On the Non-Exclusivity of Loan Contracts: An Empirical Investigation*

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Abstract

Theory shows that the non-exclusivity of financial contracts generates important negative contractual externalities. Employing a unique dataset, we identify how these externalities affect credit availability. Using internal information on a creditor's willingness to lend, we find that a creditor reduces its willingness to lend to a borrower when the borrower obtains a loan at another creditor ("outside loan"). Consistent with the theoretical literature, the effect is more pronounced the larger the outside loans and it is muted if the initial lender's existing and future loans retain seniority over outside loans and are secured with valuable collateral.

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1. Introduction

Financial contracts are non-exclusive. In credit markets, for example, borrowers cannot credibly commit to take loans from at most one creditor and creditors cannot completely prevent borrowers from taking credit from others. This is because contracts cannot be made fully contingent on loans from other creditors and in particular on future creditors who have not yet lent to the borrower. Such loans, however, could adversely affect a borrower's probability of repayment by exacerbating moral hazard and incentives for strategic default (e.g., Bizer and DeMarzo (1992) and Parlour and Rajan (2001)). The prospect of such loans is expected to worsen the borrower's access and terms of credit. When non-exclusivity is pervasive and cannot be contained, it could also lead to overborrowing, high rates of default, credit rationing, and market freezes.[1]

The non-exclusivity of credit contracts has played an important role in several financial crises such as the Latin-American debt crisis in the 1970s and the Asian crisis in the 1990s (Radelet and Sachs (1998) and Bisin and Guaitoli (2004)). Non-exclusivity has also been identified as an important factor behind the high interest rates and default rates in the consumer credit card market (Parlour and Rajan (2001)). More recently, the non-exclusivity in the credit derivatives market has played a central role in the financial crisis of 2007-2008. Acharya and Bisin (2011), for example, argue that the non-exclusivity of financial contracts coupled with the opacity of the over-the-counter (OTC) markets—where credit default swaps (CDS) trade— played a central role in the current financial crisis by creating severe counterparty risk externalities. The risk that a party—in this case

[1] Several theoretical papers studied the role of non-exclusivity in financial contracting. See, among others, Bizer and DeMarzo (1992), Kahn and Mookherjee (1998), Parlour and Rajan (2001), Bisin and Guaitoli (2004), Bennardo et al. (2009), and Attar et al. (2010) for a theoretical analysis of non-exclusivity in different game-theoretic settings.

the seller of a CDS— might not be able to fulfill its future obligations depends largely on other, often subsequent, exposures. In a theoretical model, the authors show that more transparency on counterparty risk exposures in the OTC market could have helped the contracting parties to internalize the externalities.

These insights are in line with parallel theoretical work on the role of the institutional framework on credit markets. Collateral and credit registries, for example, could help creditors protect their claims and thus dampen the impact of non-exclusivity on credit availability. Collateral, whose effective use is facilitated by a collateral registry, could mitigate moral hazard and incentives for strategic default (Holmström and Tirole (1997) and Parlour and Rajan (2001)). Credit registries could in some cases allow lenders to effectively employ ex-post punishment to enforce exclusivity or mitigate the resulting externalities by conditioning their terms on loans from others (Bennardo et al. (2009)).

Despite the substantial theoretical work on the impact of non-exclusivity on financial contracts and its role in major financial crises up to now, no direct test of the impact of non-exclusivity on credit availability was possible due to lack of adequate data. This paper aims to fill this void by employing a unique dataset containing information on a creditor's internal limit to the borrower both before and after a non-exclusivity event realizes. The internal limit indicates the maximum amount this creditor is willing to lend to a borrower; it represents the amount for which the bank's loan supply becomes vertical. Changes in the internal limit represent changes in loan supply. Hence, using this information, we investigate how a creditor's willingness to lend reacts after a firm with whom it held an exclusive relationship acquires loans from other creditors, which we refer to as "outside loans". This would not be possible using data on the outstanding level of

credit as this is an equilibrium outcome driven both by demand and supply factors whereas the theory concerns supply effects. The empirical analysis takes place in a setting where individual trades with other creditors can be observed and contractual features, such as collateral, can be employed more effectively.

Our empirical evidence is consistent with the theories on contractual externalities. We find that when a previously exclusive firm, obtains a loan from another bank, the firm's initial bank decreases its internal limit to the firm and it decreases it more the larger the size of the outside loans. We find that $1 from another bank leads to a decrease in the initial bank's willingness to lend by 34 to 50 cents. As explained later, these estimates should be viewed as a lower bound on the effect of the negative externalities on credit availability and are not driven by reverse causality, omitted variable bias, or a reduced ability to extract rents. Consistent with the theoretical literature on contractual externalities, we also find that the initial bank's willingness to lend does not change when its existing and future loans are protected from the increased risk of default. In particular, we find that an outside loan does not trigger any change in the initial bank's willingness to lend if its existing and future loans retain seniority over the outside loans *and* the claims are secured with assets whose value is high and stable over time.

While there have not been direct investigations of the non-exclusivity externality using information on a bank's credit supply, several papers have investigated the reasons and the impact of establishing single versus multiple bank relationships. Some studies have found that older and larger firms and firms in countries with a lower degree of judicial efficiency are more likely to maintain multiple relationships (for an overview of the empirical studies see e.g., Degryse, Kim and Ongena (2009)). Some papers also find that

firms that borrow from multiple banks are of lower quality (see, for example, Petersen and Rajan (1994)). Farinha and Santos (2002) follow the debt share of firms after initiating multiple relationships. They find that the bank with which the firm had an exclusive relationship only provided about half of the firm's bank debt after three years. While the findings are overall consistent with the presence of significant negative externalities stemming from the non-exclusivity of loan contracts, these studies do not identify the driving force behind these associations as they cannot disentangle demand and supply factors. For example, the initial bank's debt share may decrease as the firm demands fewer loans from that bank. Our paper in contrast identifies how the initial bank's supply is modified as we observe the initial bank's maximum willingness to lend to the firm.

The remainder of the paper is organized as follows. Section 2 reviews the literature and develops two testable hypotheses. Section 3 presents the data and the institutional setting, while Section 4 describes our identification strategy. Section 5 discusses our results and various robustness checks and Section 6 concludes.

2. Hypotheses on the Impact of Non-Exclusivity in Financial Contracting

To structure our empirical analysis, we discuss the extant theoretical literature and summarize the key insights in two testable hypotheses. We also briefly review the institutional environment to better position our study into this literature. Finally, we discuss alternative theories and their implications for our analysis.

As mentioned earlier, the inefficiencies resulting from the non-exclusivity of financial contracts are addressed in several theoretical papers, each highlighting different sources of the resulting externalities. Regardless of the model employed, additional outside

lending imposes externalities on the existing lender by increasing the borrower's probability of default— the specific channel varies across models.

In Bizer and DeMarzo (1992) and Bennardo et al. (2009) an outside loan imposes an externality on prior debt by exacerbating the borrower's *moral hazard* incentives. Everything else equal, a higher total indebtedness reduces the borrower's work effort leading to higher probability of default as in Holmström (1979) and Holmström and Tirole (1997). The outside loan imposes an externality on existing debt because the terms of the loan do not reflect the resulting devaluation of the existing debt. This is in contrast to a one-creditor environment where all effects from additional loans are internalized. Because new lenders do not pay for the externality they impose on existing debt, they can offer loans with more attractive terms.[2] As a result borrowers cannot credibly commit to exclusivity. Recognizing the possibility of future outside loans, the initial creditor requires higher interest rates for any given loan (or put differently lends a smaller amount for any given interest rate) than it would if borrowers could commit to exclusivity. This in turn decreases the maximum amount of loans that the borrower can support.

In Parlour and Rajan (2001) and Bennardo et al. (2009) the non-exclusivity creates incentives for *strategic default*s. The authors show that when multiple lenders can simultaneously offer loans to a borrower, incentives to overborrow with intentions to default could arise when borrowers can exempt a large fraction of their assets from bankruptcy proceedings. Everything else equal, these incentives increase in the total

[2] This sequential contracting creates incentives for *opportunistic lending* i.e., lenders have incentives to target the customers of other creditors with attractive offers at the expense of the initial lenders. These incentives arise because new lenders do not pay for the externality they impose on existing debt, while they can protect their own claims from the increased risk (through higher interest rates, for example).

amount borrowed. Multiple lending in this setting creates a negative externality to all lenders as each loan increases the default risk of the others, which inhibits competition and undermines the availability and the terms of credit. When the externalities are pervasive, it could also result in credit rationing (Bennardo et al. (2009)).

Overall, the theories on contractual externalities predict that when a borrower obtains a loan from another creditor, the maximum amount that the borrower's initial creditor will be willing to lend to this borrower should decrease and it should decrease more the larger the outside loan.[3] This motivates our first testable hypothesis:

(H1) *The theory on contractual externalities predicts that when a borrower obtains an outside loan, the maximum amount that the initial creditor will be willing to lend to the borrower will decrease and it will decrease more the larger the outside loan.*

Creditors could employ several contractual features to mitigate the externalities resulting from the non-exclusivity of debt contracts. For example, they could use *covenants* that make loan terms contingent on future borrowing from other sources. Such covenants, however, are not widely used because they introduce other inefficiencies.[4]

[3] In Bizer and DeMarzo (1992), for example, a rational initial creditor anticipates the firm may seek additional loans up to the creditor's willingness to lend. These additional loans may be taken at the initial creditor or outside creditors. If the initial creditor correctly anticipated the externalities from outside loans in its pricing of prior debt, when an outside loan is obtained, the initial creditor's willingness to lend to the borrower should drop by an equal amount. A smaller drop is expected when the initial creditor's willingness to lend is partially lower in anticipation of an outside loan.

[4] For example, with the use of debt covenants creditors could permit future borrowing only with the approval of existing creditors. This, however, would give veto power to existing creditors and open the door to hold-up problems (see, for example, Smith and Warner (1979) and Bizer and DeMarzo (1992)). Although hold-up problems could be mitigated if contracts could specify ex ante the exact circumstances under which borrowing would be allowed, designing fully state-contingent contracts is very difficult in practice and often prohibitively expensive. Making debt callable is an alternative

Moreover, as Attar et al. (2010) point out, the ability of covenants to enforce exclusivity is bounded by limited liability; in some cases covenants may even aggravate the problem by creating incentives for opportunistic lending.

Another approach, first discussed in Fama and Miller (1972), is to *prioritize debt* (i.e., allow the borrower's existing debt to retain seniority over new loans). While prioritization avoids dilution of prior debt, Bizer and DeMarzo (1992) point out that this will not solve the externalities from sequential contracting if the higher levels of debt increase the incentives for moral hazard. Asking borrowers to pledge *collateral* could mitigate the increased incentive for moral hazard i.e., the fear of losing the pledged assets could induce high effort (Holmström and Tirole (1997)).[5] According to Parlour and Rajan (2001), collateral could also be interpreted as a commitment to accept only one contract since it is by definition a non-exempt asset.[6]

A *floating charge* on the borrower's assets—a special form of collateral that carries over to future loans— could be an effective way to mitigate the contractual externalities as it allows the initial creditor's existing and future loans to retain seniority over future outside loans *and* at the same time curtails incentives for moral hazard and strategic default

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mechanism. As pointed out in Bizer and DeMarzo (1992), this would solve the problem only if the call price equals the fair market value of debt in the absence of further borrowing. For this to be true the contract would either have to specify the fair market value ex ante, which is as complex as writing a fully state-contingent contract or base the call price on the ex post market price of debt, which again gives rise to hold-up problems.

[5] Collateral is also motivated in the literature as a way to mitigate other ex post frictions such as difficulties in enforcing contracts (Banerjee and Newman (1993), Albuquerque and Hopenhayan (2004)) and costly state verification (e.g., Townsend (1979), Gale and Hellwig (1985), Williamson (1986), and Boyd and Smith (1994)).

[6] In the context of Attar et al. (2010) valuable collateral could be viewed as a way to sidestep limited liability (i.e., an alternative to using courts to enforce unlimited liability).

resulting from the higher levels of debt.[7] The degree to which a floating charge will mitigate the externalities from outside loans depends positively on the value of the pledged assets and negatively on the volatility of their values (see, for example, Bennardo et al. (2009)). If, for example, the initial creditor's loss in the event of default is negligible, an outside loan will not impose any externalities to the existing lender and thus should not trigger any changes in its willingness lend. Regular collateral might not solve the externalities as it does not extend to future loans. This leads us to our second testable hypothesis:

(H2) *The theory on contractual externalities predicts that an outside loan will not trigger a change in the initial creditor's willingness to lend if the initial creditor's existing and future claims are fully protected.*

H1 and H2 are tested in the context of a modern banking system, where collateral and credit registries are operational, allowing lenders to mitigate the negative externalities from the non-exclusivity of loan contracts. Everything, else equal, collateral registries facilitate the effective use of collateral (Haselmann et al. (2010)). Similarly, information sharing through credit registries could allow lenders to mitigate the negative externalities by conditioning their offers on future borrower behavior (see, for example, Bennardo et al.

[7] Djankov et al. (2008) find that debt contracts secured with a floating charge are enforced more efficiently: they have higher recovery rates and shorter enforcement times.

(2009)).[8] Before turning to a detailed description of our data and the institutional framework we briefly discuss the predictions of alternative theories.

In addition to the literature on contractual externalities, alternative theories predict that multiple financing sources may actually decrease the borrower's probability of default, and thus increase the initial creditor's willingness to lend. (The outside loan and the initial bank's willingness to lend are complements.) This could happen, for example, if the outside loans facilitate a worthwhile project that the initial creditor could not finance alone (e.g., due to lack of sufficient liquidity as in Detragiache et al. (2001) or a too large exposure to the borrower as in Hertzberg et al. (2011)).[9] In sharp contrast with H1, an outside loan in this case should increase the initial creditor's willingness to lend and it should increase it more the larger the outside loan. Hence, finding evidence consistent with H1 would not necessarily imply that these alternative theories are not at work. It would only imply that the theories on contractual externalities are at work and that they are sufficiently important to dominate empirically.

3. Data and Institutional Setting

[8] Bennardo et al. (2009) point out that although information sharing is expected for the most part to mitigate the contractual externalities and expand the availability of credit it could also facilitate opportunistic lending if the value of the assets securing the existing debt is very volatile. See also Attar et al. (2010) on the limitations of covenants due to limited liability.

[9] Hertzberg et al. (2011) write that "a bank's optimal level of lending is … due to the complementarity, increasing in the expected level of lending of another bank (p.386)." In addition, the willingness of another lender to extend credit to a borrower could also be perceived as a positive signal about the borrower's quality (e.g., Biais and Gollier (1997)). A signal from another lender could be particularly useful when the initial creditor is relatively uninformed or the prospects of the borrower are uncertain.

The paper makes use of a unique dataset containing detailed information on all corporate clients of one of the four largest banks in Sweden.[10] The dataset contains detailed information on the contract and performance characteristics of all commercial loans between April 2002 and December 2008 as well as information about the borrowing firm. For each loan, we observe the origination and maturity dates, type of credit, loan amount, interest rate, fees, collateral as well as its subsequent performance. For each firm, we observe its industry, ownership structure, credit history, credit scores as well as the bank's internal limit to the firm—our key variable.

A bank's internal limit to a firm indicates the maximum amount that the bank is willing to lend to the firm. In economic terms, it indicates the amount for which the bank's loan supply becomes vertical. Hence, changes in the internal limit represent changes in loan supply. Loan officers are not allowed to grant loans that exceed the limit— they can only lend up to that amount. The internal limits are not directly communicated to firms as they do not involve a commitment from the bank.[11] This is in sharp contrast to credit lines that are communicated and are typically committed.[12]

A firm's internal limit is determined based on the firm's repayment ability. It can change during the so called "limit review" meetings, where the maximum exposure towards the firm is reevaluated. The meetings typically take place once a year on a date

[10] The Swedish banking market is rather concentrated with the four largest banking groups accounting for around 80 percent of total banking assets. At the end of 2003, there were a total of 125 banks established in Sweden.

[11] Although the internal limit is not directly communicated, firms could indirectly learn their internal limits when they become binding. We return to this in the next section when we discuss our methodology.

[12] The extant empirical literature has employed lines of credit to study several aspects of the credit markets such as credit constraints and default risk (see, for example, Sufi (2009), Jiménez et al. (2009), and Norden and Weber (2010)).

determined at the end of the previous meeting, but they can be moved to an earlier date if the firm's condition changes substantially (e.g., if the firm has new investment opportunities or the firm's condition deteriorates substantially). To determine a firm's internal limit, the committee makes use of both internal proprietary information (e.g., the loan officer's evaluation report) as well as external public information. For example, through the main Swedish credit bureau, Upplysningscentralen (UC), the bank can observe whether the firm had recent repayment problems with other banks and non-bank counterparties, the firm's external rating, the number, amount, and value of collateral on all outstanding bank loans as well as the number of loan applications. (The bank identities are not revealed.) This information is updated monthly and at any point in time the bank can obtain a report with historical data for the past twelve months.[13]

Hence, the Swedish institutional setting is such that banks know about past transactions with other creditors and can learn quickly about the borrowers' future borrowing. In addition, Swedish firms have few bank relationships (see e.g., Ongena and Smith (2000)). Non-exclusivity events are therefore part of this institutional setting. This provides us with a unique opportunity to study whether the theories on contractual externalities are at work by studying how the internal limit changes following the origination of loans from another bank. (These loans are not syndicated as otherwise the initial creditor can fully control the borrower's loan taking behavior.) As explained below, the bank's response is benchmarked relative to otherwise similar firms.

To obtain additional information about the firm, the bank dataset is merged with accounting data from the main credit bureau, UC, and information from the Swedish

[13] Information from the firm's annual accounting statements is also provided for corporations.

registration office, Bolagsverket. In particular, to determine a firm's age, the firm's date of registration is obtained from Bolagsverket. The available information from Bolagsverket allows us (as well as current or prospective lenders) to determine whether the firm has posted collateral on any of its outstanding loans and observe whether a lender has a floating charge on the firm. Data on the value and volatility of the floating charge assets are obtained from the bank dataset and the firm's accounting statements.[14]

4. Methodology

To test H1 and H2 we use a matching procedure. This procedure allows us to benchmark the adjustment in the internal limit of firms that obtain loans from other banks (the treatment group) with the adjustment in the internal limit of similar firms that do not obtain loans from other banks (the control group). Similar firms are obtained by matching on several firm characteristics at the time of the non-exclusivity event. By matching, we minimize the likelihood that other factors—besides the loans from other banks— are driving the observed adjustments. Next, we describe in detail how our treatment and control groups are defined as well as the firm characteristics that we match on.

A. Treatment and Control Groups: Definition and Descriptive Statistics

The *treatment group* consists of firms that enter the sample with an exclusive relationship with our bank and at some point during the sample period obtain a loan from

[14] The law determines the types of assets that can be pledged under a floating charge claim and the creditors' rights when a borrower defaults. As of 2004, a floating charge includes inventory, accounts receivable, equipment, real estate, financial assets such as cash, bank deposits, bonds, and stocks and can be invoked during bankruptcy like other collateral types (see Lag (2003:528) om Företagsinteckningar and Cerqueiro et al. (2011)). Banks typically combine a floating charge with a negative pledge clause to ensure the priority and value of the floating charge.

another bank. (We define a relationship as exclusive if the firm borrows only from our bank for at least one year and we refer to the first loan(s) from other banks as "outside loan(s)".) We identify whether a firm obtains an outside loan by comparing the bank's total outstanding loans to the firm with the firm's total bank debt reported in the firm's annual accounting statements. This allows us to once a year identify whether a firm borrows from another bank.

To investigate how the bank responds to an outside loan, we compare the internal limits around the time of the non-exclusivity event. Figure 1 illustrates our event window. Let t' indicate when the firm obtains a loan from another bank (i.e., when the non-exclusivity event takes place). Let t_0 indicate the time that the firm's first accounting statements following the non-exclusivity event are reported (i.e., this is when we can first observe the outside loan(s)) and t_0-*12* to indicate the time of the firm's last accounting statements prior to the non-exclusivity event. Since the bank decides on the internal limit once a year—during its annual limit review meeting— there are two possibilities about the timing of any reaction following the non-exclusivity event: either the meeting is held sometime between t' and t_0 or it is held sometime between t_0 and t_0+*12*. Hence, to evaluate how the bank reacts to the non-exclusivity event we study the change in bank's internal limit between t_0-*12* and t_0+*12* (i.e., the $Limit_{t_0+12} - Limit_{t_0-12}$ of the treated firms).[15]

[Insert Figure 1 about here]

[15] If the firm's relationship with the bank is terminated prior to t_0+*12*, we use the last observed limit between t_0 and t_0+*12*. This involves 6% of the treated firms. About 5% of Swedish firms have accounting periods longer than one year. We exclude those firms from our sample.

Due to the length of the event window and the available sample period, the treatment group contains firms that obtain a loan from another bank any time during the period 2004:04 to 2007:12. Given that data are available between 2002:04 and 2008:12, this allows us to verify that all firms enter the sample period with at least one year of an exclusive relationship with our bank and gives us one year after the last possible non-exclusivity event to observe the bank's limit at t_0+12. We omit firms with an internal limit lower than SEK 100,000 (this corresponds to around US$14,000) at time t_0-12 since such small exposures are typically determined rather "mechanically".[16] Similarly, we do not include non-exclusivity events with amounts less than 1 percent of the firm's internal limit at t_0-12 as these may stem from noise in combining different data sources and externalities are expected to be small (if any). Finally, since our goal is to investigate how the bank's loan supply reacts to the non-exclusivity event, we do not include firms whose internal limit at t_0-12 is binding (i.e., it is equal to their outstanding loans and unused credit lines at t_0-12) and thus can be driven by both demand and supply factors.

This yields a total of 991 treated firms. Figure 2 reports the number of treated firms in each year as a percentage of the firms with an exclusive lending relationship for which the internal limit is not binding. As can be observed in Figure 2, this percentage is fairly constant over time, ranging between 4.5 and 5.5 percent, which is comparable to switching rates found in other studies (e.g., using data from Portugal and Bolivia, Farinha and Santos (2002) and Ioannidou and Ongena (2010) report rates of 4 and 4.5 percent per year, respectively).

[16] For example, firms may hold a company credit card with a minimum amount. Since we want to focus on strategic interactions, we do not include such automated decisions.

[Insert Figure 2 about here]

In Table 1 we compare the characteristics of the treated firms relative to the "universe" of firms with our bank (i.e., all firms with an outstanding loan at our bank during the sample period).[17] Compared to the "universe", the treated firms are faster growing firms with more tangible assets, lower cash flows, higher risk of default (e.g., higher default probabilities, worse credit ratings, and worse credit histories), larger limits relative to their assets, larger distance to limit, and higher interest rates on outstanding debt.[18] Overall, these differences suggest that the treated firms are not a random draw of the population and highlight the importance of controlling as much as possible for firm characteristics that may influence the bank's internal limits as well as the probability of obtaining an outside loan. Our matching procedure is geared to meet this challenge. [19]

[Insert Table 1 about here]

[17] For the treated firms, we report their characteristics just prior to the outside loan (i.e., at t_0-*12*). Hence, the number of observations is equal to the number of unique treated firms. For the "universe", we report their characteristics for the period they maintained a lending relationship with our bank, which yields 51,164 firm-year observations for 19,197 unique firms.

[18] Approximately 60% of the average treated and control firms' debt is bank debt. Non-bank debt consists almost entirely of trade credit for both the treated and the control firms as most of these firms do not have access to the bond market, a typical characteristic of small and medium sized enterprises with single banking relationships.

[19] We rely on matching per individual firm characteristic rather than on a propensity score. This matching procedure ensures firms are similar on all firm characteristics. The propensity score methodology is often criticized because the same score may be given to firms with very different characteristics.

We begin by identifying a possible set of control firms. This includes firms that, like the treated firms, have an exclusive relationship with our bank at t_0-*12* for at least one year, but unlike the treated firms retain this exclusive relationship for at least until the end of the event window, t_0+*12*.[20] Using information from the accounting statements, the credit registry, and the bank dataset we match the two groups with respect to several characteristics at the beginning of the event window, t_0-*12*. By matching we select the sub-sample of treated firms for which a similar control firm can be found and we benchmark the bank's adjustment in the limit relative to the "matched control" firm over the same period (i.e., using $\left(Limit_{t_0+12} - Limit_{t_0-12}\right)_{treated} - \left(Limit_{t_0+12} - Limit_{t_0-12}\right)_{control}$).

The matching variables are selected with respect to factors that are acknowledged by the bank to be instrumental in its determination of the limits as well as variables that are identified in the literature to affect a firm's likelihood of obtaining an outside loan (i.e., the likelihood of replacing or adding a banking relationship).[21] Hence, apart from matching on calendar-time, the identity of the initial bank, and key relationship characteristics through the way we define the eligible set of control firms, we also match on several firm characteristics. This includes publicly observable firm characteristics as well as characteristics that might only be observable to the initial bank (i.e., proprietary information gathered through past interactions).

[20] In robustness checks, presented in Section 5.1.2, we also require that the control firm got a loan from the initial bank of similar size to the treated firm's outside loan between t_0-*12* and t_0 (i.e., we require that during the same period the matched firms had a similar demand for loans).

[21] See, for example, Detragiache et al. (2000), Ongena and Smith (2001), Farinha and Santos (2002), Berger et al. (2005), and Gopalan et al. (2011). Our bank was not involved in a merger during our sample period (see, for example, Sapienza (2002) and Degryse et al. (2011) for the effects of bank mergers on loan contracts and incentives to seek outside loans).

The set of publicly observable firm characteristics includes industry, age, size, asset growth, tangible assets, cash flows, indicators of leverage such as total debt to total assets and total bank debt to total assets, external credit rating, and indicators of recent repayment problems. Some of these variables are observable (to us and other banks) through the firm's accounting statements. Others are observable through the credit registry. To control for bank proprietary information we also match on the firm's internal limit, the distance to limit (i.e., the difference between the firm's internal limit and its outstanding bank debt and committed but unused credit lines), and the interest rate on the most recently originated inside loan.[22] The internal variables can be particularly useful in capturing relevant firm characteristics that are unobservable to us, but observable to the initial bank and thus key in the determination of the firm's internal limit and incentives to seek an outside loan. These internal variables are included only in our most conservative matching set (Match 2) as they come at the expense of degrees of freedom. Table 2 summarizes and defines our matching variables.

[Insert Table 2 about here]

The matching exercise yields 1,421 pairs corresponding to 350 treated firms and 1,170 control firms (Match 1).[23] When we also match on the internal variables, the sample

[22] When a firm has more than one recently originated loan outstanding at $t_0 - 12$, we use the highest interest rate among those loans. Similar results are obtained if we use the average interest rate or the bank's internal rating instead. Matching on the interest rate as opposed to ratings is preferred for the specifications presented in the tables because the ratings are sometimes missing.

[23] Each treated firm can be matched with more than one control firm. Similarly, a control firm could be a match for more than one treated firm. Treated firms without a match are dropped.

is reduced to 549 pairs with 207 treated firms and 507 control firms (Match 2). The descriptive statistics of the two "matched treated" groups are reported in Table 1 to facilitate comparison with respect to the 991 treated firms that we identified and the "universe" of firms with our bank. The treated firms for which a match can be found are overall better than their 991 treated counterparts. They are older firms, with more tangible assets, higher cash flows, higher leverage ratios, and a lower risk of default (e.g., lower default probabilities and perfect credit histories). They also have smaller outside loans relative to their total assets.

B. Empirical Specifications

Using the matched samples, we estimate the following baseline model:

$$y = \alpha + \varepsilon, \tag{1}$$

where y is the difference in the adjustment of the internal limit between the "treated" firms and their matched "control" firms scaled by their respective total assets at t_0-*12* (we refer to this variable as the bank's "standardized response"):

$$y = \left[\frac{Limit_{t_0+12} - Limit_{t_0-12}}{Total\ \ Assets_{t_0-12}} \right]_{treated} - \left[\frac{Limit_{t_0+12} - Limit_{t_0-12}}{Total\ \ Assets_{t_0-12}} \right]_{control},$$

The dependent variable is scaled by total assets to enhance comparability across firms of different size and we use total assets prior to the outside loans to avoid endogeneity problems. α is the constant term, and ε is the error term in equation (1).

The model is estimated using OLS with the standard errors clustered at the treated firm-level. Because each treated firm can be matched with multiple firms, the point estimates are adjusted by weighting the observations by one over the number of matched control firms for each treated firm as in Ioannidou and Ongena (2010).[24] A negative and statistically significant α indicates that banks decrease their loan supply when a firm originates a loan from another bank, consistent with the theories on contractual externalities and H1. It also implies the net empirical dominance of these theories over alternative theories that predict an increase in the initial creditor's willingness to lend.

To examine whether the bank's response varies with the size of the outside loan we augment equation (1) by adding the size of the outside loan scaled by total assets at t_0*-12*, *OutsideLoan*, as an explanatory variable:[25]

$$y = \alpha + \beta_1 OutsideLoan + \varepsilon, \qquad (2)$$

The constant term, α, measures the bank's response when the *OutsideLoan* is zero, while β_1 measures the degree to which the bank's response varies with the size of the

[24] As discussed later, the results are robust to using different estimation techniques (e.g., clustering the standard errors with respect to both the treated and the control firm as discussed in Cameron et al. (2006), Thompson (2006), and Petersen (2009) or using one observation per treated firm by randomly selecting one of the matched control firms—when the matching procedure yields multiples— and clustering the standard errors at the control firm-level).

[25] To avoid scaling the dependent and independent variables by the same variable we also estimated our model using $\left(Limit_{t_0+12} / Limit_{t_0-12}\right)_{treated} - \left(Limit_{t_0+12} / Limit_{t_0-12}\right)_{control}$ as an alternative dependent variable. All results were qualitatively and quantitatively very similar to those presented later in the paper and are available upon request. The same holds for results on equation (1) and (3).

outside loan. A negative β_1 and a zero or not statistically significant α would be consistent with H1.

To test H2, we augment equation (2) by introducing an interaction between the *OutsideLoan* and the degree to which the initial bank's claims are protected, *Z*:

$$y = \alpha + \beta_1 OutsideLoan + \beta_2 OutsideLoan \times Z + \beta_3 Z + \varepsilon, \quad (3)$$

The constant term, α, measures the bank's response when the *OutsideLoan* is zero and its claims are not protected. β_1 measures the degree to which the bank's response varies with the *OutsideLoan* when its claims are not protected and β_2 measures the difference in the bank's response when its claims are protected. Finally, β_3 measures the bank's response when its claims are protected and the *OutsideLoan* is zero. A negative β_1, a positive β_2, and a zero or not statistically significant α and β_3 would be consistent with H2.

To capture the degree to which the bank's claims are protected, *Z*, we mainly employ three indicators: a dummy variable indicating whether the bank has a floating charge on the firm's assets (*FloatingCharge*) as well as two qualifying variables regarding the value of the floating charge assets (*FloatingChargeValue*) and the volatility of their values (*FloatingChargeVolatility*). The *FloatingChargeValue* is equal to the value of the floating charge assets as reported by the bank, scaled by committed bank debt at t_0*-12* (i.e., outstanding debt plus unused credit lines). The *FloatingChargeVolatility* is equal to the volatility of earnings in the three years preceding t_0*-12* divided by the firm's average assets over that period.

[Insert Table 3 about here]

Table 3 provides descriptive statistics on the characteristics of treated firms with and without a floating charge using our most conservative set of matching variables (Match 2). The two groups of firms are remarkably similar. The only statistically significant difference between them is with respect to age and asset growth: firms with a floating charge are younger with somewhat slower growth. With respect to other characteristics, they appear to be of a slightly lower quality (with less tangible assets, lower cash flows, a somewhat higher probability of default, and worse external ratings). These differences, however, are not statistically significant.

5. Results

We now test our two hypotheses. We first document the bank's average reaction after the firm obtains a loan from another bank and the degree to which the bank's reaction depends on the size of the outside loan (H1). We then subject these results to several robustness checks with respect to possible endogeneity issues as well as possible alternative explanations for our findings and then examine the degree to which the bank's response is mitigated when its claims are protected (H2).

5.1. Non-Exclusivity Externalities and the Size of the Outside Loan: Test of H1

5.1.1. Main Results

Table 4 reports our findings with respect to H1. Column (I) reports the bank's average response (i.e., equation (1)). Column (II) documents how the bank's response varies with the size of the outside loan (i.e., equation (2)). For both specifications we match the "treated" and "control" firms with respect to all the variables discussed above except for the bank-internal variables— the latter are added in corresponding specifications reported in Columns (III) and (IV).[26] As mentioned earlier, matching on the internal variables allows us to better control for unobserved firm heterogeneity.

[Insert Table 4 about here]

Regardless of our set of matching variables, we find a negative and statistically significant constant term (i.e., the α in equation (1)), consistent with H1. In terms of magnitudes, we find that the "treated" firms' internal limit to total assets ratios drop on average by 6.6*** (Column (I)) and 6.2*** (Column (III)) percentage points more than the ratios of similar "control" firms.[27] This amounts to a drop in the treated firms' average internal limit to total assets ratio of 15 and 14 percent, respectively. All in all, these results are consistent with banks adjusting their internal limits downwards in view of the negative externalities resulting from the outside loans.

[26] Theses specifications are estimated using OLS, weighting the observations by one over the number of control firms per treated firm and clustering the standard errors with respect to the treated firm. Similar results are obtained if the standard errors are clustered with respect to both the treated and the control firm. This procedure, however, does not allow for weighting the observations. Hence, we also estimate the model using one observation per treated firm by randomly selecting one of the matched control firms and clustering the standard errors with respect to the control firm. Results are again similar with those presented in Table 4.

[27] ***, **, * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Consistent with this interpretation we also find that the bank decreases its internal limit more, the larger the outside loan. In terms of magnitudes, we find that the coefficient of the *OutsideLoan* (i.e., the outside loan to total assets ratio) in equation (2) ranges between -0.335*** (Column (II)) and -0.408*** (Column (IV)), depending upon the matching variables, whereas the constant term is not different from zero. In terms of economic significance, a 1-standard deviation increase in the *OutsideLoan* (which is around 0.25 in both matched samples) induces a drop in the limit to total assets by 0.084 to 0.11 (i.e., -0.335*0.25 in Column (II) and -0.408*0.269 in Column (IV)). This amounts to a drop in the average treated firm's limit to total assets ratio of 19.6 to 24.4 percent, respectively. The estimated coefficients in Columns (II) and (IV) also imply that $1 from another bank leads to a drop in the internal limit by 34 to 41 cents, respectively.[28]

All in all, our findings suggest that the initial bank decreases its loan supply once borrowers become non-exclusive and it decreases it more the larger the outside loans, consistent with the theories on contractual externalities. Our estimates should be viewed as a lower bound on the effect of the negative externalities on credit availability. There are several reasons for this. A firm's initial limit, for example, could already be lower reflecting the anticipation of an outside loan. Alternatively, contractual features (such as collateral and other covenants) may allow banks to mitigate the negative externalities for a sub-sample of firms, resulting in a lower average adjustment. Finally, the alternative

[28] The change in the treated firm's limit at $t_0 + 12$ following a change in outside loan at t_0 is equal to β_1. This is obtained by multiplying both sides of equation (2) with the treated firm's total assets at t_0 and then taking the derivative with respect to the size of the outside loan. This is possible because the scaling variable, total assets at $t_0 - 12$, is not a function of the outside loan.

theories which predict an increase in the limit might also be at work. Next, and before turning to H2, we discuss several robustness checks.

5.1.2. Robustness Checks: Alternative Explanations and Additional Controls

We begin by investigating whether our findings are driven by alternative explanations such as reverse causality, omitted variable bias, and reduced ability to extract rents. For all cases, to conserve space we report results for our most conservative matching set, Match 2, which allows us to better control for unobserved firm heterogeneity.

[Insert Table 5 about here]

One possibility is that our findings are driven by *reverse causality*: a prior and gradual reduction in the internal limit has pushed the firm to another bank. To investigate this possibility we examine how the internal limit behaves in the period just prior to the non-exclusivity event i.e., t_0*–24* and t_0*–12*. Re-estimating equations (1) and (2) using the earlier timing for our dependent variable, we find no evidence of reverse causality as both α and β_1 are close to zero and not statistically significant (see Table 5, Columns (I)-(II)). Note further that failure to increase the limit and accommodate the growing needs of a firm could also be a reason to seek outside loans, but this explanation does not account for our findings as it does not predict a decrease in the internal limit. In the absence of any externalities, a firm's internal limit is not expected to change.[29]

[29] This alternative explanation could have accounted for our findings if instead of the internal limit we were using the firm's outstanding debt at the initial bank, which often decreases over time as firms add or replace relationships (see Farinha and Santos (2002)).

A second possibility is that our findings are driven by an *omitted variable bias*. Firms with private information about deteriorating future performance may have incentives to secure additional credit before their bank and other potential creditors learn this. Hence, the decreases in the internal limit that we document could be adjustments to the news about their performance. (Our internal variables control for factors that are observable to the initial bank, and thus do not account for this possibility.) To investigate this possibility we re-estimate equations (1) and (2) for the sub-sample of high quality firms (with a probability of default < 2 percent and no recent repayment problems at t_0–*12*) whose condition did not deteriorate during the event window. As can be observed in Columns (III)-(IV) of Table 5, the results are slightly stronger than those presented earlier in Table 4, suggesting that our findings are not driven by this alternative channel.

Next, we also investigate whether the observed decreases in the internal limit are driven by reduced ability to extract informational rents. Proprietary information gathered over the course of a bank-firm relationship might allow banks to extract rents from opaque firms that find it difficult to switch to other credit providers (see, for example, Sharpe (1990), Rajan (1992), and von Thadden (2004)). Although an outside loan would imply a reduced ability to extract rents, it is unclear that it should lead to a decrease in the bank's willingness to lend to the borrower. The initial bank might temporarily become more aggressive in an attempt to win the "switching" borrower back. (This is in fact consistent with evidence in Ioannidou and Ongena (2010) who find that subsequent loans to "switching" customers are priced even more competitively than the first loan.) Nevertheless, to investigate whether our findings are driven by a reduced ability to extract rents, we re-estimate equations (1) and (2) using the amount of fixed fees on lending

products to total assets at t_0–*12* as an indicator of possible rent extraction. As can be observed in Columns (V)-(VI) of Table 5 the results do not support this alternative explanation: our key coefficients remain unchanged, while the estimated coefficients of fees to total assets are statistically not significant in both specifications.

Before turning to H2, we also investigate the robustness of our findings to a more stringent set of matching variables. In particular, to better control for investment opportunities, we further require that between t_0–*12* and t_0 the matched control firm got an inside loan of similar size to the treated firm's outside loan (i.e., we require that both the treated and the matched control firms had similar demands for loans in the same period). As can be observed in Columns (VII)-(VIII) of Table 5, results are even stronger than those presented earlier— although the number of observations is substantially reduced. Finally, to better control for the strength of a bank-firm relationship, we also match on the length of the firms' relationships with the initial bank. As can be observed in Columns (IX)-(X), the results are similar with those presented earlier.

We now turn to H2, which we believe is also important for identification purposes as alternative explanations for our findings do not have predictions in line with H2. For example, if banks are reducing their limits because of reduced ability to extract rents (and not because of the negative externalities associated with the outside loans) as discussed above, their reaction is not expected to vary with the degree to which their claims are protected. A similar argument could be made for a possible reallocation of internal limits between borrowers in the presence of limit constraints at the bank level.

5.2. Protection of the Initial Bank's Claims: Test of H2

Table 6 presents our findings with respect to H2. We first estimate the model in equation (3) using the *FloatingCharge* dummy for our key explanatory variable *Z*. As mentioned earlier, a floating charge is a special form of collateral that automatically carries over to future loans and thus allows the bank's existing, but also future loans to retain seniority over outside loans. The bank's loans are also secured by the assets under the floating charge. The degree of protection depends on the value of the pledged assets as well as the volatility of their values. Hence, we also estimate the model using *FloatingChargeValue* and *FloatingChargeVolatility* for *Z*. Results with respect to other collateral types, are also presented to better understand the role of the floating charge.

[Insert Table 6 about here]

All specifications are estimated for both Match 1 (Columns I-IV) and Match 2 (Columns V-VIII). Results are qualitatively very similar between them. Hence, to conserve space we only discuss the results using Match 2— our most conservative and preferred set of matching variables. In Column (V), the coefficient of the *OutsideLoan*, β_1, is -0.496***, while the coefficient of the interaction term with the *FloatingCharge*, β_2, is 0.515***, resulting in a combined coefficient of 0.019, which is neither economically nor statistically different from zero. Consistent with H2, we also find that the coefficient of the *FloatingCharge*, β_3, is close to zero and not statistically significant. These findings suggest that when the initial bank's claims are protected through a floating charge, the bank does not react to the outside loan. Instead, when the bank's claims are not protected, $1 from another bank leads to a drop in the internal limit by 50 cents.

Next, we study how the bank's response varies with the characteristics (value and volatility) of the floating charge assets. As can be observed in Column (VI) of Table 6, any given outside loan triggers a smaller reaction, the larger the value of the floating charge assets. The opposite is true for volatility. A floating charge on assets whose values are volatile triggers a larger reaction. In particular, the coefficient of the *OutsideLoan*, β_1, is -0.496***, while the coefficient of the interaction terms with value and volatility are 1.437*** and -8.100*, respectively. In terms of economic significance, our estimates indicate that a 1-standard deviation increase in the *FloatingChargeValue* (i.e., by 0.266), decreases the bank's response to the *OusideLoan* by 0.38 (i.e., 1.437*0.266). Similarly, a 1-standard deviation increase in the *FloatingChargeVolatility* (i.e., by 0.048), increases the bank's response to the *OutsideLoan* by 0.39 (i.e., 8.1*0.048).[30]

To further understand the role of the floating charge, we also investigate the bank's response when its claims are protected through other collateral types (this includes fixed charge claims, pledges and liens). Our indicator, *OtherCollateral*, is a dummy variable that equals one when the bank's existing debt is only secured with other types of collateral (whose value relative to the outstanding loan is greater or equal to 80 percent), and it is equal to zero otherwise. Everything else equal, these other collateral types should be less effective as they do not necessarily allow the bank's future loans to retain seniority over outside loans and they do not automatically carry over to the bank's future loans. They could, however, help mitigate some of the externalities insofar as the fear of losing the pledged assets mitigates the increased moral hazard associated with the higher levels of debt.

[30] This finding is consistent with Bennardo et al. (2009) who argue that volatile collateral values magnify the negative contractual externalities.

Results presented in Columns (VII) of Table 6 suggest that this is not the case. The coefficient of the *OutsideLoan*, β_1, is -0.377**, while the coefficient of the interaction term, β_2, is 0.007. Including the *FloatingCharge* and *OtherCollateral* variables in the same specification yields similar results. In particular, in Column (VIII) the coefficient of *OutsideLoan*FloatingCharge* is 0.500*** whereas the coefficient of *OutsideLoan*OtherCollateral* is -0.007, suggesting that the presence of a floating charge mitigates the negative contractual externalities, while other collateral does not. All in all, these findings suggest that the explanatory power of the floating charge may rest on its ability to protect not only the bank's current but also future loans.

6. Conclusions

Credit contracts are non-exclusive. While a set of theoretical papers study the impacts of non-exclusivity on the initial creditor's behavior, up to now, no empirical study has directly investigated the impact of non-exclusivity on the initial creditor's willingness to lend. In this paper, we aim to fill this gap by employing a unique dataset that allows for the first time to directly investigate how a bank's willingness to lend changes when an exclusive borrower obtains loans from another bank. This would not be possible using data on the outstanding level of credit as this is an equilibrium outcome driven by both demand and supply factors.

Our findings are consistent with the theories on contractual externalities. We find that when a previously exclusive firm obtains a loan from another bank, the firm's initial bank decreases its internal limit to the firm and it decreases it more the larger the size of the outside loans. We further show that our findings are not driven by alternative

explanations such as reverse causality, omitted variable bias, or a reduced ability to extract rents. Consistent with the theoretical literature on contractual externalities, we also find that the initial bank's willingness to lend does not change when its existing and future loans are protected from the increased risk of default. In particular, we find that an outside loan does not trigger any change in the initial bank's willingness to lend if its existing and future loans retain seniority over the outside loans and the claims are secured with assets whose value is high and stable over time.

Although our analysis focuses on credit markets, the insights drawn extend to other markets such as the insurance and credit default swaps markets, where the externalities resulting from the non-exclusivity of financial contracts have recently played a pivotal role in the current financial crisis. The collapse of AIG and Lehman Brothers has only highlighted the pressing need for an improved institutional framework that could help the involved parties to better evaluate and internalize the externalities. Consistent with the theoretical literature, our results highlight that information on counterparty exposures combined with contractual features, such as general collateral that extends to future exposures, could mitigate the externalities from counterparty risk.

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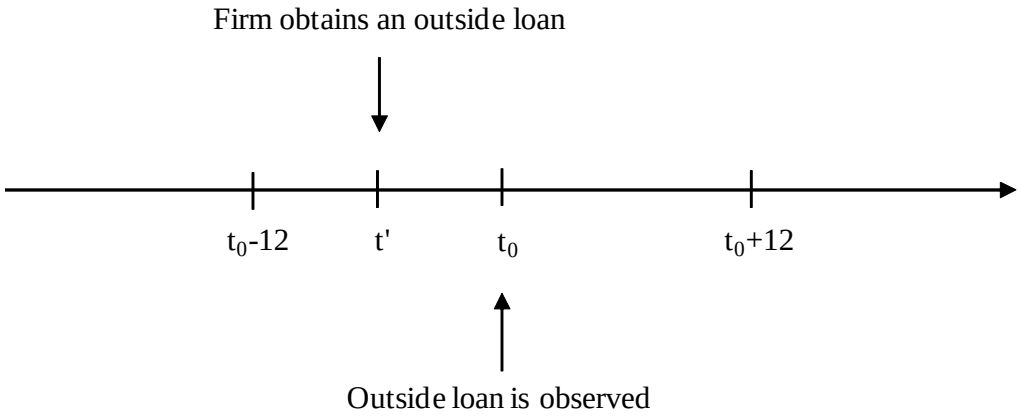
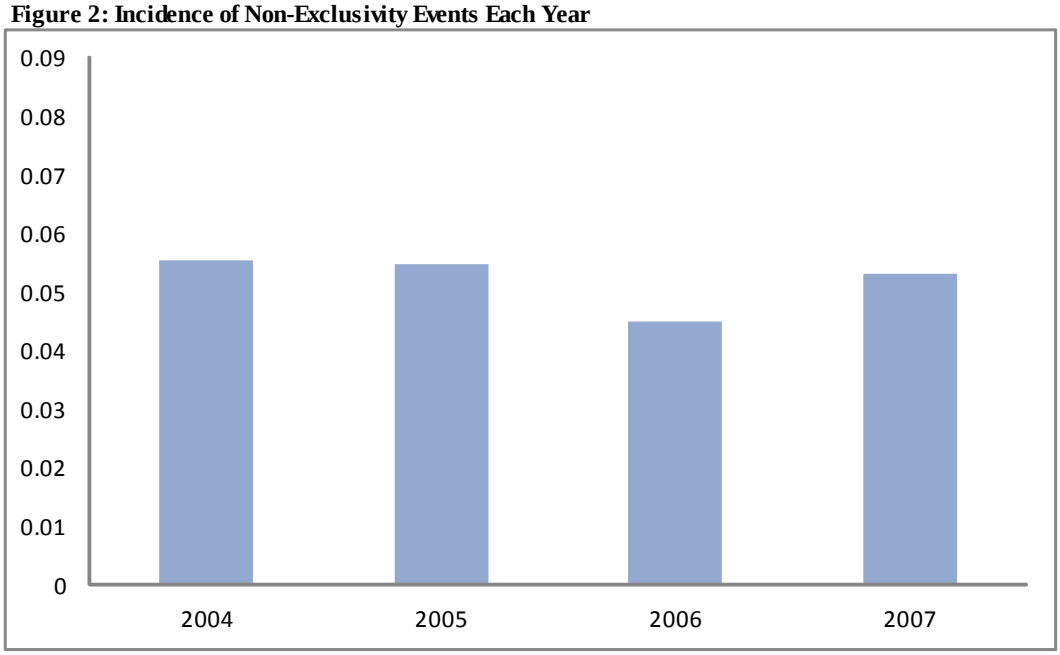
Figure 1: The Event Window



Note.— This figure describes the event window in months. Firms enter the event window with an exclusive lending relationship with our bank. At time t_0 an outside loan, originated at *t'*, is observed through the firm's accounting statements. The window [t_0*-12*, t_0*+12*] captures the bank's response to an outside loan.

Figure 2: Incidence of Non-Exclusivity Events Each Year



Note.— This figure reports the number of treated firms in each year as a percentage of the firms with an exclusive relationship with our bank for the two prior years for which the limit is not binding.

Table 1: Variable Definitions and Descriptive Statistics

Variable Names	Definition	Treated			Universe			Treated (Match 1)			Treated (Match 2)		
		Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Firm Characteristics													
Public													
Age	Number of years since the date of registration	18.828	15.000	14.601	18.927	15.000 *	16.003	20.483 *	16.500 ***	13.870	21.251 **	17.000 ***	14.047
Total Assets	Total assets (in 1,000 SEK)	389,000	3,093	7,600,000	224,000	3,760 ***	3,910,000	24,200	3,006	207,000	10,400	2,890	32,800
Asset Growth	One plus year-on-year growth of total assets	1.119	1.017	0.717	1.042 ***	1.009 **	0.245	1.070	1.028	0.249	1.067	1.036	0.221
Tangible Assets to Total Assets	Tangible assets / Total assets	0.716	0.814	0.270	0.687 ***	0.772 ***	0.274	0.795 ***	0.866 ***	0.192	0.814 ***	0.870 ***	0.173
Cash Flow to Total Assets	Eearnings before interest and taxes / Total assets	0.042	0.045	0.174	0.046	0.052 **	0.192	0.056 ***	0.051 ***	0.084	0.051 ***	0.050 ***	0.070
Total Debt to Total Assets	Total debt (includes all debt obligations, excluding taxes)/ Total assets	0.428	0.424	0.297	0.431	0.415	0.273	0.471 **	0.459 ***	0.218	0.507 ***	0.498 ***	0.206
Total Bank Debt to Total Assets	Total bank debt/ Total assets	0.274	0.212	0.249	0.259 *	0.195 ***	0.254	0.296	0.250 **	0.225	0.336 ***	0.307 ***	0.222
Probability of Default	Probability of default estimated by the main Swedish credit bureau (in percent)	3.106	1.200	5.876	2.773	1.000 ***	6.336	1.805 ***	1.200	2.295	1.816 ***	1.200	2.347
External Rating	Takes values 1, 2,…5, where 1 indicates the worst and 5 the best rating	3.193	3.000	1.118	3.322 ***	3.000 ***	1.089	3.300	3.000	0.852	3.280	3.000	0.835
Recent Repayment Problems	A dummy = 1 if recent repayment problem with third parties, = 0 otherwise	0.032	0.000	0.177	0.021 **	0.000 **	0.142	0.000 ***	0.000 ***	0.000	0.000 ***	0.000 ***	0.000
Private													
Internal Limit	Maximum amount our bank is willing to lend to the firm (in 1,000 SEK)	29,200	1,046	230,000	21,100	927 ***	182,000	10,200	1,251	81,200	5,627	1,253	19,300
Internal Limit to Total Assets	Internal limit / Total assets	0.430	0.367	0.312	0.347 ***	0.295 ***	0.245	0.427	0.396	0.212	0.450	0.421 ***	0.201
Distance to Limit	(Internal limit- debt at our bank - unused credit lines at our bank) / Internal limit	0.135	0.048	0.191	0.115 **	0.021 ***	0.203	0.123	0.048	0.158	0.088 ***	0.037	0.104
Loan Interest Rate	Interest rate on outstanding loans at our bank (in percent)	6.418	6.600	2.201	6.117 ***	6.250 ***	2.347	6.521	6.565	1.750	6.607	6.600	1.609
Internal Rating	Takes values 1, 2,…5, where 1 indicates the worst and 5 the best rating	3.148	3.000	0.890	3.313 ***	3.000 ***	0.892	3.163	3.000	0.775	3.098	3.000	0.762
Relationship Characteristics													
Multiple Relationships	A dummy = 1 if a firm is borrowing from multiple banks, = 0 otherwise	0.000	0.000	0.000	0.305 ***	0.000 ***	0.460	0.000	0.000	0.000	0.000	0.000	0.000
Credit Concentration	Outstanding debt with our bank to total bank debt	1.000	1.000	0.000	0.882 ***	1.000 ***	0.264	1.000	1.000	0.000	1.000	1.000	0.000
Relationship Length	Number of years since the earliest observed credit product at our bank	10.607	10.000	6.278	9.918 ***	9.000 ***	6.453	11.117	10.500	6.440	11.435 *	11.000 *	6.410
Outside Loan & Limit Adjustment (for treated firms)													
OutsideLoan	Outside loan (i.e., size of loan initiated at another bank) / Total assets$_{t_0-12}$	0.179	0.055	0.523	-	-	-	0.125 *	0.045 **	0.250	0.126	0.046 *	0.269
Adjustment in the Internal Limit	[(Limit$_{t_0+12}$ - Limit$_{t_0-12}$)/Total assets$_{t_0-12}$]	-0.061	-0.026	0.337	-	-	-	-0.059	-0.026	0.236	-0.050	-0.026	0.269
Collateral Information													
FloatingCharge	A dummy =1 if initial bank's debt is secured with floating charge, = 0 otherwise	0.066	0.000	0.248	-	-	-	0.077	0.000	0.267	0.077	0.000	0.268
FloatingChargeValue	Value of floating charge assets (estimated by the bank)/Committed debt (if floati	0.494	0.509	0.345	-	-	-	0.542	0.547	0.250	0.561	0.598	0.266
FloatingChargeVolatility	Three-year earnings volatility /three-year average assets (if floating charge=1)	0.102	0.064	0.120	-	-	-	0.076	0.059	0.053	0.077	0.070	0.048
OtherCollateral	A dummy = 1 if our bank 's debt is secured by any other type of collateral with value greater or equal than 80% of the bank's outstanding debt, = 0 otherwise	0.170	0.000	0.376	0.227 ***	0.000 ***	0.419	0.200	0.000	0.401	0.198	0.000	0.400
Number of Firms			991			19,197			350			207	
Number of Observations			991			51,164			350			207	

Note.— We report the mean, median and standard deviation (SD) for the treated group, the universe, the matched treated groups after the first (Treated (Match 1)) and second matching procedure (Treated (Match 2)). The matching variables and procedure are in Table 2. *, **, and *** reported next to the mean and median values of the universe and matched treated groups indicate whether the corresponding values are statistically different relative to the treated group at the 10%, 5%, and 1% levels, respectively. Differences in means are assessed using the Student's t-test. Differences in medians are assessed using the Wilcoxon-Mann-Whitney test for continuous variables and the Pearson's Chi-square test for categorical variables.

Table 2: Matching Variables

Matching Variables	Match 1	Match 2	#	Possible Values
Calendar Time				
Month-Year	X	X	45	2003:04 - 2006:12
Relationship Characteristics				
Multiple Relationships	X	X	1	both treated and control firms have a single lending relationship for at least one year prior to the beginning of the event window
Credit Concentration	X	X	1	both treated and control firms at the beginning of the event window have a 100% of their bank debt at the initial bank
Firm Characteristics				
Public				
Industry	X	X	46	Two digit NACE codes
Age	X	X	2	= 1 if the firm is younger then 10 years, and zero otherwise
Total Assets	X	X	2	= 1 if the treated and control firms have similar total assets (using a (-40%, +40%) window), and = 0 otherwise
Asset Growth	X	X	2	= 1 if the treated and control firms have similar asset growth (using a (-40%, +40%) window), and = 0 otherwise
Tangible Assets to Total Assets	X	X	2	= 1 if the treated and control firms have similar tangible assets to total assets (using a (-40%, +40%) window), and = 0 otherwise
Cash Flow to Total Assets	X	X	2	= 1 if the treated and control firms have similar EBIT to total assets (using a (-20%, +20%) window), and = 0 otherwise
Total Debt to Total Assets	X	X	2	= 1 if the treated and control firms have similar total debt to total assets (using a (-40%, +40%) window), and = 0 otherwise
Total Bank Debt to Total Assets	X	X	2	= 1 if the treated and control firms have similar total bank debt to total assets (using a (-40%, +40%) window), and = 0 otherwise
Probability of Default	X	X	5	probability of default in the [8.05%, 100%), [3.05%, 8.05%), [0.75%, 3.05%), [0.25%, 0.75%), and [0, 0.25%) range
Recent Repayment Problems	X	X	2	= 1 if the firm defaulted on any payments during the last 24 months before the event window, and = 0 otherwise
Private				
Internal Limit		X	2	= 1 if the treated and control firms have a similar internal limit (using a (-40%, +40%) window), and = 0 otherwise
Distance to Limit		X	2	= 1 if the treated and control firms have similar distance to limit (using a (-40%, +40%) window), and = 0 otherwise
Loan Interest Rate		X	3	= 1 if the treated and control firms have similar loan interest rate (using a (-40%, +40%) window), and = 0 otherwise

Note.— The table reports the variables included in the two matching procedures (Match 1 and Match 2), the number of possible values (#) and a list of values for each matching variable. Variable definitions are in Table 1.

Table 3: Firm Characteristics with and without a Floating Charge

Variable Names	Floating Charge			No Floating Charge				
	Mean	Median	SD	Mean		Median		SD
Firm Characteristics								
Public								
Firm Age	12.938	11.500	8.858	21.948	**	17.000	***	14.193
Total Assets	11,800	2,583	21,800	10,300		2,895		33,600
Asset Growth	0.968	0.998	0.180	1.076	*	1.037		0.222
Tangible Assets to Total Assets	0.771	0.804	0.223	0.817		0.870		0.169
Cash Flow to Total Assets	0.028	0.040	0.080	0.053		0.051		0.069
Total Debt to Total Assets	0.518	0.510	0.209	0.506		0.498		0.206
Total Bank Debt to Total Assets	0.322	0.211	0.268	0.337		0.317		0.219
Probability of Default	1.881	1.850	1.442	1.811		1.200		2.409
External Rating	3.188	3.000	0.911	3.288		3.000		0.831
Recent Repayment Problems	0.000	0.000	0.000	0.000		0.000		0.000
Private								
Internal Limit	6,021	924	11,700	5,593		1,294		19,900
Internal Limit to Total Assets	0.488	0.400	0.296	0.447		0.429		0.191
Distance to Limit	0.118	0.033	0.129	0.085		0.039		0.102
Loan Interest Rate	6.090	5.970	1.835	6.650		6.650		1.587
Internal Rating	3.333	3.000	0.866	3.079		3.000		0.754
Relationship Characteristics								
Relationship Length	7.938	7.000	4.074	11.728	**	11.000	**	6.490
Outside Loan & Limit Adjustment								
OutsideLoan	0.133	0.046	0.316	0.118		0.046		0.199
Adjustment in the Internal Limit	-0.023	-0.008	0.261	-0.053		-0.027		0.270
Collateral Information								
OtherCollateral	0.125	0.000	0.342	0.215		0.000		0.412

Note.— We report the mean, median and standard deviation (SD) of the characteristics of firms with and without floating charge included in Match 2. Variable definitions are in Table 1. *, **, and *** reported next to the mean and median values of the no floating charge group indicate whether the corresponding values are statistically different relative to the floating charge group at the 10%, 5%, and 1% levels, respectively. Differences in means are assessed using the Student's t-test. Differences in medians are assessed using the Wilcoxon-Mann-Whitney test for continuous variables and the Pearson's Chi-square test for categorical variables.

Table 4: Non-Exclusivity Externalities and the Size of the Outside Loan: Test of H1

Dependent variable: $[(Limit_{t_0+12}-Limit_{t_0-12})/Total\ Assets_{t_0-12}]_{Treated} - [(Limit_{t_0+12}-Limit_{t_0-12})/Total\ Assets_{t_0-12}]_{Control}$				
	(I)	(II)	(III)	(IV)
	Match 1	Match 1	Match 2	Match 2
Number of Observations (Matched Pairs)	1,421	1,421	549	549
Number of Treated Firms	350	350	207	207
Intercept	-0.066***	-0.026	-0.062***	-0.014
	(-4.176)	(-1.416)	(-2.877)	(-0.559)
OutsideLoan		-0.335***		-0.408***
		(-3.384)		(-3.152)
R^2	-	0.040	-	0.060

Note.— The table reports results from matched regressions relating the standardized response in the internal limit to a constant term (Columns (I) and (III)) and to *OutsideLoan* (i.e. the size of the loan at another bank divided by total assets at t_0-12; Columns (II) and (IV)). Columns (I) and (II) report the results for the first matching procedure (Match 1) whereas Columns (III) and (IV) those for the second procedure (Match 2). The definitions of all variables and matching procedures are provided in Tables 1 and 2, respectively. We weight each observation by one over the number of matched control firms for each treated firm. T-statistics calculated on robust standard errors, clustered on a treated-firm level, are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 5: Robustness Checks: Alternative Explanations and Additional Controls

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
	Match 2	Match 2	Match 2	Match 2	Match 2	Match 2	Match 2	Match 2	Match 2	Match 2
Number of Observations (Matched Pairs)	344	344	339	339	549	549	46	46	201	201
Number of Treated Firms	132	132	154	154	207	207	38	38	122	122
Intercept	0.002	0.008	-0.069***	-0.007	-0.063***	-0.014	-0.089*	0.084	-0.068*	-0.007
	(0.226)	(0.763)	(-3.316)	(-0.351)	(-2.907)	(-0.587)	(-1.854)	(1.560)	(-1.958)	(-0.181)
OutsideLoan		-0.046		-0.610***		-0.403***		-1.719***		-0.435***
		(-1.105)		(-6.471)		(-3.079)		(-3.572)		(-2.870)
Fees to Total Assets					0.020	0.005				
					(1.149)	(0.281)				
R^2	-	0.01	-	0.12	0.00	0.06	-	0.27	-	0.07

Note.— The table reports results for Match 2. Columns (I) and (II) report results on reverse causality, where the dependent variable is the standardized response one year before the treatment (i.e., $[(Limit_{t0-12}\text{-}Limit_{t0-24})/Total\ Assets_{t0-24}]_{Treated}$ - $[(Limit_{t0-12}\text{-}Limit_{t0-24})/Total\ Assets_{t0-24}]_{Control}$). All remaining Columns study the standardized response over our regular event window (i.e., $[(Limit_{t0+12}\text{-}Limit_{t0-12})/Total\ Assets_{t0-12}]_{Treated}$ - $[(Limit_{t0+12}\text{-}Limit_{t0-12})/Total\ Assets_{t0-12}]_{Control}$). Columns (III) and (IV) address a possible omitted variable bias, where specifications are estimated using the sub-sample of firms whose condition did not deteriorate during the event window (i.e., firms for which the probability of default at t_0+12 is smaller than the probability of default at t_0-12 and have no repayment problems during the event window). Columns (V) and (VI) display results on rent extraction by including the ratio of fees to total assets as an explanatory variable. In Columns (VII) and (VIII) we require that between t_0-12 and t_0 the matched control firm got an inside loan of similar size to the treated firm's outside loan to control for different investment opportunities. Finally, in Columns (IX) and (X) we add relationship length as an additional matching variable in Match 2 (we match using a +/- 3 years window). We weight each observation by one over the number of matched control-group firms for each treated firm. T-statistics calculated on robust standard errors, clustered on a treated-firm level, are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 6: Non-Exclusivity Externalities and Protection of Initial Creditor's Claims: Test of H2

Dependent variable: $[(Limit_{t_0+12}-Limit_{t_0-12})/Total\ Assets_{t_0-12}]_{Treated} - [(Limit_{t_0+12}-Limit_{t_0-12})/Total\ Assets_{t_0-12}]_{Control}$								
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
	Match 1	Match 1	Match 1	Match 1	Match 2	Match 2	Match 2	Match 2
Number of Observations (Matched Pairs)	1421	1421	1421	1421	549	549	549	549
Number of Treated Firms	350	350	350	350	207	207	207	207
Intercept	-0.027	-0.027	-0.022	-0.023	-0.013	-0.013	-0.011	-0.011
	(-1.410)	(-1.428)	(-1.032)	(-1.017)	(-0.509)	(-0.515)	(-0.395)	(-0.373)
OutsideLoan	-0.374***	-0.374***	-0.323***	-0.373***	-0.496***	-0.496***	-0.377**	-0.482***
	(-3.803)	(-3.810)	(-2.662)	(-3.000)	(-4.359)	(-4.348)	(-2.569)	(-3.584)
OutsideLoan x FloatingCharge	0.328*			0.327*	0.515***			0.500***
	(1.847)			(1.692)	(3.614)			(3.137)
FloatingCharge	0.029			0.025	0.053			0.051
	(0.435)			(0.363)	(0.564)			(0.537)
OutsideLoan x FloatingChargeValue		1.157***				1.437***		
		(4.226)				(4.758)		
FloatingChargeValue		-0.015				-0.045		
		(-0.094)				(-0.192)		
OutsideLoan x FloatingChargeVolatility		-8.382***				-8.100*		
		(-2.757)				(-1.849)		
FloatingChargeVolatility		0.846				1.203		
		(0.915)				(0.748)		
OutsideLoan x OtherCollateral			-0.024	-0.024			-0.007	-0.007
			(-0.635)	(-0.606)			(-0.140)	(-0.145)
OtherCollateral			-0.033	0.018			-0.168	-0.064
			(-0.189)	(0.102)			(-0.774)	(-0.306)
R^2	0.04	0.05	0.04	0.05	0.08	0.09	0.06	0.08

Note.— The table reports results from matched regressions relating the standardized response in the internal limit to a set of explanatory variables. Columns (I) to (IV) report the results for the first matching procedure (Match 1) whereas Columns (V) to (VIII) report the corresponding results for the second matching procedure (Match 2). The definitions of all variables are provided in Table 1. We weight each observation by one over the number of matched control-group firms for each treated firm. T-statistics calculated on robust standard errors, clustered on a treated-firm level, are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.