992, the collapse of the dot.com bubble and September 11 terrorist attack of the early 2000's, and the sub-prime lending crisis of 2007-2009.

[10]Chava and Roberts (2008) report that the coverage increased to include an even greater fraction of commercial loans from 1995 onward.

[11]Following Adrian et al. (2013), loans for real investment activity are defined as those with stated primary purpose equal to one of the following: capital expenditure, corporate purposes, equipment purchase, infrastructure, real estate, trade finance, or working capital.

robustness tests, we further restrict our loan issue sample to include only term loans.

We obtain data on commercial bond issues from the Thomson One Banker's New Issues database. The data consist of bond issue details for all U.S. public bond dollar denominated issues during the period 1990 to 2012. Following Adrian et al. (2013), we include in our sample bond issues with non-missing values for the following contract terms: amount, maturity, cost, and stated purpose. Further, we restrict our sample to bonds issued for investment purposes[12]. Finally, we keep only those bond issues for which the borrowing firm can be mapped to Compustat using the CUSIP identifier. We collect specific bond contract terms for these new issues, notably bond amount, cost, and maturity.

Combining the loan and bond data, we are able to identify the population of firms with non-zero demand for debt (either bank debt or public debt) in a given quarter.[13] Our final sample covers 18,015 debt issues (14,607 loan issues and 3,408 bond issues), made by 5,590 unique firms representing 64 unique (2 digit SIC 1987 codes) industries over the 84 quarters in the sample period 1990 to 2012.

In order to evaluate our hypotheses relating loan/bond substitution to contract terms and real firm outcomes in the presence of a bank credit supply shock, we require measures of the following: bank credit supply, debt contract terms, and firm characteristics. We describe these measures below.

Bank Credit Supply Shock Measures

Our identification relies on comparing loan and bond issues in normal times versus times of reduced bank credit supply. We identify times of reduced credit supply for both the aggregate banking sector and for individual banks. A credit supply shock to an individual bank, and not to the whole banking sector, could also affect loan/bond choice for firms dependent on that bank. Bank-firm relationships have been shown to be "'sticky"' (see, for example, Chodorow-Reich (2014)), so that a credit supply shock to an individual bank may force some of its relationship borrowers into a sub-optimal bond issue.

Our main variable identifying times of reduced aggregate bank credit is an indicator taking the value one during financial crises as identified in Berger and Bouwman (2013); we denote this variable $crisis_{BB}$. The following four periods of crisis occur during our sample period: 1) *Credit Crunch* (1990Q1-1992Q4), 2) *Russian debt crisis and Long-Term Capital Management bailout* (1998Q3 - 1998Q4), 3) *Bursting of the dot.com bubble and September 11 terrorist attack* (2000Q2 - 2002Q3), and 4)*Sub-prime lending crisis* (2007Q3 - 2009Q4)[14]. Two of the crisis periods captured by the $crisis_{BB}$ indicator originated in the banking sector (the credit crunch and the

[12]Following Adrian et al. (2013), bonds issued for investment purposes are those with stated primary use of proceeds equal to one of the following: buildings, capital expenditures, construction, general corporate purpose, property development, railways, and working capital.

[13]Of course, we are unable to identify firms that demanded either form of credit but were unable to obtain it.

[14]These crises are identified using a combination of crisis dates used in the literature, financial indicators, newspaper articles, and subjective judgment. For a detailed discussion of dating financial crises, see Chapter 7 of Berger and Bouwman (2015)).

sub-prime lending crisis), while the other two crisis periods originated in other markets, outside of the banking sector. Regardless of the origin of the crisis, all four of these periods displayed reduced banking sector credit. We use two additional measures of aggregate banking sector credit supply. The first is an indicator taking the value one during NBER designated recession periods. The second is the continuous bank credit supply measure introduced by Becker and Ivashina (2014). Becker and Ivashina (2014) separate the supply of bank credit from its demand by conditioning their examination of loan issuance on firms with positive debt demand. They do this by examining the subset of firms which either received new bank loans or issued new bond debt in a given quarter; by revealed preferences these firms demonstrate a positive demand for debt. Conditional on issuing new debt, the authors interpret a debt demanding firm switching from loans to bonds as a contraction in bank-credit supply. Indeed, they find that firms are more likely to switch from bank debt to bond debt in economic downturns. To measure the health of the aggregate banking sector, the authors then calculate the percentage of those firms receiving bank loans in the sample of total debt demanding firms in a given quarter. They find that this aggregate bank credit supply measure is pro-cyclical and has predictive power for bank borrowing by out-of-sample firms. For every quarter t, this measure of aggregate bank health, which we denote BH_{agg}, is defined as follows:

$$BH_{agg,t} = \frac{\text{\# of debt demanding firms in quarter } t \text{ receiving loans in quarter } t}{\text{\# of debt demanding firms in quarter } t}$$

Note that this measure is continuous and is based on a *data driven* identification of the beginning and end of a given bank crisis and not a subjective choice of crisis and non-crisis dates.

Our final measure of bank credit supply is measured at the level of an individual bank. To this end, we adapt the Becker and Ivashina (2014) bank credit supply measure to the level of an individual bank in order to measure the health of bank j in quarter t as follows. First, we define the (j,t) borrower base by identifying all firms that have borrowed from bank j over the five year period preceding quarter t. Of this borrower base, we identify the *debt demanding* subset as those firms with non-zero debt demand in quarter t defined as those firms issuing one form of debt (either bank loan or public bond) in quarter t. Next, we calculate the proportion of these debt demanding firms in the borrower base that was granted a loan by bank j. This is our measure of individual bank health. Formally, the health of bank j at time t, $(BH)_{j,t}$ is defined as

$$BH_{j,t} = \frac{\text{\# of debt demanding firms in } (j,t) \text{ borrower base receiving loan from bank } j \text{ in quarter } t}{\text{\# of debt demanding firms in borrower base of bank } j \text{ in quarter } t}$$

where the index j refers to the lending bank and t refers to time measured in quarters.

This measure yields a value for every bank in every quarter in our sample. To assign this bank level measure to our firm-quarter level observations, we introduce a measure of relationship. We then assign each firm the bank health of its relationship bank. To this end, we

calculate relationship weights for each firm in our sample with each of the 5,454 lending banks for each quarter. The relationship weights are calculated as follows:

$$w_{i,j,t} = \frac{\text{\$ Amount of loans to borrower } i \text{ by bank } j \text{ over the period } t-20 \text{ to } t-1}{\text{Total \$ amount of loans to borrower } i \text{ over the period } t-20 \text{ to } t-1}$$

where the index i refers to the borrower, j refers to the lending bank, and t refers to time measured in quarters as above. To assign the bank-quarter level credit supply measure to the firm-quarter observations, we created a weighted bank health measure for each firm using the relationship weights. Individual bank health for a given firm-quarter is then given by:

$$BH_{i,t} = \sum_{j} w_{i,j,t} \times BH_{j,t}$$

Note that using the relationship weights allows us to assign an individual bank health measure to a firm based on the quarter t health of its most likely lender(s).

Loan and Bond Contract Terms

We examine the effects of loan/bond substitution on debt contract firms, namely cost, amount, and maturity. The cost of debt for loans is defines as the "drawn all-in spread" (henceforth AIS) reported for each loan in the LPC database. The AIS provides a standard measure of the overall cost of a loan and is expressed as a spread (in basis points) over the benchmark London interbank offering rate (LIBOR).[15] For bonds, we obtain cost, defined as the spread (in basis points) between the bond interest rate and the interest rate on the treasury bond of matching maturity, from Thomson One Banker.

In addition to cost, we obtain maturity information, measured in months, for both loan and bond issues from LPC and Thomson One Banker, respectively. Finally, we obtain loan and bond amounts from their respective sources.

Firm Characteristics

Several firm characteristics have been found in the literature to systematically affect a firm's choice of debt structure (see, for example, Denis and Mihov (2003) and Rauh and Sufi (2010)). We follow the definitions in Adrian et al. (2013) for measures of these known determinants. We include two proxies for information asymmetry: firm size measured as log of assets and tangibility, defined as (net property, plant, and equipment) / (total assets). In addition, we include Tobin's Q as a proxy for a firm's investment opportunity. Tobin's Q is calculated as (assets + market value of equity - book value of common equity - deferred taxes)/(total assets). We control for a firm's project quality with measures of credit rating and profitability. A firm's credit rating is given by converting its S&P Domestic Long Term Issuer Credit Rating

[15]The AIS is defined as the coupon spread, plus any annual fee, plus any up-front fee divided by the maturity of the loan. See Berg et al. (2014) for a detailed explanation of the AIS spread and its merits as a measure of overall loan cost.

Table 1: Sample Summary Statistics

Panel A: Firm Characteristics

	Overall				Bond Issuing Firms			Loan Issuing Firms		
	Observations	Mean	Median	Standard Deviation	Observations	Mean	Standard Deviation	Observations	Mean	Standard Deviation
Assets (Millions of USD)	18,015	6,500.74	1,006.60	23,303.85	3,408	16,396.42	32,810.73	14,607	4,191.96	19,760.78
Cash (Millions of USD)	17,980	387.89	32.14	2,041.26	3,403	890.46	2,725.18	14,577	270.57	1,825.78
Cash Ratio (% of assets)	17,980	0.084	0.036	0.123	3,403	0.055	0.083	14,577	0.090	0.130
Investment (Millions of USD)	16,900	104.89	11.41	348.81	3,076	298.38	589.24	13,824	61.84	247.63
Investment Ratio (% of assets)	16,900	0.019	0.011	0.030	3,076	0.020	0.023	13,824	0.019	0.031
Leverage Ratio	17,310	0.320	0.299	0.246	3,237	0.357	0.160	14,073	0.311	0.261

Panel B: Debt Contract Terms

	Overall				Bond Issues			Loan Issues		
	Observations	Mean	Median	Standard Deviation	Observations	Mean	Standard Deviation	Observations	Mean	Standard Deviation
Amount (Millions of USD)	18,015	360.44	150.00	751.14	3,408	467.56	692.90	14,607	335.44	761.95
Cost (bps)	18,015	205.28	175.00	150.96	3,408	207.95	186.16	14,607	204.65	141.49
Maturity (Months)	18,015	62.57	48.00	73.63	3,408	155.71	126.12	14,607	40.84	21.91

Table 2: Summary Statistics: Debt Contract Terms by Aggregate State

Panel A: Normal Times

	Bond Issues			Loan Issues		
	Observations	Mean	Standard Deviation	Observations	Mean	Standard Deviation
Amount (millions USD)	2,138	430.90	607.2251	10,436	364.14	745.38
Cost (bps)	2,138	178.68	172.0081	10,436	198.93	138.12
Maturity (months)	2,138	166.00	140.0863	10,436	43.08	21.74

Panel B: Crisis Times

	Bond Issues			Loan Issues		
	Observations	Mean	Standard Deviation	Observations	Mean	Standard Deviation
Amount (millions USD)	1,270	529.29	813.62	4,171	263.65	797.51
Cost (bps)	1,270	257.24	198.35	4,171	218.96	148.66
Maturity (months)	1,270	138.37	95.81	4,171	35.26	21.31

to an integer value ranging from 1 for a rating of D to 22 for a rating of AAA. The quarterly credit rating is given by the monthly rating assigned during the last month of each quarter. Profitability is defined as (operating income before depreciation) / (total assets). Finally, we control for firm leverage, defined as (debt in current liabilities + long- term debt) / (total assets). All firm level variables are measured at a quarterly frequency and lagged by one quarter when included as controls.

Sample summary statistics are shown in Table 1 and Table 2. The mean firm in our sample

has total assets of $6.5 billion, has a cash reserve that makes up 8.4% of assets, investment that makes up 1.1% of assets, and a leverage ratio of .320. At the time of a debt issue, the average bond issuing firms is larger than the average loan issuing firm ($16.4 billion in assets vs. $4.2 billion), holds a smaller percentage of its assets in cash (5.5% versus 9.0%), and has a slightly higher leverage ratio (.357 vs. .311). Panel B of Table 1 displays summary statistics for the observed debt contract terms in our sample of debt issues. Bonds tend to be issued at larger amounts ($548 million vs. $355 million), have longer maturities (152 months vs. 41 months), and have only slightly higher spread (208 basis points versus 205 basis points). In Table 2, average contract terms of loans and bonds are compared in crisis and in normal times. The costs of bonds and loans both increase in times of crisis, with bonds increasing by more in relative terms (44% increase in bonds spreads vs. 10% increase in loan spreads). The maturities of both bonds and loans decrease in crisis (maturities fall by 28 months for bonds and 8 months for loans).

4 Results

We present results from our analysis following the empirical strategy described in section 2.

Table 3 shows results from a linear probability model where the dependent variable is a binary indicator that equals 1 when a firm issues public bonds in a given quarter and 0 if it obtains a bank loan. Across columns, we use three different measures of crises: Berger-Bouwman indicator (BB crisis indicator hereafter), NBER crisis indicator, and the continuous measure of banking crisis (bank health). Additionally, in all specifications, we include relationship bank health. All specifications also include industry fixed effects, and time varying firm characteristics that previous literature has found to influence firm debt choice between bank loans and public bonds. Moreover, in columns 2, 4, and 6 include firm fixed effects. Note that in these specifications, identification comes from only those firms that choose bonds and bank loans as their source of debt at least once. Firms that make use of only one of these sources throughout the sample period do not provide identification, due to the inclusion of time-invariant firm fixed effects.

The main takeaway from these results is that firms are more likely to issue bonds during crises. This is true both between and within firms. Using the BB crisis indicator, we find that during periods of macroeconomic crises, firms are 6% more likely to issue bonds compared to normal times. This increases to 8-9% if we use the NBER crisis measure. Note that the higher the aggregate bank health measure, the better the banking sector does. Thus, a negative coefficient on bank health indicates that a decline in the health of the banking sector is associated with a greater likelihood of bond issues by firms. Consistent with previous literature, all firm characteristics are positively and significantly associated with the likelihood of bond issues by firms.

Next, in Tables 4 and 5, we examine how the debt contract terms vary between crises and

Table 3: Choice Between Bank Loans and Public Bonds

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Bond or Bank Loan					
Size	0.067***	0.037***	0.065***	0.030***	0.062***	0.009*
	(0.004)	(0.010)	(0.004)	(0.009)	(0.003)	(0.005)
Tobin's Q	0.006***	0.004***	0.007***	0.00423***	0.008***	0.004***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Profitability	0.281***	0.283**	0.282***	0.295**	0.421***	0.288***
	(0.089)	(0.136)	(0.089)	(0.133)	(0.093)	(0.087)
Tangibility	0.181***	0.158**	0.183***	0.165***	0.168***	0.099**
	(0.027)	(0.061)	(0.027)	(0.061)	(0.025)	(0.042)
BB Crisis Indicator	0.062***	0.058***				
	(0.020)	(0.019)				
Relationship Bank Health	-0.141***	-0.208***	-0.141***	-0.207***	-0.0937***	
	(0.015)	(0.021)	(0.015)	(0.021)	(0.010)	
NBER Crisis Indicator			0.0790***	0.0951***		
			(0.026)	(0.022)		
Bank Health					-0.843***	-0.937***
					(0.069)	(0.049)
Constant	-0.397***	-0.128*	-0.380***	-0.0742	0.317***	0.814***
	(0.066)	(0.076)	(0.067)	(0.074)	(0.097)	(0.060)
Observations	8,969	8,969	8,969	8,969	8,969	12,858
R-squared	0.222	0.027	0.221	0.029	0.248	0.054
Industry FE	YES	YES	YES	YES	YES	YES
Number of firms		2,923		2,923		4,505
Firm FE		YES		YES		YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

normal times and whether they change depending on the source of debt chosen by a firm. Table 4 considers the cost of debt, measured as the all in spread. We find that while the crisis itself does not directly influence the cost of debt (coefficients on BB and NBER crises indicators are statistically insignificant), it sharply matters whether firms issue bonds or obtain bank loans during these periods. For instance, columns 1 shows that if a firm issues a bond during a crisis period, its cost is 102 basis points higher than a firm that is able to obtain a bank loan at the same time. Column 2 shows that the same firm's cost goes up 97 basis points by issuing a bond instead of getting a bank loan during crises. These estimates are even higher when we measure crises using the NBER and aggregate bank health measures. Thus, firms that issue bonds during banking crises are substantially worse off in terms of cost of debt compared to loan taking firms. This disadvantage is also evident when we consider maturity periods of bonds versus bank loans (Table 5). Firms that issue bonds during crises get significantly shorter maturities than those obtaining bank loans at these times, or if they themselves had

been able to obtain loans from banks. Columns 1 and 2, for example, demonstrate that they face maturities that are approximately 20 months shorter compared to if they (or other firms) had been able to get bank loans. Results in Tables 4 and 5 together indicate that crises or bank credit supply shocks force firms that need credit to issue public debt even though they face considerably worse debt contract terms. We take this as evidence that bond issues are a sub-optimal debt choice for an average firm during crises.

Given this evidence, we now ask whether the unfavorable debt contract terms negatively affect real outcomes of bond issuing firms. Table 6 presents results for output, measured as log of real sales, and Table 7 presents results for investment, measured as a percentage of total assets. In both tables, columns 1 and 2 consider the real outcome one quarter after the debt is obtained, columns 3 and 4 consider the outcome two quarters ahead, and columns 5 and 6 consider the outcome three quarters ahead. Further, columns 1, 3, and 5 control for the previous period's outcome, so that the coefficients in these columns can be interpreted as providing effects on quarterly growth in that real outcome. The inclusion of fixed effects implies that the coefficients measure the effect of *within firm* change in debt contract terms on a firm's real outcomes. Table 6 shows that the cost of debt, debt maturity, and debt amount of newly issued debt all affect a firm's subsequent sales performance, as evidenced by the statistically significant coefficient estimates on these variables. Specifically, the higher the cost of debt, the lower subsequent sales up to three quarters ahead. Shorter debt maturities are also associated with decreased sales performance. Further, the negative effect of shortened maturities on sales performance is magnified in crisis, as indicated by the negative and statistically significant coefficient on the maturity-crisis interaction term. The negative effect of shortened debt maturity on sales persists for at least three quarters. Finally, lower amounts of debt principal are also associated with decreased sales performance. Table 7 shows that the cost and maturity of newly issued debt both affect a firm's subsequent levels of investment (as a fraction of total assets). Specifically, the higher the cost of debt, the lower subsequent investment up to three quarters ahead. Shorter debt maturities are also associated with decreased investment and similar to sales, this negative effect of shortened maturities on investment is magnified in crisis, as indicated by the positive and statistically significant coefficient on the maturity-crisis interaction term. The negative effects of shortened debt maturities on investment persist for at least three quarters. The evidence in Tables 6 and 7 suggests that debt contracts matter for real outcomes. Taken together with the results previously described, that firms forced to switch sub-optimally to bonds face worse credit terms, these results on real outcomes suggest that loan/bond choice could affect a firm's real performance.

In Tables 8 and 9, we examine the effects of firm debt choice during crises on real outcomes – sales and investment, respectively. In both tables, columns 1 and 2 consider the real outcome one quarter after the debt is obtained, columns 3 and 4 consider the outcome two quarters ahead and columns 5 and 6 consider the outcome three quarters ahead. Further, columns 1, 3, and 5 control for the previous period's outcome, so that the coefficients in these columns can be

Table 4: Cost of Debt

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Cost of Debt					
Size	-32.63***	4.816	-32.84***	0.547	-33.66***	-4.520
	(1.769)	(4.152)	(1.623)	(3.675)	(1.686)	(3.297)
Tobin's Q	-9.110***	-7.264***	-8.804***	-6.949***	-8.161***	-6.315***
	(1.580)	(0.999)	(1.475)	(0.896)	(1.342)	(0.842)
Profitability	-860.4***	-654.4***	-836.9***	-619.2***	-781.0***	-552.4***
	(58.47)	(62.83)	(58.56)	(59.09)	(51.92)	(52.91)
Tangibility	-13.69	-27.40	-12.69	-21.84	-17.15*	-44.56**
	(10.05)	(21.63)	(9.924)	(21.50)	(9.376)	(20.14)
Issued Bond	108.7***	119.9***	113.8***	123.4***	376.9***	371.7***
	(15.23)	(13.11)	(13.69)	(11.91)	(89.82)	(80.23)
BB Crisis Indicator	3.249	8.507				
	(11.69)	(10.13)				
Issued Bond*BB Crisis Indicator	102.2***	97.25***				
	(19.52)	(18.86)				
Relationship Bank Health	-30.54***	-23.49***	-29.31***	-23.47***	-14.14**	-2.912
	(8.552)	(8.632)	(8.494)	(8.515)	(6.697)	(7.715)
Issued Bond*Relationship Bank Health	-110.4***	-112.2***	-106.3***	-100.5***	-23.14	-12.92
	(39.84)	(38.58)	(36.24)	(32.70)	(31.82)	(27.79)
NBER Crisis Indicator			29.42	29.86*		
			(20.98)	(17.16)		
Issued Bond*NBER Crisis Indicator			141.4***	135.5***		
			(16.27)	(18.32)		
Bank Health					-352.2***	-370.1***
					(69.83)	(58.67)
Issued Bond*Bank Health					-345.1***	-329.5***
					(109.0)	(97.94)
Maturity	-0.185***	-0.141***	-0.175***	-0.134***	-0.162***	-0.123***
	(0.042)	(0.031)	(0.037)	(0.027)	(0.035)	(0.028)
Amount of Debt Obtained	5.833**	-2.537	5.189**	-2.670	5.917**	-1.493
	(2.265)	(1.994)	(2.193)	(1.996)	(2.251)	(2.006)
Constant	510.5***	208.2***	512.7***	234.6***	798.3***	570.2***
	(47.92)	(28.64)	(47.50)	(25.36)	(74.78)	(55.25)
Observations	8,969	8,969	8,969	8,969	8,969	8,969
R-squared	0.300	0.217	0.318	0.245	0.337	0.273
Industry FE	YES	YES	YES	YES	YES	YES
Number of firms		2,923		2,923		2,923
Firm FE		YES		YES		YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

interpreted as providing effects on quarterly growth in that real outcome. Table 8 shows that firms that issue bonds during crises see little effect on their sales growth compared to if they had been able to obtain a bank loans. The coefficients are small and statistically indistinguishable from zero. The same result is evident when we look at investment (measured relative to assets) in Table 9. This is surprising since we already saw that bonds become costlier compared to

Table 5: Maturity of Debt

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Maturity of Debt					
Size	0.212	0.155	0.242	1.026	0.318	1.149
	(0.838)	(1.066)	(0.844)	(1.088)	(0.828)	(1.114)
Tobin's Q	-0.314	-0.0799	-0.335	-0.0826	-0.346	-0.0945
	(0.236)	(0.168)	(0.260)	(0.177)	(0.261)	(0.177)
Profitability	-2.781	14.76	-2.567	14.70	-3.751	13.61
	(9.868)	(11.75)	(10.14)	(11.99)	(10.37)	(11.90)
Tangibility	8.247**	22.98**	8.102**	22.01**	8.332**	24.28**
	(3.756)	(10.67)	(3.735)	(10.55)	(3.821)	(10.56)
Bond Issued	109.8***	105.8***	105.3***	101.6***	23.90	34.52
	(7.485)	(6.076)	(6.856)	(5.361)	(26.44)	(26.36)
BB Crisis Indicator	-5.836***	-5.971***				
	(1.431)	(1.402)				
Issued Bond*BB Crisis Indicator	-21.44***	-19.67***				
	(7.313)	(6.206)				
Relationship Bank Health	-0.781	-1.297	-0.741	-0.741	-1.286	-1.606
	(1.218)	(2.234)	(1.147)	(2.208)	(1.184)	(2.227)
Bond Issued*Relationship Bank Health	-11.45	5.682	-6.465	9.905	-25.46	-6.703
	(24.11)	(21.40)	(24.10)	(20.94)	(24.01)	(21.36)
NBER Crisis Indicator			-6.311***	-6.164***		
			(1.558)	(1.533)		
Bond Issued*NBER Crisis Indicator			-19.73***	-17.67***		
			(6.300)	(5.585)		
Bank Health					21.21***	22.77***
					(7.538)	(8.458)
Bond Issued*Bank Health					105.5***	87.04**
					(35.52)	(34.45)
Cost of Debt	-0.0343***	-0.0378***	-0.0335***	-0.0376***	-0.0317***	-0.0359***
	(0.00587)	(0.00551)	(0.00573)	(0.00534)	(0.00671)	(0.00701)
Amount of Debt	3.647***	4.537***	3.853***	4.530***	3.853***	4.546***
	(0.737)	(0.857)	(0.739)	(0.846)	(0.752)	(0.864)
Constant	35.50***	19.63**	33.58***	12.73	15.18	-8.365
	(11.09)	(8.768)	(10.90)	(8.623)	(14.48)	(11.64)
Observations	8,969	8,969	8,969	8,969	8,969	8,969
R-squared	0.388	0.263	0.385	0.259	0.385	0.259
INDUSTRY FE	YES	YES	YES	YES	YES	YES
Number of gvkeyid		2,923		2,923		2,923
Firm FE		YES		YES		YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

loans during crises and that such unfavorable debt contract terms adversely affect firms' real outcomes.

While the results in Tables 7 and 8 are puzzling, we are able to explain this finding. We document that this "absence" of negative real effects for bond issuing firms during crises in fact

masks the underlying heterogeneity in the effects across firms. We first examine whether bond issuing firms are able to tide over the higher costs of debt by employing alternative strategies so as to avoid any negative consequences for their output and investment. Table 10 shows that this is indeed the case when we examine cash holdings. In column 1, cash holdings are measured proportional to assets and in column 2 they are measured in levels. Both specifications include firm fixed effects so that the coefficients are within-firm estimates. The coefficient on whether a firm issues a bond or gets a bank loan indicates that when a firm issues a bond, it does so when it has high cash holdings. As expected, crisis is associated negatively with cash holdings.

Table 6: Association Between Sales and Debt Contract Terms

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Ln (Real Sales)					
	Sales One Quarter Ahead		Sales Two Quarters Ahead		Sales Three Quarters Ahead	
Size	0.176***	0.778***	0.150***	0.749***	0.195***	0.741***
	(0.026)	(0.010)	(0.019)	(0.009)	(0.019)	(0.012)
Tobin's Q	0.009***	0.037***	0.011***	0.039***	0.016***	0.045***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Profitability	-0.450***	0.898***	0.852***	1.522***	1.652***	2.779***
	(0.143)	(0.228)	(0.206)	(0.214)	(0.192)	(0.286)
Tangibility	-0.001	-0.0613	0.010	-0.004	-0.0405	-0.025
	(0.038)	(0.063)	(0.033)	(0.0651)	(0.035)	(0.072)
Loan Issued	-0.036***	-0.059***	0.005	-0.039**	-0.001	-0.037***
	(0.011)	(0.014)	(0.008)	(0.015)	(0.007)	(0.013)
Cost of Debt	-0.000***	-0.000***	-7.81e-07	-0.000***	9.58e-05***	-8.76e-05*
	(3.08e-05)	(5.35e-05)	(4.26e-05)	(5.80e-05)	(3.24e-05)	(4.97e-05)
BB Crisis Indicator*Cost	4.23e-05	-1.42e-05	-1.42e-05	-7.84e-06	-6.78e-05	-3.89e-05
	(4.05e-05)	(5.75e-05)	(6.16e-05)	(7.69e-05)	(4.27e-05)	(8.32e-05)
BB Crisis Indicator	-0.066**	-0.133***	-0.044	-0.136***	-0.026	-0.117**
	(0.025)	(0.037)	(0.027)	(0.042)	(0.027)	(0.045)
Maturity of Debt	-6.21e-05*	-2.38e-05	-6.07e-05*	-7.82e-05	4.39e-05	-1.63e-05
	(3.44e-05)	(4.38e-05)	(3.42e-05)	(4.73e-05)	(3.86e-05)	(5.82e-05)
BB Crisis Indicator*Maturity	0.000**	0.000***	0.000	0.001***	3.50e-05	0.000**
	(7.31e-05)	(0.000)	(8.28e-05)	(0.000)	(6.20e-05)	(0.000)
Amount of Debt	0.017***	0.035***	0.003	0.030***	0.005	0.030***
	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)
BB Crisis Indicator*Amount	0.004	0.013**	0.000	0.007	-0.001	0.002
	(0.004)	(0.006)	(0.005)	(0.008)	(0.005)	(0.009)
Sales in Previous Quarter	0.729***		0.772***		0.730***	
	(0.031)		(0.024)		(0.023)	
Constant	0.274***	-0.0161	0.173***	0.154*	0.0519	0.163*
	(0.046)	(0.076)	(0.046)	(0.078)	(0.052)	(0.097)
Observations	12,518	12,540	12,185	12,199	11,798	11,828
R-squared	0.822	0.681	0.848	0.646	0.841	0.626
Number of firms	4,426	4,430	4,350	4,359	4,268	4,274
Firm FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

However, the main coefficient of interest is that on the interaction between the crisis indicator and whether the firm issues bonds. This estimated coefficient reveals that when firms issue bonds during crises, they witness a large decline in their cash holdings. In column 2, this coefficient is large and highly statistically significant. This suggests that faced with costly debt, bond issuing firms dip into their cash holdings to meet the costs of issuing bonds. This arguably allows them to avoid any potential negative consequences for their real outcomes.

5 Conclusion

Several recent studies conjecture that the lack of employment declines among large firms during the Great Recession is attributable to their ability to switch to bonds when bank credit is

Table 7: Association Between Investment and Debt Contract Terms

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment/Assets One Quarter Ahead		Investment/Assets Two Quarters Ahead		Investment/Assets Three Quarters Ahead	
Size	-0.003***	-0.005***	-0.004***	-0.005***	-0.003***	-0.004***
	(0.007)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tobin's Q	0.001**	0.001**	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	0.042***	0.049***	0.041***	0.052***	0.053***	0.063***
	(0.010)	(0.011)	(0.010)	(0.010)	(0.015)	(0.014)
Tangibility	0.006	0.007	-0.000	0.002	-0.003	-0.003
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Loan Issued	-0.001*	-0.002***	-0.001	-0.002**	-0.002***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BB Crisis Indicator	-0.002	-0.003*	-0.003	-0.004*	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cost of Debt	-1.11e-05***	-1.69e-05***	-1.26e-05***	-1.68e-05***	-1.17e-05***	-1.52e-05***
	(2.63e-06)	(2.60e-06)	(2.42e-06)	(2.36e-06)	(3.01e-06)	(3.03e-06)
BB Crisis Indicator*Cost	-3.18e-06	-2.38e-06	-6.10e-07	-5.71e-07	1.47e-06	1.23e-06
	(2.42e-06)	(2.70e-06)	(2.87e-06)	(3.22e-06)	(3.14e-06)	(3.40e-06)
Maturity of Debt	4.10e-06*	5.35e-06**	1.41e-06	2.64e-06	4.62e-06***	5.06e-06***
	(2.08e-06)	(2.24e-06)	(1.96e-06)	(2.11e-06)	(1.62e-06)	(1.81e-06)
BB Crisis Indicator*Maturity	1.52e-05***	1.81e-05***	8.40e-06*	1.36e-05**	5.85e-06	8.83e-06*
	(4.57e-06)	(5.55e-06)	(4.89e-06)	(5.45e-06)	(3.95e-06)	(4.48e-06)
Amount of Debt	-0.000	-8.08e-05	0.000	0.000	0.002	0.000231
	(0.0000)	(0.000)	(0.000)	(0.000)	(0.000	(0.000259)
BB Crisis Indicator*Amount	0.0000	0.001	0.000	0.000	-0.000	-3.24e-06
	(0.0000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Investment/Assets Previous Quarter	0.241***		0.243***		0.206***	
	(0.0430)		(0.042)		(0.0459)	
Constant	0.035***	0.050***	0.039***	0.052***	0.038***	0.049***
	(0.005)	(0.006)	(0.008)	(0.008)	(0.005)	(0.005)
Observations	12,120	12,172	11,803	11,843	11,442	11,487
R-squared	0.113	0.049	0.106	0.048	0.082	0.042
Number of firms	4,350	4,369	4,287	4,296	4,205	4,218
Firm FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

unavailable. However, we provide several pieces of evidence to demonstrate that this conjecture is not supported by the data. Even firms with access to bond markets do not switch to issuing bonds easily. Although they are more likely to issue bonds during crises, they do so at higher costs and lower maturities than they would have if they had been able to obtain bank loans, as well as compared to other firms who do not make a similar switch away from bank loans. These unfavorable contract terms hurt the real outcomes of the smallest among the bond issuing firms, while others are able to tide over them by employing a variety of alternative strategies, such as dipping into their cash holdings.

Table 8: Real Outcomes of Debt Choice: Sales

	(1)	(2)	(3)	(4)	(5)	(6)
	Sales One Quarter Ahead		Sales Two Quarters Ahead		Sales Three Quarters Ahead	
Size	0.185***	0.809***	0.152***	0.775***	0.199***	0.765***
	(0.026)	(0.010)	(0.020)	(0.010)	(0.020)	(0.012)
Tobin's Q	0.011***	0.040***	0.0106***	0.041***	0.016***	0.047***
	(0.002)	(0.004)	(0.00182)	(0.003)	(0.003)	(0.003)
Profitability	-0.386***	1.065***	0.856***	1.653***	1.615***	2.852***
	(0.146)	(0.234)	(0.199)	(0.214)	(0.190)	(0.289)
Tangibility	-0.002	-0.060	0.00965	-0.003	-0.041	-0.025
	(0.037)	(0.063)	(0.0328)	(0.066)	(0.035)	(0.072)
BB Crisis Indicator	-0.036***	-0.074***	-0.0426***	-0.010***	-0.042***	-0.110***
	(0.010)	(0.017)	(0.0127)	(0.019)	(0.012)	(0.020)
Bond Issued	0.010	0.005	-0.0179***	-0.016	0.010	0.003
	(0.009)	(0.012)	(0.00632)	(0.012)	(0.007)	(0.012)
BB Crisis Indicator*Bond Issued	0.014	0.053***	0.0260*	0.069***	0.004	0.047**
	(0.013)	(0.020)	(0.0144)	(0.021)	(0.012)	(0.022)
Previous Quarter Sales	0.735***		0.773***		0.730***	
	(0.030)		(0.0246)		(0.023)	
Constant	0.191***	-0.176**	0.174***	0.039	0.072	0.084
	(0.045)	(0.079)	(0.043)	(0.075)	(0.052)	(0.093)
Observations	12,518	12,540	12,185	12,199	11,798	11,828
R-squared	0.821	0.676	0.848	0.643	0.841	0.623
Number of firms	4,426	4,430	4,350	4,359	4,268	4,274
Firm FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Real Outcomes of Debt Choice: Investment

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment/Assets One Quarter Ahead		Investment/Assets Two Quarters Ahead		Investment/Assets Three Quarters Ahead	
Size	-0.003***	-0.004***	-0.003***	-0.005***	-0.003***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tobin's Q	0.001***	0.001**	0.000*	0.001*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	0.050***	0.060***	0.049***	0.062***	0.060***	0.072***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.015)	(0.014)
Tangibility	0.006	0.007*	-0.000	0.002	-0.003	-0.002
	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
BB Crisis Indicator	-0.001	-0.001	-0.002***	-0.002**	-0.001**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bond Issued	0.000	0.001	-0.001	-0.001	0.0014**	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BB Crisis Indicator*Bond Issued	0.001	0.001	0.001	0.001	6.83e-05	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Previous Quarter Investment/Assets	0.249***		0.251***		0.212***	
	(0.043)		(0.042)		(0.046)	
Constant	0.031***	0.043***	0.034***	0.046***	0.033***	0.043***
	(0.005)	(0.006)	(0.008)	(0.008)	(0.005)	(0.005)
Observations	12,120	12,172	11,803	11,843	11,442	11,487
R-squared	0.107	0.037	0.101	0.038	0.078	0.034
Number of firms	4,350	4,369	4,287	4,296	4,205	4,218
Firm FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Association Between Cash Holdings and Debt Choice

	(1)	(2)
	Cash Holdings/Assets	Ln (Cash Holdings)
Size	-0.008***	316.6***
	(0.002)	(28.72)
Tobin's Q	0.001*	-7.395
	(0.001)	(7.342)
Profitability	0.084**	-746.0***
	(0.035)	(271.2)
Tangibility	-0.213***	-998.1***
	(0.012)	(165.2)
BB Crisis Indicator	-0.005**	-17.97
	(0.002)	(22.30)
Bond Issued	0.006***	26.41
	(0.002)	(58.45)
BB Crisis Indicator*Bond Issued	-0.002	-278.0***
	(0.003)	(101.8)
Constant	0.211***	-1,331***
	-0.014	(193.5)
Observations	12,840	12,840
R-squared	0.067	0.032
Number of firms	4,501	4,501
Firm FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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