RELATIONSHIP LENDING AND FIRMS' ACCESS TO CREDIT: EVIDENCE FROM THE SYNDICATED LOAN MARKET

by

Yaming Sun

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ABSTRACT

This study explores the dynamics of relationship lending in the context of syndicated loans and its implications for firms' access to credit. Chapter one distinguishes between borrower-lead lender (BL) relationships, characterized by direct interaction, and borrower-participant lender (BP) relationships, marked by indirect information acquisition. The analysis reveals that firms in BL relationships experience a significant increase in loan amounts and are more inclined to engage in the syndicated loan market following banks' initial syndications. In contrast, firms in BP relationships see an enhanced probability of obtaining credit but do not demonstrate a similar market focus. The research also sheds light on the evolving role of institutional lenders in the syndicated loan market.

Chapter two explores the effects of the 2013 leveraged lending guidance on firms' access to leveraged financing, differentiating firms by their probability of default and the intensity of their bank relationships. The results support the "hold-up" theory, showing that firms with longer lending relationships face challenges in switching lenders and experience significant reductions in their chances of obtaining leveraged credit. The findings suggest that relationship lenders may use their informational advantage to extract monopoly rents, impacting firms' borrowing costs and access to credit.

Chapter 1

LENDING RELATIONSHIPS AND FIRMS' ACCESS TO CREDIT: EVIDENCE FROM INITIAL LOAN SYNDICATION

1.1 Introduction

Having access to external financing sources is the lifeline for a firm. It impacts on firms' day-to-day functions and is a crucial factor in their success. However, informational asymmetries between borrowers and lenders can cause adverse selection (when lenders experience difficulties screening out unacceptable poor quality borrowers) and moral hazard (borrowers have the incentive to engage in suboptimal investment and risk-shifting activities) problems that hinder the markets' functioning and impede firms from getting enough credit (Akerlof (1970)). Banks, as financial intermediaries, play an essential role in information acquisition and mitigate the information frictions caused by agency problems (Diamond (1984), Ramakrishnan and Thakor (1984), Fama (1985), and Boyd and Prescott (1986)). Given that bank loans constitute the primary source of external financing for corporations, it is essential for corporate finance to understand the process by which banks acquire proprietary information about a firm, as well as the impact of this information on the firm's access to credit and the terms of that credit (Gorton and Winton (2003) and Botsch and Vanasco (2019)).

Banks have comparative advantages in screening and monitoring borrowers. They accumulate private information about the firm as part of the loan screening process (Allen (1990)) and in the midst of monitoring and servicing previously

granted loans (Diamond (1984) and Winton (1995)). For example, Boot (2000) states that the firm-specific information is expensive to create, confidential, and reusable by the lender over time; it is also likely to alleviate adverse selection problems when the borrower returns to the lender to apply for other loans since earlier transactions would have provided the lender with proprietary inside knowledge about the borrower.[1] On the other hand, banks can write explicit loan contracts that include extensive covenants or accommodate collateral requirements to control potential conflicts of interest between borrower and lender and reduce moral hazard concerns. Thus, as the bank becomes more informed about the borrower due to multiple interactions with the firm over time and/or across products, relationship lending presents, information friction will be alleviated, and the agency problem will eventually mitigate (Garleanu and Zwiebel (2009) and Agarwal and Hauswald (2010)).

The literature has consistently highlighted the benefits of firm-bank relationships on borrowers' access to credit. For instance, Petersen and Rajan (1994) observed positive effects of such relationships on credit availability, while Elsas and Krahnen (1998) provided empirical evidence that relationship lenders offer liquidity insurance to borrowers facing unexpected deteriorations in quality ratings. Cole (1998) noted that lenders are more inclined to extend credit to firms with which they have pre-existing relationships. However, these studies primarily focus on relatively small and opaque firms whose information is not publicly available, allowing banks to

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[1] See Chan et al. (1986) and Bhattacharya and Chiesa (1995) for more discussion about the relationship lending benefits the information exchange between borrower and lender, and the reusable information facilitate implicit long-term contracting. See James (1987) and Lummer and McConnell (1989) for empirical evidence.

potentially monopolize information through multiple interactions. In contrast, this research is centered on large and transparent firms, where previous literature posits that loans are more transactional in nature.

Recent studies have begun to explore the role of lending relationships for relatively large and transparent firms, revealing positive effects on lending terms. Ivashina and Kovner (2011) demonstrated that relationship banking enables leveraged buyout firms to borrow at lower rates. Bharath et al. (2011) found that repeated borrowing from the same lender benefits borrowers through lower loan prices and collateral requirements, especially for relatively opaque borrowers. Prilmeier (2017) observed similar evidence regarding covenant tightness, and Botsch and Vanasco (2019) identified heterogeneous effects of relationship banking on borrowers, with loan rates decreasing for high-quality borrowers and loan spreads increasing and loan amounts decreasing for those with poor creditworthiness. However, to the best of my knowledge, no study has intensively focused on the impact of firm-bank relationships on access to credit. Bharath et al. (2011) briefly touched on the loan size received by relationship firms using an instrumental variable method, as there is a potential source of endogeneity whereby a common unobserved factor may drive both the formation of a relationship and the loan size. However, their use of geographic distance between the borrower and its lead lender as an instrument is also contingent on whether the borrower obtains a loan from a nearby bank, which could be subject to the same endogeneity issues as the relationship choice itself. This study contributes to this strand of literature by providing empirical evidence of the effects of relationship lending on firms' access to credit for publicly listed, widely held firms based on the syndicated loan market, using a difference-in-difference identification strategy with an

exogenous credit supply shock to banks at the time they become syndication lead arrangers.

Syndicated lending has emerged as the primary source of external finance for large and middle-market firms seeking substantial capital for various purposes, including expansion, mergers, acquisitions, and other projects (Dennis and Mullineaux (2000)). A syndicated loan involves multiple lenders jointly providing funds to a single borrower, with the lenders categorized as lead lenders and participant lenders. While both have access to proprietary firm information, their methods differ: lead lenders actively gather and process borrower data during screening and monitoring, whereas participant lenders receive information from the lead arranger during syndication and performance updates.

Most existing research has focused on the lending relationship between the firm and the lead arranger. However, Sufi (2007) observed that syndicated loan participants tend to be geographically closer to the borrower and have prior lending relationships when the borrower is informationally opaque, indicating that participant lenders also gain valuable borrower insights through previous syndicated loans. Building on Sufi (2007), this study examines the impact of relationship lending on the credit access of relatively large and transparent firms, considering two types of relationships that reflect different levels of bank information acquisition. The first, the borrower-lead lender relationship (BL relationship), is formed through a previous sole lender loan, where the bank directly acquires firm-specific information through multiple interactions, similar to a lead arranger's role in a syndicated loan. However, unlike a lead arranger who shares risk with other participants, the sole lender bears the entire default risk. The second, the borrower-participant lender relationship (BP

relationship), is formed through a previous syndicated loan, where the bank, as a participant lender, indirectly obtains firm-specific information from the lead arranger. This study aims to be the first to explore how prior borrower-participant lender relationships influence the future loan amounts arranged by such lender for the borrower.

To address the potential endogeneity arising from unobserved factors that influence both relationship formation and credit access, this study employs a distinct methodology from the instrumental variable (IV) approach commonly found in the literature.[2] Specifically, my specification uses panel data to analyze around a credit supply event - bank initial syndication activity. The analysis employs a difference-in-differences approach with multiple treatment dates, comparing subsequent borrowing on both the intensive margin (changes in loan amount when a loan is obtained) and the extensive margin (the likelihood of obtaining a loan) for firms with established lending relationships and those without, before and after their relationship banks lead-arrange their first syndicated loans.[3] The study focuses on firms and banks with at least one existing relationship, with firms considered treated at various times based on when their relationship lenders become active in syndication. Consequently, all firms

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[2] Bhareth et.al (2011) uses the geographic distance between the borrowers and its lead lender as an instrument for relationships to estimate the effect of relationship lending on loan price, collateral requirements, and credit availability for firms. Prilmeier (2017) uses the geographic distance between the borrower and the nearest syndication active bank as the instrument for relationship to estimate the effect of relationship lending on loan covenant.

[3] As discussed below, this paper seeks to use difference-in-differences best practices, following the work of Beck et al (2010).

with a relationship with a specific bank are treated simultaneously when that bank initiates its lead-arranging activity in syndicated lending.

The results of this study reveal that borrowers with pre-existing direct interaction-based relationships obtain larger loan amounts on the intensive margin following a bank's initial syndicated loan, corroborating Bhareth et.al (2011)'s findings that prior relationships with lead banks are linked to increased loan sizes. I further investigate the debt structure and find no significant change in net long-term debt issuance, suggesting a shift in financing sources from other types of loans to syndicated loans or a change in debt structure. The study also finds evidence of relationship lending between firms and syndicated loan participants who acquire firm-specific information through indirect interaction. The likelihood of obtaining credit from a borrower-participant (BP) relationship lender increases after the lender arranges its first syndicated loan, although there is no significant change in market loan borrowing or net long-term debt issuance. Further analysis reveals that BL relationships continue to rely on existing lending channels, with no significant change in the number of lead arrangers' post-syndication. A comparable scenario is observed for BP relationships. Although BP banks possess the capability to arrange syndicated loans, the likelihood of receiving additional credit from BP banks stems not from loan origination but rather from loan participation, indicating the effects of relationship lending between BP relationship parties are evident at the loan participation level.

This paper contributes to the expanding body of research on the impact of relationship lending on large and transparent borrowers. Recent studies have highlighted how asymmetric information influences key aspects of the syndicated loan market, including syndicate structure, loan rates, collateral requirements, and the use

of covenants. This research extends the literature by demonstrating that bank information acquisition plays a role in firms' access to credit and financing sources. It provides evidence supporting the existence of relationships between firms and syndicated loan participants and introduces a new identification strategy to ascertain the causal relationship between these factors.

The remainder of the paper is organized as follows. The empirical framework is described in Section 2. The data and summary statistics are presented in Section 3. Section 4 summarizes the main findings, while Section 5 delves into a series of robustness tests. Section 6 investigates the firm-institutional lender lending relationship. Section 7 concludes.

1.2 Empirical framework

1.2.1 Asymmetric information and bank roles

Literature about asymmetric information focuses on the disparities in the information accessible to different parties in a financial contract. Information asymmetry can occur between a borrower and a lender when the borrower fails to disclose all the information about the project they want to undertake. Thus, it has an informational advantage over the lender---this informational advantage results in adverse selection and moral hazard problems that affect the efficiency of the financial markets. The classic adverse selection problem, the “lemons” problem, was first described by Akerlof (1970).[4] It occurs when the lenders experience difficulties

[4] More works on asymmetric information include Stiglitz and Weiss (1981), Myers and Majluf (1984), Mankiw (1986), Mishkin (1990), and Pagano and Jappelli (1993).

identifying the high-quality borrowers who provide attractive investment opportunities with minimal risk from the poor-quality borrowers. As a result, the lender will charge an interest rate that reflects the average quality of the good and poor borrowers, with the high-quality borrowers paying a higher interest rate than they should be getting. Thus, high-quality borrowers will sometimes not take the loans. When high-quality borrowers leave the market, some good investment projects cannot be funded, and the market's function is destructive. In addition, as the riskier borrowers will be more likely to take out loans at a high interest rate, a higher interest rate leads to an even more significant adverse selection problem. If the lender cannot determine the borrower's quality, he may be incentivized to cut down the number of loans he makes.

When asymmetric information arises and lenders have difficulty determining the quality of the investment projects, the borrowers have risk-shifting incentives to participate in activities that may be individually beneficial but would raise the likelihood of default and so hurt the lender.[5] The moral hazard problem occurs if the borrower, for example, misallocates funds for personal use or invests in projects with higher risk. Under that circumstance, the borrower would be better off if the project succeeds, but the lender would face the majority of the loss if the project failed. Furthermore, the borrower may shirk and operate inefficiently, putting the bank at a disadvantage. The borrower-lender conflict of interest implies that lending and investment will be at suboptimal levels.

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[5] The risk-shifting problem was first introduced by Galai and Masulis (1976) and Jensen and Meckling (1976). More recent paper is Eisdorfer (2008) that provides empirical evidence of risk-shifting behavior in distressed firms.

Banks play an essential role in the financial market. Banks not only have expertise in collecting valuable proprietary information about the firms, which helps lenders to screen the high-quality borrowers from the poor ones and thus alleviate the adverse selection problems; banks also have a comparative advantage in monitoring the firms' behavior and enforcement of restrictive covenants, which reduce the chance of moral hazard. Banks, as financial intermediaries, alleviate the agency problem and help firms access enough credit for profitable investment opportunities, thereby enhancing the financial market's efficiency. The information-collection activities can be further enhanced by developing a long-term relationship with the firm through multiple interactions. Hence, the relationship firms should have greater availability of funds.

1.2.2 Conceptual background

Corporate debt is a key source of financing for firms, and the two most significant sources of debt financing for non-financial firms are corporate bonds and syndicated loans. Syndicated loans continue to grow in popularity among borrowers and lenders. The US market has experienced substantial growth over the past two decades, increasing from $137 million in 1987 to almost $2 trillion in 2016. The global market of syndicated loans also observed a similar growth. According to VoxEU, in 2016, non-financial corporations obtained $3.4 trillion worldwide from the syndicated loan market, significantly outpacing the issuance of bonds and equity.[6] With the rapid expansion of the market, an increasing number of lenders have begun

[6] VoxEU.org is a web publication set up by Centre for Economic Policy Research to promote "research-based policy analysis and commentary by leading economists".

to lead-arrange syndicated loans.[7] The timing of bank entries into syndicated lending gives one variation for the difference-in-differences identification strategy, which is based on the premise that banks are more likely to extend loans if they can arrange syndicated loans, and the timing of their initial syndication is considered exogenous (H1). Additionally, I assume that once a unit is treated, it will remain treated for the remaining periods (staggered adoption); in other words, the bank will continue to syndicate loans if they so choose after the first syndication (A1). Since originating syndication encounters fixed costs, once they start to syndicate loans, they will assumedly continue arranging syndication to earn more fee incomes.

Why do banks originate syndicated loans, and what are the benefits? From Simons (1993), banks are motivated to participate in syndication activities because of their liquidity restrictions and the need to diversify their portfolios. There is a higher likelihood of syndicated loans at banks with a small capital-to-asset ratio, according to her research. Banks could also be constrained by regulations limiting any single loan size to a portion of the bank's equity capital. In particular, uncollateralized and collateralized loans to a single borrower must not exceed 15% and 25%, respectively, of the bank's total capital. In addition to the regulated lending restriction, banks often have internal lending limitations associated with their internal structure.[8] Thus, by syndicating and retaining only a small portion of the loan, banks can make more loans and make larger size loans that they could not otherwise make. Furthermore, by originating a syndicated loan, the lead arranger can earn fees ranging from 10 to 40

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[7] See Figure 1.

[8] See Ivashina (2009).

basis points as a percent of the facility, which helps the lender diversify their income. In sum, arranging syndications can avoid excessive exposure to a single borrower, comply with regulatory limits on risk concentration, meet borrowers' demand for large loan commitments, and earn income while maintaining relationships with borrowers (Gadanecz (2004)).

If a sole loan lender becomes a syndicated loan lead arranger, compared with making sole lender loan only, lead arranging syndicated loans not only enables lenders to take part in financial opportunities that may be too large for their capital base but also allow banks to expand their lending to broader areas that are not their expertise. Meanwhile, with the same lending capacity, lenders can originate more loans with syndication and lower the lending risk by sharing the risk of default with other lenders in the syndicate. If a syndicated loan participant becomes a syndicated loan lead arranger, the bank is more active, especially for lenders who underwrite loans. For an underwritten deal, the lead arranger guarantees the total commitment. If the arranger cannot fully subscribe to the loan, the lead arranger is forced to absorb the difference. Thus, compared with passively participating in a syndicated loan, lead arranging loans requires more commitment from the borrower.

Figure 2 compares the loan amounts originated by each bank in the years before and after its first syndication. The figure includes loans made by commercial or investment banks that originated between 1982 and 2017 in LPC DealScan. The left panel demonstrates the overall bank credit supply, including the years when the bank did not provide any credit. I also examine the variation in the intense margin by taking the logarithm of the credit supply to exclude years without lending from the balanced bank-year data in the right panel. The two figures imply that the bank originates more

loan amounts after its first syndication. Additionally, I draw comparable graphs for banks included in my model for both BL and BP relationships, as shown in Figure 3 and Figure 4, respectively. Similar findings are presented.

The identification of this paper rests on the assumption that the bank's initial syndication activity is an exogenous shock on the firm, which means the incident or the timing of syndicating the first loan is unaffected by relationship firms' credit demand, but purely determined by the bank's motivation for syndication, such as risk-sharing or earning arranging fees (A2). One possible challenge to this assumption is the possibility of reverse causality. For example, if a firm with a long lending history with the bank asks for a large loan that exceeds the bank's lending limit. The bank has a solid motive to arrange the loan since it has a superior understanding of the firm's quality and would not want to miss out on profit potential. However, the bank could not make the entire loan by itself. Thus, the bank with a good reputation will approach other banks or financial institutions, asking them to co-finance the loan to the firm. As a result, the bank successfully makes its first syndication, and the firm gets a large loan deal. Since the observed loan origination corresponds to a set of equilibrium points resulting from the interaction of both credit supply and demand, if the timing of bank syndication active status change were influenced by the relationship firm's growing demand for syndicated loans, the exogenous variation assumption upon which my empirical analysis is based would be violated. To shut this channel down, I exclude firms that have received banks' first syndicated loans from my sample.

1.2.3 Measuring relationships

A syndicated loan is granted by a group of lenders agreeing to provide credit to a single borrower. Based on their different roles in the syndication process, lenders in

the syndicate can be separated as lead arranger and participant lenders. The lead arranger organizes the funding based on specific agreed terms of the loan. During the loan syndication, the lead arranger acquires information about the borrower, shares it with syndicate members, and conducts due diligence. Meanwhile, the lead arranger is responsible for administering the loan on behalf of the participant lenders and monitoring the borrower's performance. On the other hand, the participants obtain the borrower's information that the lead arranger shares during the loan syndication process. After loan syndication, participants are provided with various financial and operational information from the lead arranger, including the borrower's financial/operating performance and quarterly updates on the borrower's covenant compliance, which they can use to evaluate the borrower's credit risk. In the event that loan renegotiation is required, participants acquire appropriate private borrower information in order to vote on loan revisions. Meanwhile, syndicate participants are required to perform their own independent due diligence and credit analysis. In practice, however, lenders commonly rely, to some extent, on the due diligence performed by the lead arrangers. Participant lenders can also monitor the borrower, but as monitoring induces cost and the risk-sharing feature of the loan, participants have less incentive to do that and would instead take advantage of free-ride on the lead arranger’s monitoring efforts.

This study considers two types of relationships, reflecting the two different levels of information acquisition by lead lenders and participant lenders. The first relationship between borrower and lender is established through a previous sole lender

loan before the bank's first syndication (BL relationship).[9] The second type of relationship is established between a borrower and syndicated loan participant banks (BP relationship).[10]

The sample used to examine the treatment effect for BL relationships includes bank-firm relationships fostered through previous sole lender loans. The relationships should be fostered before the bank originates its first syndicated loan. Banks are not required ever to originate a syndicated loan. If banks never originate a syndicated loan, then the relationship pairs will never be treated and act as a control. The control group also includes not-yet-treated relationship pairs. For example, if a bank originated its first syndicated loan in 1995, those relationship pairs with this bank will act as a control in the years before 1995. Thus, the BL sample includes both syndication active and inactive banks and ever-treated and never-treated relationship pairs.

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[9] I consider this type of relationship similar to the relationship between firms and a syndicated loan lead arranger. As they both collect information of the borrower by themselves and have direct interaction with the borrower. The only difference is that lender in a sole loan has 100% exposure to the borrower's default risk, and therefore, would have a stronger incentive to acquire information and monitor the borrower. Examples of excellent prior work on relationship lending between firms and lead arrangers include Dennis and Mullineaux (2000), Bharath et al (2011), Prilmeier (2017), and Botsch and Vanasco (2019). I do not consider the relationship with the previous lead arranger in a syndicated loan to be a BL relationship in my paper is because one of the variations for my difference-in-difference specification requires relationship banks to be syndication inactive while the relationship was fostered, meaning the relationship bank had not originated any syndicated loan prior to originating credit for the borrower.

[10] A few studies have explored participant-level relationship. Sufi (2007), for example, claims that lead arranger tends to syndicate the loan with participants who has a relationship with the borrower when there is a significant informational gap between the borrower and the lender. Li (2017) finds that participants with borrower relationships retain larger share, especially for opaque firms.

The sample used to examine the treatment effect for BP relationships includes bank-firm relationships fostered through previous syndicated loans, and banks are the participant lenders in those syndicated loans. I only include relationships fostered within three years prior to the bank originating its first syndicated loan. For example, bank A participated in syndicated loans before 1995 and started to originate syndicated loans in 1995. Then, those firms that obtained the syndicated loans that had bank A as a participant lender from 1992-1994 will be included in my sample. As the way I defined the BP relationship, the sample does not include banks that never originated a syndicated loan. So, the sample for the BP relationships only includes banks that have been syndication active, and ever-treated firm-bank relationship pairs. The control group for BP relationships only has not-yet-treated relationship pairs. Thus, the difference-in-differences estimates compare the treatment effect between pairs of relationships that have been treated and those that have not yet been treated.

For both BL and BP samples, if the firm has multiple relationships, I only keep the first one, or in other words, the longest one, to avoid double-counting when examining the firm-year level outcome variables. In Figure 5, three banks and three firms make up a microcosm of the loan market. The solid line represents the lead lender in a solo lender loan or a syndicated loan, and the dashed line represents the participant lender in a syndicated loan. A loan with several linked lines is a syndicated loan involving multiple lenders. A loan with a single solid line linked with it is a sole lender loan. In this small market shown in Figure 5, firm A received a syndicated loan led by bank A and participated by banks B and C, firm B received two solo lender loans from banks B and C, and firm C received a sole lender loan from bank C. Loan syndication is now only available by bank A. Let us assume that bank B begins to

originate syndicated loans two years later, whereas bank C does not. Thus, firm B and bank B, firm B and bank C, and firm C and bank C are all described as having BL relationships under my definition; firm A and banks B and C are classified as having a BP relationship. If firm B obtained the sole lender loan from bank B earlier, then firm B's relationship with bank B would be longer. Thus, the BL sample would include relationship pairs between firm B and bank B and firm C and bank C. Firm B and bank B will be an ever-treated pair, and firm C and bank C will be a never-treated pair. Because bank C never arranges syndicated loans, the BP sample would only include a relationship pair between firm A and bank B, which is the ever-treated pair.

The BL relationship is likely more substantial than the BP relationship as the lead lender is better informed than the loan participants. Since a sole lender (i.e., one defined here to have a BL relationship) is 100% exposed to the risk of borrower's default, the lender must thoroughly screen the borrower before the loan origination and monitor the borrower very closely so that the interaction between borrower and lender would be more frequent. On the other hand, syndicated loan participants (i.e., those defined here to have a BP relationship) indeed obtain proprietary information about the borrower to some extent. However, the relationship is tenuous since the participants do not acquire borrowers' information independently. Due to the risk-sharing property of the syndicated loan, the participants have less incentive to interact with borrowers frequently and to keep collecting borrowers' information. As a result, I anticipate that the treatment effect of the first type of relationship will be more significant if it has any effect.

1.2.4 Specifications

I use difference-in-differences specification with multiple treatment dates to assess the effect of the lender's initial syndication on relationship borrowers' credit availability by comparing the loan amount borrowed by treated relationship firms and untreated relationship firms before and after the relationship bank originates its first syndicated loans, based on the following regression setup:

$$Y_{f,b,t} = \gamma + \beta_1 Relationship_{f,b} + \beta_2 Active_{b,t} + \rho Relationship_{f,b} * Active_{b,t} + \beta X_{f,t} + \varepsilon_{f,b,t}. \quad (1)$$

In equation (1), $Y_{f,b,t}$ measures subsequent borrowing on the intensive and extensive margins by firm f from bank b in year t, or by firm f from the credit market in year t.[11] The specific outcome variables are the loan amount borrowed between a bank-firm relationship pair, including $Log\left(LoanAmount_{f,b,t}\right), Log\left(LoanAmount_{f,b,t} + 1\right)$, and $I\left(LoanAmount_{f,b,t}\right)$; the total loan amount borrowed from the syndicated loan market, including $Log\left(LoanAmount_{f,t}\right), Log\left(LoanAmount_{f,t} + 1\right)$, and $I\left(LoanAmount_{f,t}\right)$; the firm's net long-term debt issuance, which is obtained using long-term debt issuance minus long-term debt reduction; the loan structure type of variables, including the number of facilities and the number of lead arrangers in a syndicated loan package. $I\left(LoanAmount_{f,b,t}\right)$ or $I\left(LoanAmount_{f,t}\right)$ is a dummy variable equals one if $LoanAmount_{f,b,t} > 0$ or $LoanAmount_{f,t} > 0$ holds. In this equation, γ is a set of fixed effects, including year fixed effects, borrower fixed effects, and lender fixed effects. $Active_{b,t}$ is a dummy variable equaling one in the

[11] Since credit availability cannot be observed directly, I use the total loan amount being borrowed per year to attempt to measure the incremental loan amount available for borrowing. A large loan amount being borrowed which may come from a large size loan or multiple loans made to firm implies a better credit availability.

years after bank b lead-arranges its first syndicated loan. $Relationship_{f,b}$ is a dummy variable that represents the relationship between borrower and lender, $Relationship_{f,b} = 0$ if firm and bank has no history of borrowing and lending before bank b becomes syndication active, $Relationship_{f,b} = 1$ if firm f has ever obtained a sole lender loan from bank b before bank b's initial loan syndication for BL relationship, or if firm f has ever received a syndicated loan and bank b acted as a participant three years before bank b became syndication active for BP relationship. As the firm-bank relationship was fostered before the bank started to lead arrange syndicated loans, $Relationship_{f,b} * Active_{b,t}$ equals 1 after the relationship bank that has started lead syndication. $X_{f,t}$ is a set of time-variant firm characteristic variables, including the natural logarithm of total assets, leverage, and profitability. The coefficient of interest, ρ, therefore indicates the average treatment effect of credit supply expansion on relationship borrowers' credit availabilities.

1.3 Data

The primary data are obtained from the LPC DealScan database between 1981 and 2017, containing extensive information on the global commercial loan market, including syndicated loan contracts, lead arrangers, and participant lenders.[12] The majority of the DealScan data is collected from commitment letters and credit

[12] Because my specification relies on the coverage of the loan, my sample begins with using all loan deal in Dealscan starting in 1981; meanwhile, as I need to get the firms' accounting data from Compustat, I use Chava and Roberts's linking table, which matches the loan facility by 2017.

agreements drawn from the SEC filings by public borrowers.[13] It also receives data from lenders who backfilled their loans into the database to receive credit in the Gold Sheets quarterly league tables. The league tables rank lenders based on the number of transactions and the loan volume. As the league table's prominence in a bank's standard pitch book to borrowers, lenders have a strong incentive to backfill their loans to the database to maintain a good ranking. According to Carey et al. (1998), the loan agreements in the database cover between half and three-quarters of all outstanding commercial and industrial loans in the US by volume for year-end 1992, and coverage rises further afterward. Thus, I restricted my sample only to include loan deals made to US firms. Meanwhile, since my analysis heavily depends on the loan coverage of the dataset to accurately identify banks' first syndicated loan, I further limited my sample to include only banks that originated their first syndicated loan after 1992. Loans to borrowers in the financial, insurance, and real estate industries were excluded from the sample (SIC 6000-6999), as is usual practice in corporate finance. The DealScan provides both deal (package) and tranche (facility) level data since syndicated loans can be arranged in many tranches, also known as facilities. I use facility-level data to do the analysis.[14]

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[13] See DealScan background information: https://www.kellogg.northwestern.edu/rc/docs/dealscan.pdf

[14] I use facility level data for three reasons: First, a loan package may comprise multiple facilities with different origination dates, and the origination date for the whole package will be determined by the earliest facility date. As I use firm-year level data, if a package contains facilities that are originated across different years, using deal level data to calculate the year level loan amount borrowing would be inappropriate. Second, if a package deal includes both a single lender facility and a syndicated facility, using package level data would omit certain BL relationships.

I consider relationships with commercial or investment banks. Following Lim et al. (2014), I define commercial banks when lenders' type (institution type) in DealScan as "US Bank," "African Bank," "Asian-Pacific Bank," "Foreign Bank," "Eastern Europe/Russian Bank," "Middle Eastern Bank," "Western European Bank," or "Thrift/S&L." I manually eliminate data that DealScan incorrectly identifies as banks. Then I add lenders whose SIC code ranges from 6011 to 6082, or 6712 or 6719 if they are commercial banks. I define investment banks when DealScan classifies lenders' type as an investment bank. I exclude lenders from investment banks if they are more accurately categorized as other lender types. Then, I include lenders with the SIC code 6211 if they are investment banks.

Similar to Ivashina (2009) and Prilmeier (2017), when the variable "Lead Arranger Credit" is marked "Yes", I consider it as lead arranger. In addition, I define the following roles as lead arrangers when "Lead Arranger Credit" is "No": agent, administrative agent, arranger, lead bank. Participants are defined as all other lenders involved in a loan package. I define a sole lender loan if the loan is identified with only one lender and the distribution method is not marked as "Syndication".

Each observation in the sample corresponds to a firm-borrower-year level (when examining the effects on loan borrowing within a relationship) or a firm-year level (when examining the impacts on total loan borrowing) outcome variable. If a company has several relationships, I only consider the first to eliminate the possibility of duplicate counting. The total loan amount a firm borrowed from a lender each year would equal the total facility amount if the lender was a lead arranger. If the lender

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Third, as Chava and Roberts's linking table is based on facility level data, using facility level data to match the firm's annual accounting data would be more accurate.

was a participant, I use the "bankallocation" to identify the lender share in that facility and calculate the borrowed amount. I exclude the facilities if the lender share cannot be identified for my baseline regression and discuss the robustness of my finding in Section 1.5.3, where I exclude the relationship pairs if the firm received at least one loan with an unidentified lender share. I use the FRED's GDP deflator to convert all the nominal numbers to real values, and the reference year is 2012.

Using the link table created by Chava and Roberts (2008), I link the DealScan with the Compustat Fundamentals Annual database to extract borrower accounting data. I exclude relationship pairs when a loan deal cannot be linked with Compustat. To ensure lenders observed the firm's accounting variables when the loan was made, I compute borrowers' characteristics as of the earliest date prior to the origination of the year's first loan. I manually link the lenders to the FDIC and obtain banks' accounting data from FDIC Call Reports.

The summary statistics are shown in Table 1, and Appendix B presents a detailed sample overview. Firms in BL relationships tend to be small in size and borrow small loans, which is anticipated given that the BL relationship is fostered via a single lender loan, which is often a small loan. Meanwhile, as firms in BP relationships primarily borrow syndicated loans, firms in the last sample are larger in size and borrow larger loans than firms in the other two groups. Figure 6 demonstrates how the banks became syndication active and when the BL and BP relationships were formed. Although the top-left graph does not include 79 inactive syndication banks, relationships with those banks are shown as never-treated pairs on the top right graph.

Table 2 examines if the bank's ex-ante features influence its syndication status or the date of its first syndication. As my sample only includes banks that originated

their first syndicated loans after 1992, my base year for the balance tests is 1992. This regression only considers banks in the sample for BL relationship analysis. Unsurprisingly, the results show that larger banks are more likely to become lead arrangers. For those banks who become lead arrangers, larger banks begin syndicated loan arrangements earlier. I do not find it problematic, as, typically, big banks have established reputations and connections, which makes loan syndication considerably simpler. There is no significant correlation between the number of participated loans and the year of syndication or syndication active status. However, banks with a large number of previous loans prefer to syndicate loans sooner. This finding indicates that banks that have already made several loans would like to continue their credit supply by syndicating the loan, either because they think this is a good way to earn a profit or because the borrowers' credit demand continues to grow. Thus, my analysis cannot rule out the existence of reverse causality. As stated in Section 1.2.3, to entirely rule out the reverse causality concern, I exclude firms that have received banks' first syndicated loans from my sample. Meanwhile, in Section 1.5.1, I add back the dropped relationship pairs and examine the changes and robustness of my findings.

1.4 Results

In this section, I test whether the bank's credit supply shock will benefit more for BL or BP relationship borrowers on loan borrowing within relationship pairs, as well as total market loan borrowing. In addition, I attempt to capture the mechanism by which relationship firms obtain additional credit following the bank entry and lead-arranges syndicated loans, as well as to discuss some possible implications worth future studies, such as the change in the lead bank's dependence and the potential hold-up problem, or the shift in preference for bank loans and the structure of debt. I

also provide several robustness checks, including re-adding firms that receive syndicated loans that make banks active in syndication, being conservative with data selection, dropping firms that have ever obtained loans with missing lender shares, and discussing the potential pitfalls of the two-way fixed effects (TWFE) estimates and use new estimators present by Sun and Abraham (2021) and de Chaisemartin and D'Haultfoeuille (2020) to re-examine the effects.

1.4.1 Testing the baseline hypothesis

I start my analysis by examining whether banks originate more credit after they start to lead-arrange syndicated loans (H1). I use a difference in differences with multiple time periods specification based on the following form:

$$Y_{b,t} = \alpha_b + \gamma_t + \rho D_{b,t} + \varepsilon_{b,t}. \quad (2)$$

In Equation (2), $Y_{b,t}$ is the logarithm of the total loan amount originated by bank b in year t, γ_t are year fixed effects that control for economic cycle and trends that shape bank credit supply over time, α_b are bank fixed effects to control time-invariant, unobserved bank characteristics that shape credit supply across banks, and $\varepsilon_{b,t}$ is the error term. The variable of interest is $D_{b,t}$, a dummy variable equals one in and after the year that bank b originates its first syndicated loan and zero otherwise. The coefficient ρ indicates the average treatment effect of initial bank syndications on banks' credit supply, and the two-way fixed effects (TWFE) estimates are shown in Table 3. I estimate Equation (2) allowing for bank-level clustering of the errors, that is, allowing for correlation in the error terms over time within banks. Positive and substantial estimates for both intensive and extensive margins indicate that banks' first loan syndication increases both the amount of loan originated by the bank and the likelihood of the bank originating a loan. The results support Hypothesis 1 that the

timing of the bank's initial loan syndication will be a credit supply shock on firms and provides a valid variation for the DID specification in Equation 1.

1.4.2 Baseline model results

In the core segment of my analysis, I employ graphical methods to elucidate the treatment effects by illustrating the loan amounts borrowed within each relationship pair. Due to the varying treatment times across relationship pairs, a singular plot cannot adequately compare the outcome variables for the treatment and control groups before and after treatment. Consequently, I present the outcome variable for pairs that have experienced treatment (ever-treated relationship pairs) and those that have never been treated (never-treated relationship pairs) in distinct figures to ensure clarity in the analysis.[15]

Figure 7 depicts the logarithm of the total loan amount borrowed within the two parties of a BL relationship, showcasing variations before and after the banks became active in syndication. Panel A reveals an initial increase in borrowing during the first five years post-bank entry, followed by a decline. Despite this, firms in BL relationships generally exhibit an upward trend in borrowing over time, particularly on the intensive margin. Panel B, focusing on the never-treated group and controlling for borrower fixed effects, illustrates a stable borrowing pattern from 1990 to 2000. Figure 8 presents a comparison of total loan borrowing for firms in BL relationships,

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[15] Ever-treated relationship pairs include firm-bank pairs with a bank that start to lead arrange a syndicated loan after the relationship was fostered. Never-treated pairs are firm-bank relationships with a bank that never lead arrange any syndicated loans. In Appendix C, I show some loan borrowing figures for individual bank with its relationship pairs.

with Panel A highlighting a consistent trend in both pre- and post-treatment periods, and a slightly steeper post-treatment slope indicating accelerated growth in market loan borrowing. Panel B shows a significant increase in market loan borrowing by firms in never-treated BL relationships during the same period, although not as pronounced as in the ever-treated group.

For the BP relationship, the analysis solely involves ever-treated pairs. Figure 9 displays the intensive margin of loans obtained from relationship banks versus the loan market. Panel A highlights a significant shift in the slope of borrowing within relationship pairs, signifying an accelerated growth rate in the post-treatment period. Conversely, Panel B shows that for firms in BL relationships, the post-treatment line's slope flattens, indicating a deceleration in the growth rate of market loan borrowing on the intensive margin.

Turning to the regression framework, I start with exploring the relationship lending effect within a relationship pair by estimating Equation (1) with several outcome variables, including the natural logarithm of the firm's annual loan amount borrowed (intensive margin), the natural logarithm of the firm's annual loan amount borrowed plus 1, the probability of firm obtained a loan from relationship bank (extensive margin), and the number of facilities received by the firm from the relationship bank. Compared with $Log\left(LoanAmount_{f,b,t}\right)$, the regression on $Log(LoanAmount_{f,b,t}+1)$ adds back the observations with 0 loan amount made between the firm-bank relationship, which examines both the intensive margin (whether the firm gets a larger loan amount when they borrow) and the extensive margin (whether the probability of getting a new loan increased).

1.4.2.1 Main findings for the BL relationship

The baseline results in Table 4 for the BL relationship show that the coefficient of interest is statistically significant at the 10% level when controlling for borrower's time-variant characteristics, consistent with the relationship lending literature. This suggests that relationship borrowers receive more credit on the intensive margin when banks have greater ability to extend credit. After controlling for firms' time-variant observables, borrowers' access to credit improves by around 0.377 log points, or a 45.8% increase in the loan amount, when the bank becomes active in syndication. However, there is no effect on the extensive margin of firms' access to credit, indicating that the bank's initial syndication activity does not impact the likelihood of receiving a loan from the relationship bank. Furthermore, columns 7-8 show that banks do not engage in additional loan facilities with relationship firms, supporting the finding of no change in the probability of borrowing from the relationship bank.

The initial results suggest that relationship firms have greater credit accessibility from the relationship bank after the bank's initial syndication. However, they do not confirm an increase in the firm's total access to credit, as firms may opt for a larger loan from the bank instead of multiple small loans from various lenders. To delve deeper, the impact of the relationship banks' initial loan syndication on firms' total loan amount and the number of lenders is examined. The findings, summarized in Table 6 , explore various outcome variables related to the firms' borrowing. The outcome variables are the natural logarithm of the firms' annual loan amount borrowing from the syndicated loan market (intensive margin), the natural logarithm of the firms' annual loan amount borrowing from the syndicated loan market plus one (intensive and extensive margins), the probability of firm obtained a loan from the

market (extensive margin), firms' annual net long term debt issuance and the number of distinct lead arrangers that originate loans for the firm in the past three years.

My analysis examines firms' access to funds from the syndicated loan market, their reliance on specific lenders, and changes in financing sources due to bank entry. According to column 1 in Table 6, the total market loan borrowing significantly increased on the intensive margin by approximately 0.380 log points at the 10% level, corresponding to a 46.2% improvement if the time-variant features of the firms are not taken into account, indicating enhanced credit accessibility for firms with firm-bank relationships. Columns 5 and 6 show that the probability of loan borrowing (extensive margin) has not significantly changed. The results imply that the increase in the loan amount borrowed from the relationship bank is not the consequence of combining small loans with big loans but rather indicates an increase in overall credit availability. On the other hand, the coefficients for net long-term debt issuance in columns 7 and 8 are all insignificantly different from zero, indicating that bank initial syndication activity has no effect on a firm's total debt issuance but increases the total credit borrowing from the syndicated loan market, which implies a concentration on syndicated loans. Since firms in BL relationships are relatively small, they do not have as many financing options as a larger firm. Thus, the findings suggest a shift in the usage of different types of bank loans instead of migration from public to private financing. In future studies, I do not anticipate seeing a significant change in debt specialization for relatively small and opaque firms. However, it is worthwhile to investigate the relationship lending effect on debt specialization in the future since firms have a greater credit availability if they have established a long-run relationship

with the bank and may choose bank loans over other credit sources when they need funding.

In examining how firms acquire additional loan amounts from relationship banks, the study finds that lenders in BL relationships predominantly continue to originate loans independently, either as syndicated or sole loans, rather than seeking new lead arrangers for syndication. The data indicates that the number of distinct lead arrangers for firms remains unchanged post-bank entry, supporting the preference for maintaining existing lending relationships due to the costs associated with establishing new ones. Moreover, there is no evidence to suggest that firms increase their reliance on relationship banks when there is a positive credit supply shock, nor do lenders use their private information to exploit borrowers under such circumstances.[16]

1.4.2.2 Main findings for the BP relationship

Table 5 shows the estimates for the BP relationship. As shown in Columns 1 and 2, the treatment effects on the intensive margin of firms' credit availability are not statistically significant, indicating no additional credit is obtained after the bank starts originating syndicated loans. However, the treatment effects on the overall borrowing in columns 3-6 are statistically significant at the 10% level, suggesting an increase in the number of loans borrowed from the relationship bank. After controlling for the firms' time-variant characteristics, the relationship borrowers incurred a 4.8

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[16] The hold-up theory is first put out by Sharpe (1990) and Rajan (1992), and has been empirically supported by literatures, including Santos and Winton (2008), Schenone (2010), and Ioannidou and Ongena (2010).

In chapter two, I use a negative credit supply shock to further examine the "hold-up" problem.

percentage point increase in the chance of getting loans from the relationship bank when the bank entered the syndication business (extensive margin). The findings corroborate Sufi (2007) and Li (2018) in that participant lenders acquire valuable firm-specific information during loan syndication, thereby reducing information asymmetries and benefiting borrowers' future loan terms, demonstrating that firm and participant lenders are not restricted to engaging in arm's length transactions.

The analysis reveals that banks entering the syndicated loan market facilitated access to credit for firms within relationship pairs. However, when examining total syndicated loan borrowing in Table 7, firms with BP relationships do not experience a significant impact on market loan borrowing or net long-term debt issuance. In contrast, larger firms are able to raise more credit from the syndicated loan market, with more options for choosing different lead arrangers. Conversely, highly leveraged firms face difficulties in issuing more debt compared to their less leveraged counterparts.

It is worth investigating how the firm obtains additional loan amounts from the bank for BP relationships. Initially, banks only participated in syndicated loans led by other lenders. After entry, they could lead-arrange or join more loan facilities. As shown in columns 7 and 8, there is no significant change in the number of lead arrangers in response to the bank entry. Since the BP relationship bank is not a lead arranger for the firm during the pre-treatment period, two potential scenarios explain the findings: 1. Firm transit from one of the existing lead arrangers to the newly joined BP relationship lender to originate syndicated loans; 2. The BP relationship lender engages in more loan agreements lead-arranged by other lenders and lends more credit to the firm as participants. Participant lenders have less incentive to obtain more firm

information than the existing lead arrangers who directly acquire firm-specific information. Thus, fewer relationship lending benefits incentivize firms to transition from strong to weak relationships unless borrowers can get discounts when switching lenders.[17] To further support the second scenario, I use a difference-in-differences specification across treatment status (treated vs. not-yet treated) and across time variation in the timing of bank entry into the syndication business to assess the relationship between the bank's initial syndication and the number of facility participations.

$$Y_{b,t} = \alpha_b + \gamma_t + \rho D_{b,t} + \varepsilon_{b,t}. \quad (3)$$

In Equation (3), $Y_{b,t}$ is the number of facilities that the bank b participates in year t. γ is a set of fixed effects, including year fixed effects and bank fixed effects. The variable of interest is $D_{b,t}$, a dummy variable that equals one in and after the year that bank b originates its first syndicated loan and zero otherwise. The coefficient ρ indicates the average treatment effect, and the estimate is shown in Table 8. Considering either the banks in the BP relationships or all lenders in the Compustat sample, the number of loan agreements participated in by lenders significantly increases at the 1% level. Banks engage in approximately eight more facilities as participant lenders after they lead originate their first syndicated loans. With a mean of 15.77 loan participations, the impact of bank entry on its loan participation is substantial, arguing strongly in favor of the second scenario. Similar results are shown with the logarithm transform in column 6. Meanwhile, institutional lenders show a

[17] See Ioannidou and Ongena (2010).

similar trend, with an average of 3.235 more facility participation than syndication inactive or not yet active institutions.

1.4.3 Dynamics of bank's first syndication and firms' access to credit

Next, I examine the dynamic of the relationship between banks' syndication status change and firms' access to credit in an event study framework. It is done by using dummy variables to track the year-by-year impacts of syndication status change on the logarithm of the total loan amount borrowed:

$$Y_{f,b,t} = \gamma + \sum_{\tau=-10}^{10} \delta_\tau Relationship_{f,b} * Active_{b,t+\tau} + \beta X_{f,t} + \varepsilon_{f,b,t}, \quad (4)$$

where identical with Equation (1), $Y_{f,b,t}$ measures subsequent borrowing on the intensive and extensive margins; γ is a set of fixed effects, including borrower fixed effects, lender fixed effects, and year fixed effects; $Active_{b,t+\tau}$ is a dummy variable that equals one in the $|\tau|th$ year before, if τ is a negative number, or after, if τ is a positive number, bank b lead arrange first syndicated loan; $Relationship_{f,b}$ is a dummy variable for the relationship between borrower and lender, $Relationship_{f,b} = 0$ if firm and bank have no history of borrowing and lending before bank b becomes syndication active, $Relationship_{f,b} = 1$ if firm f borrowed money through sole lender loan, BL relationships, or syndicated loans, BP relationships, from bank b before bank b's first syndication, $X_{f,t}$ is a set of time-varying firm characteristic variables, including the logarithm of total assets, leverage, and profitability. At the endpoints, $Active_{b,t+\tau} = 1$ for all ten or more years before or after bank syndication active status change. Thus, there is a much greater variance for these endpoints, and the estimates may be measured with less precision. Figures 10 and 11 plot the point estimates and 95% confidence intervals for BL and BP relationships, adjusting for relationship pair-level clustering.

As shown in Figure 10, panels A and C, for BL relationships, the coefficients on the treated dummy variables for the intensive margin of the loan amount borrowed from the market and relationship bank are insignificantly different from zero for all the years before the status change, with no trends in access to credit. Next, note that, for these two outcome variables, the point estimates are generally positive after the relationship lender becomes active and are statistically significant at the 5 % level in the second and fourth years following the treatment, indicating that the treatment had a positive effect for the first few years; however, will eventually vanish. Meanwhile, the point estimates are generally around zero, and there is no significant treatment impact on the extensive margin of the loan borrowed and the net long-term debt issuance.

For the BP relationship in Figure 11, panels A, C, and E, the intensive margin of the loan amount borrowed from the market and the relationship bank, and the net long-term debt issuance remain steady from 5 years before the first loan syndication to ten years after it. Panel D shows that the point estimates for the impact on the overall loan borrowing from the syndicated loan market have increased and remained positive for the first three years after the bank's initial loan syndication. However, they are statistically insignificant at the 5 % level. It is clear from panels B and F that BP relationship lenders participate less in syndicated loan lending and negatively impact relationship borrowing. However, after the initial arrangement, they engage in more loan agreements lead-arranged by other lenders, which significantly impacts relationship loan borrowing.

In summary, the results from the event study approach are consistent with the main findings in Section 1.4.2 for both BL and BP relationships.

1.5 Robustness checks

1.5.1 Adding back the bank's first syndicated borrower

The baseline results from Tables 4 to 7 excluded the firms that received banks' first syndicated loans to address reverse causality concerns. This section re-estimates the baseline regression for both the BL and BP relationships using the sample that adds back those firms who received banks' first syndicated loans, and the results are shown in Tables 9 to 12. Compared with the baseline results, Tables 9 to 12 reflect two changes: First, they include subsequent loans to the firm that make the bank active. Second, they include the unambiguous mechanical effect of the loan that makes the bank active. Thus, the estimates of the average treatment effect may be upward biased. Not surprisingly, for the BL relationship, the estimates for the impact of bank entry on the firm's access to credit within a relationship pair are consistent with Table 4 except for the significance level, which is increased from 10% to 1%. The degree of the impact is also enhanced, from 45.8% to an 84.6% increase, which is anticipated as I add back firms that at least one large-size loan in the post-treatment period is guaranteed. Results for the BP relationship in Table 10 display similar changes. After controlling for the firms' time-variant characteristics, the relationship borrowers incurred a 5.2 percentage point increase in the chance of getting loans from the relationship bank when the bank entered the syndication business (extensive margin). In terms of credit availability from the syndicated loan market, consistent with the baseline results, the results in Tables 11 and 12 imply that firms in BL relationships focus more on the syndicated loan market when the relationship lender becomes active in syndication, whereas firms in BP relationships do not.

1.5.2 Conservative about sample selection

The timing of the bank's first syndication is crucial for the previous analysis, and I rely on the coverage of the DealScan data to accurately identify the bank's initial syndicated loan. According to Carey and Hrycray (1999), since 1995, DealScan coverage of commercial loans has improved. Meanwhile, loan information for the prior year was collected retrospectively in August 1996 when DealScan started collecting data. In that sense, the coverage in the year later than 1996 of the sample could be more accurate.

Measurement error in the year of entry into syndication could induce offsetting biases in the results above. If loans to borrowers with relationships are more likely to get reported by banks to DealScan, the estimates of impacts on the number of subsequent relationship loans would be biased upwards. However, loans to borrowers with relationships might also be more likely to be retroactively backfilled, causing this bias to disappear in specifications with firm fixed effects.

Thus, to further test the robustness of my findings, I restrict my sample only to include banks that first originated a syndicated loan after 1996. The results for the BL relationship are shown in Tables 13 and 15. The coefficient of interest for the impact on the intensive margin of loan amount borrowing within a relationship pair is positive but statistically insignificantly different from zero, indicating that firms in BL relationships do not access more credit from the relationship lender following entry. However, my findings are robust for market loan borrowing at the 5% significant level, indicating firms prefer to raise funds by syndicating after the relationship bank becomes active in syndication. One possible explanation for the results is that firms primarily obtained credit from the bank through sole lender loans prior to bank entry. As the bank participates in more syndicated loans following entry, other banks that

originate syndicated loans for the firm may find it easier to syndicate the loan as it is easier to find banks to participate.

Tables 14 and 16 show the estimates for the BP relationship. The treatment effects on the overall loan amount borrowed between the two parties in a relationship pair are statistically significant at the 10% level. After controlling the firms' time-variant characteristics, the relationship borrowers incurred a 4.9 percentage point increase in the chance of getting loans from the relationship bank when the bank entered the syndication business. There is no significant treatment effect on total market loan borrowing, which is consistent with the baseline results. Thus, my findings are robust with a more conservative sample for the BP relationship.

1.5.3 Loans with missing lender shares

The sole loans only account for a small fraction of the loan deals in DealScan.[18] Since I am defining pre-existing BL relationships via sole lender loan, I have a limited sample size with all the restrictions and conditions. To maintain as many relationship pairs as feasible, I only drop the loan deal rather than the relationship pair if DealScan does not have information regarding lender shares. As a result, my findings could be biased, particularly if the loans without lender share information were issued during the pre-treatment period. To ensure the robustness of my findings, I remove the firms that have borrowed at least one loan facility with no lender share information during the pre-treatment period. I retain the firms if the missing lender share loan is made within the post-treatment period. Thus, the results

[18] According to WRDS Overview of WRDS-Reuters DealScan, 5.7% of the loan facilities have a single lender.

shown in this subsection could underestimate the effects. The effect of the bank entry on loan borrowing between relationship pairs is seen in Tables 17 and 18, respectively, for the BL and BP relationships. The results are consistent with the baseline findings. For the BL relationship, loan borrowing from the relationship bank rises by about 0.398 log points or 48.9 % on the intense margin. On the other hand, the BP relationship increases by approximately 5.1 percentage points in the probability of obtaining a loan from the relationship bank. Meanwhile, the average number of facilities borrowed rises by 0.128, indicating that the company borrows more from the bank following the entry. Tables 19 and 20 illustrate the impact of bank entry on market loan borrowing for the BL and the BP relationships, respectively. There is no significant effect on the BP relationship. The total market loan borrowing for the BL relationship rises by around 0.451 log points, or 57.0%, if the time-variant characteristics of the firm are not controlled.

1.5.4 Potential criticism and new estimates

This paper is based on a DID procedure with multiple periods and groups, and units can be treated at different points in time. Compared to the standard two groups, two time periods (2×2) approach, where only one kind of parallel trend assumption and the key parameter is the average treatment effect across treated units, this DID design is much more difficult.[19] The treatment effect estimates in this paper are based

[19] The 2×2 DID hinges on the premise that the average outcome for the treated and control groups would have occurred in parallel in the absence of the treatment. Recent research, such as Marcus and Sant'Anna (2021), Sun and Abraham (2021), Callaway and Sant'Anna (2021), de Chaisemartin and D'Haultfoeuille (2020), and Goodman-Bacon (2021), on the other hand, use various kinds of parallel trends assumptions and

on two-way fixed effects (TWFE) regression models, commonly used by researchers in this DID setting with many periods and groups. However, recent literature, such as Sun and Araham (2021), Borusyak and Jaravel (2017), de Chaisemartin and D'Haultfoeuille (2020), Goodman-Bacon (2021), and Backer et al. (2022) point out the potential pitfalls associated with these TWFE estimates, saying the TWFE estimate, which is viewed as a weighted average of treatment effects, would be biased if treatment effects were allowed to be heterogeneous across groups and time periods. The bias comes from estimating a single-coefficient DD model when treatment effects vary over time (Goodman-Bacon (2021)). In this case, other estimators such as Callaway and Sant'Anna (2021), de Chaisemartin and D'Haultfoeuille (2020), or Sun and Araham (2021) may be more appropriate.

As the limitation of my sample, which is not a balanced panel, I can not follow Callaway and Sant'Anna (2021)'s method. Thus, I use two estimators proposed by de Chaisemartin and D'Haultfoeuille (2020) and Sun and Araham (2021) to re-examine the impacts. de Chaisemartin and D'Haultfoeuille (2020) are also based on the assumption that no groups appear or disappear over time, but it is not a requirement. They state that their results still hold for an unbalanced panel, but the notation becomes more complicated. Sun and Araham (2021) require the sample to have a never treated group, which, in my analysis, only the BL sample satisfied. So for the BL relationship, I use both estimators to check the robustness of my finding. For the BP relationship, I only use the estimator proposed by de Chaisemartin and D'Haultfoeuille (2020).

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suggest alternative estimators for different causal parameters of interest when studying DID with multiple periods and multiple groups.

The results are shown in Figures 12-14. The results for the BL relationship are consistent with what I have using TWFE estimates. A rise in the intense margin on the loan quantity borrowed from the relationship bank and the loan market. However, the extensive margin and the net long-term debt issuance have no significant effects. However, the findings for the BP relationship contradict what I have using TWFE estimates. The extensive margin of the loan amount borrowed from the relationship bank and the loan market decreased after the relationship bank's first syndication. To further examine the issue, I also looked at the number of bank loan participants in the BP sample and found an opposite result as well (Figure 15). However, we can draw a similar conclusion that bank participation in new syndicated loans affects BP relationship firms' access to credit. Suppose like the conclusion I draw in Section 1.4.2.2, banks participate more after their first syndication. In that case, firms in a BP relationship can get more loans, as it is easier for the original lead arranger to find participant lenders and originate loans to firms. However, suppose banks participate less in syndicated loans originated by other lead arrangers after their first syndication. In that case, other lead arrangers will find it hard to syndicate loans for the BP firms, and the loan amount will decrease. The finding is consistent with Sufi (2007) that lead arranger tends to include participant lenders who have a previous lending relationship with the firm when syndicating loans to relative information opaque firms. Both the TWFE or de Chaisemartin and D'Haultfoeuille (2020) estimates indicate that the lending relationship between a firm and participant lender only stays at the loan participation level. If banks engage in more loans that originated by other lead arrangers, firms with a BP relationship could obtain more loan amounts from them and vice versa.

more credit after their first syndications. As institutional investors have less incentive to collect borrowers' information, particularly for lending as participant lenders, I only consider the institutions which originate sole lender facilities before arranging syndicated loans. Thus, I only examine the BL relationship lending effects.

Panel A shows the institutional lenders' overall credit supply, including the years with and without lending. Compared with Figure 2, two implications are revealed: first, the majority of the loans are originated by banks, and second, non-bank institutions exhibit comparable increases in credit supply to banks after their initial syndications. The intensive margin on loan supply in panel B also increased to a higher level after the entry. Two plots of loan supply by non-bank institutions in the sample for estimating the relationship lending effects are shown in Figure 17. Similar growth in overall credit supply for the first decade after the entry is illustrated in Panel A, but the intensive margin of the credit supply does not exhibit a comparable trend, making the treatment effects unclear. Suppose the estimates show no significant relationship lending effect on loan amount borrowing between non-bank institutions and firms on the intensive margin. In that case, I cannot conclude that there is no relationship lending between the two parties as I had a sample selection bias in the first place.

With the credit supply variation, I estimate Equation (1) for the firm-institutional lender pair. Following the relationship definition for a firm and a traditional bank, the relationship between a firm and a non-bank institution is defined as a dummy variable $Relationship_{f,i} = 1$ if firm f has received a sole lender loan from the non-bank institution i before i originates its first syndicated loan. The results are shown in Tables 21 and 22. The results show that the impact on the firm's access

to credit from non-bank institutions is statistically significant at the 5% level if controlling for firms' time-variant characteristics. The average treatment effect is around 0.772 log points, corresponding to a 116% change in the annual loan borrowing between the two parties. The effect is mainly from the intensive margin, though it is not statistically significant, which may be due to the small number of observations. However, whether the additional loans are offered via lead originating loans or loan participation is to be determined.

Following the same process, I first estimate the impact on the number of lead arrangers for firms. The results are not shown in the table, but no significant impact is observed. Meanwhile, referring to Table 8, institutional lenders participate in more loan agreements after their initial syndications, suggesting that the institutional lenders lend more credit to relationship borrowers through facility participation. Though the small sample size reduces the power of the study, the results encourage fresh thinking on non-bank lending. As more institutional lenders engage in syndicated loan origination, they are no longer restricted to "arm-length" transactions described in the literature. Future studies will be worthwhile investigating how institutional lenders acquire firm-specific information and how this information will change borrowers' access to credit and other loan contract terms.

1.7 Conclusion

In conclusion, this study advances the understanding of relationship lending in the syndicated loan market, highlighting its impact on firms' access to credit and debt structures. By examining both borrower-lead lender (BL) and borrower-participant lender (BP) relationships, the research demonstrates that direct interactions between

banks and firms significantly enhance credit accessibility, particularly when banks become active in syndication. The findings indicate a shift in firms' financing preferences towards syndicated loans, without a corresponding increase in overall debt issuance.

The analysis also reveals that banks indirectly acquiring information through participation in syndicated loans led by other arrangers extend more credit to firms in BP relationships. This underscores the importance of information sharing in reducing information asymmetry and facilitating credit provision in the syndicated loan market. However, the impact of bank entry into syndication on BP relationship firms' market loan borrowing and net long-term debt issuance appears limited.

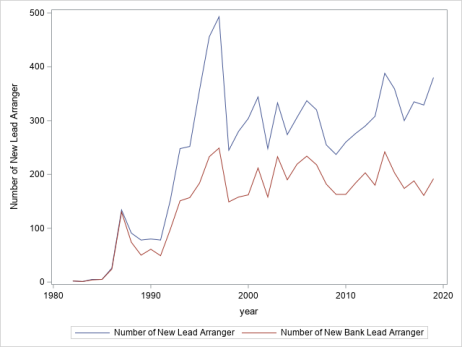
The study further explores how firms obtain additional credit from relationship banks post-syndication, suggesting that for BP relationships, the lending relationship remains primarily at the loan participation level. In contrast, BL relationships continue to rely on existing lending channels, with no significant change in the number of lead arrangers' post-syndication, indicating the additional credit from BL banks stems from loan origination.

The evolving role of institutional lenders in the syndicated loan market, particularly following regulatory changes, warrants further investigation. The findings indicate that institutional investors are increasingly providing more credit to firms with previous loan relationships, challenging the traditional arm's length transaction paradigm.

Overall, this research contributes to the literature by providing a comprehensive analysis of relationship lending's effects on firms' access to credit and debt specialization in the syndicated loan market. It offers valuable insights for

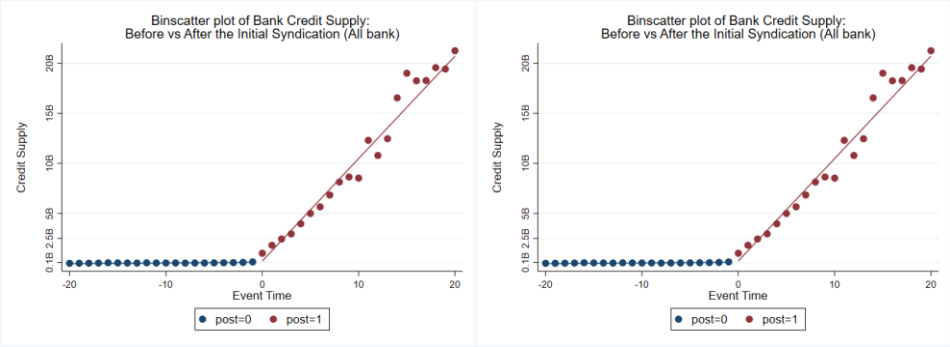
policymakers, financial institutions, and firms navigating the complexities of syndicated lending and relationship banking.

Figure 1. The annual number of new lead arrangers in the global syndicated loan market.



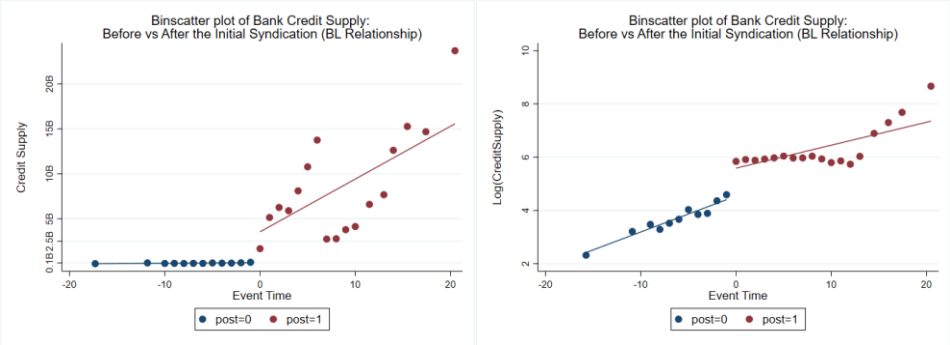
Notes: A new lead arranger is defined as a lender that starts arranging at least one syndicated loan as a lead arranger in a given year. Loan deals and lender information are obtained from LPC DealScan. The red and blue lines represent the number of new bank lead arrangers and the overall Number of lead arrangers. The gap between those two lines indicates the number of new institutional lead arrangers.

Figure 2. Binscatter plot of the bank's credit supply before and after the first syndication.



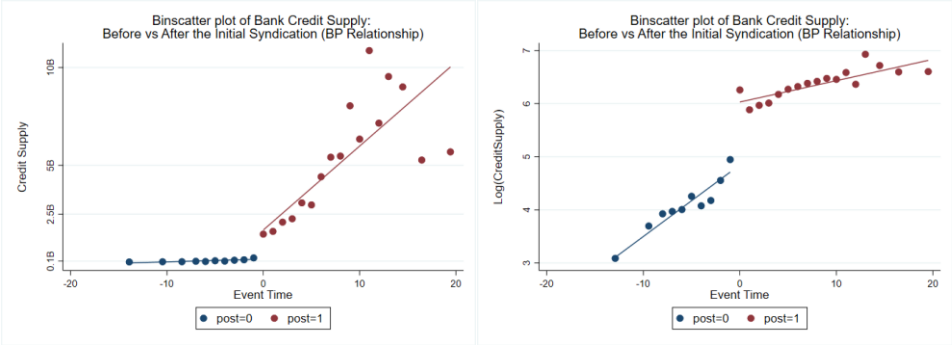
Notes: Left graph shows the bank's total credit supply, including the year when the bank supplies zero credit, in pre- and post-entry periods. The right graph shows the natural logarithm of the total amount of credit supplied by the bank, excluding the year when the bank supplies zero credit before and after the entry (intensive margin). EventTime=0 represents the year of the bank's first syndication. EventTime<0 represents the pre-entry period. EventTime≥0 represents the post-entry period. The figure includes loans made by commercial or investment banks that originated between 1982 and 2017 in LPC DealScan

Figure 3, Binscatter plot of the bank's credit supply before and after the first syndication for BL relationship.



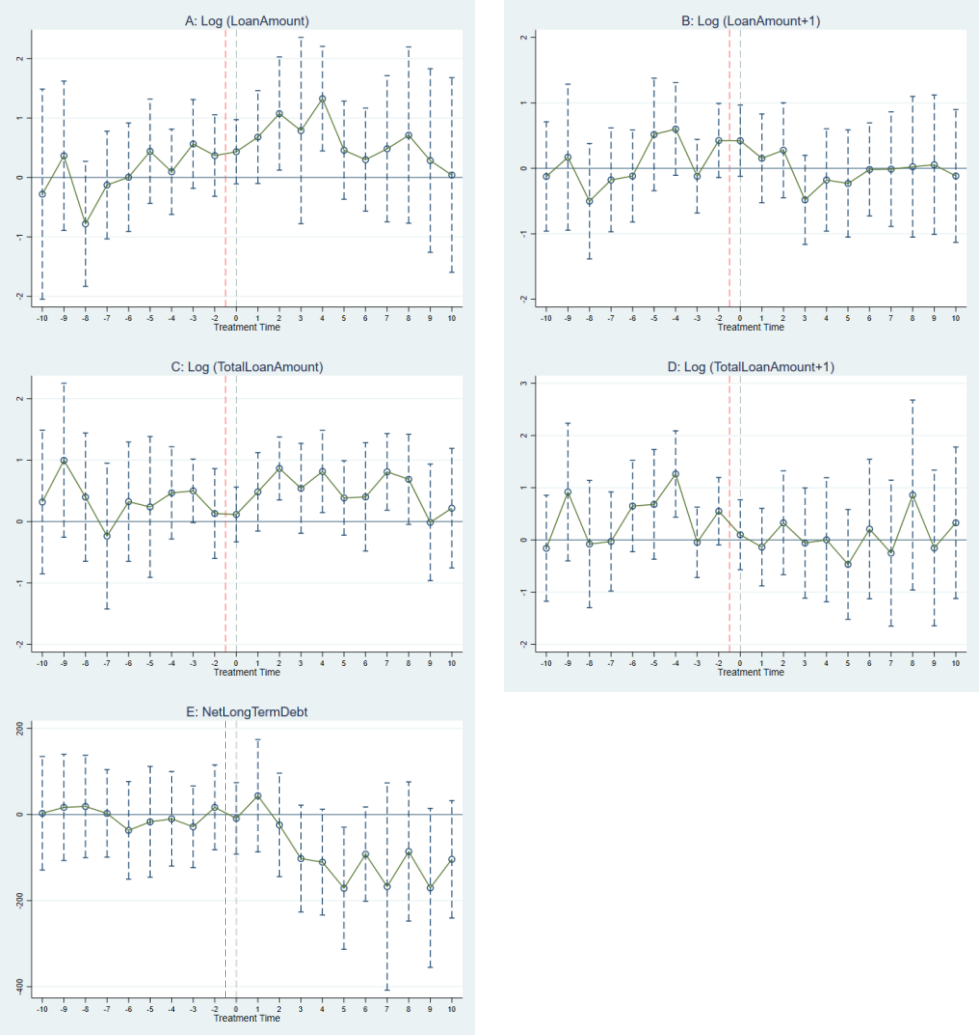
Notes: Left graph shows the bank's total credit supply, including the year when the bank supplies zero credit, in pre- and post-entry periods. The right graph shows the natural logarithm of the total amount of credit supplied by the bank, excluding the year when the bank supplies zero credit before and after the entry (intensive margin). EventTime=0 represents the year of the bank's first syndication. EventTime<0 represents the pre-entry period. EventTime≥0 represents the post-entry period. The figure includes loans made by banks in the sample used to analyze the relationship lending effect for the BL relationship.

Figure 4. Binscatter plot of the bank's credit supply before and after the first syndication for BP relationship.



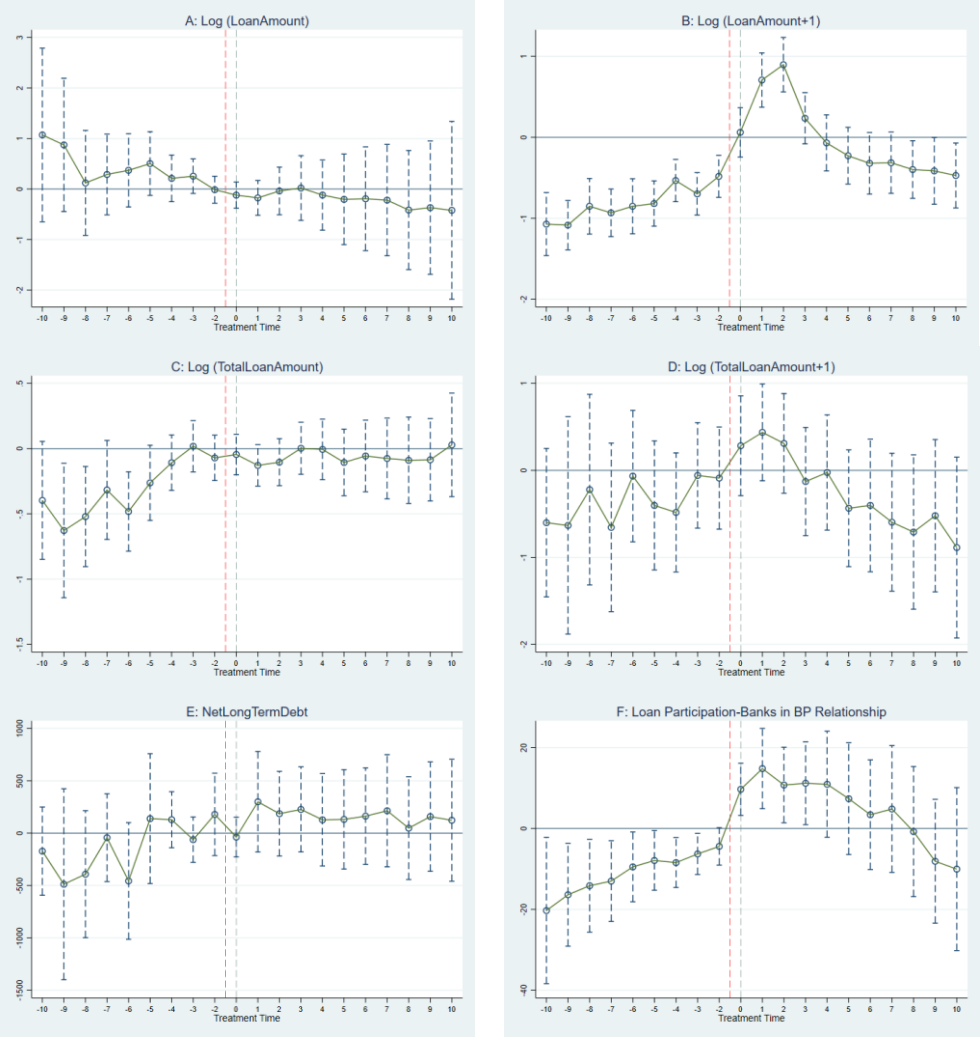
Notes: Left graph shows the bank's total credit supply, including the year when the bank supplies zero credit, in pre- and post-entry periods. The right graph shows the natural logarithm of the total amount of credit supplied by the bank, excluding the year when the bank supplies zero credit before and after the entry (intensive margin). EventTime=0 represents the year of the bank's first syndication. EventTime<0 represents the pre-entry period. EventTime≥0 represents the post-entry period. The figure includes loans made by banks in the sample used to analyze the relationship lending effect for the BP relationship.

Figure 10. The dynamic impact of the syndication active status change on the relationship firm's access to credit (BL Relationships).



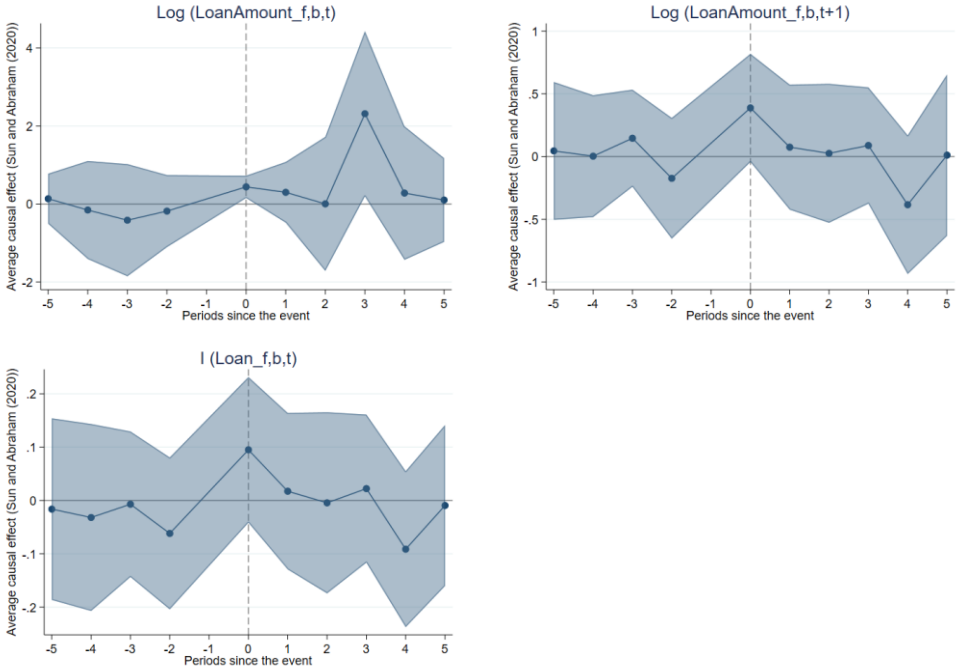
Notes: The figure plots the dynamic impact for the firm in a BL relationship. I consider a 10-year window, spanning from 10 years before bank syndication status change until 10 years after the status change. The dashed lines represent 95% confidence intervals clustered by firm-bank relationship pairs level. TreatmentTime=0 represents the bank's year of the first syndication. TreatmentTime<0 represents the pre-treatment period. TreatmentTime≥0 represents the post-treatment period. I exclude TreatmentTime=-1 from the regression, thus estimating the dynamic effect of changes in bank syndication status on the relationship firms' access to credit relative to that year. The reference year is highlighted using a red dashed line.

Figure 11. The dynamic impact of the syndication active status change on the relationship firm's access to credit (BP Relationships).



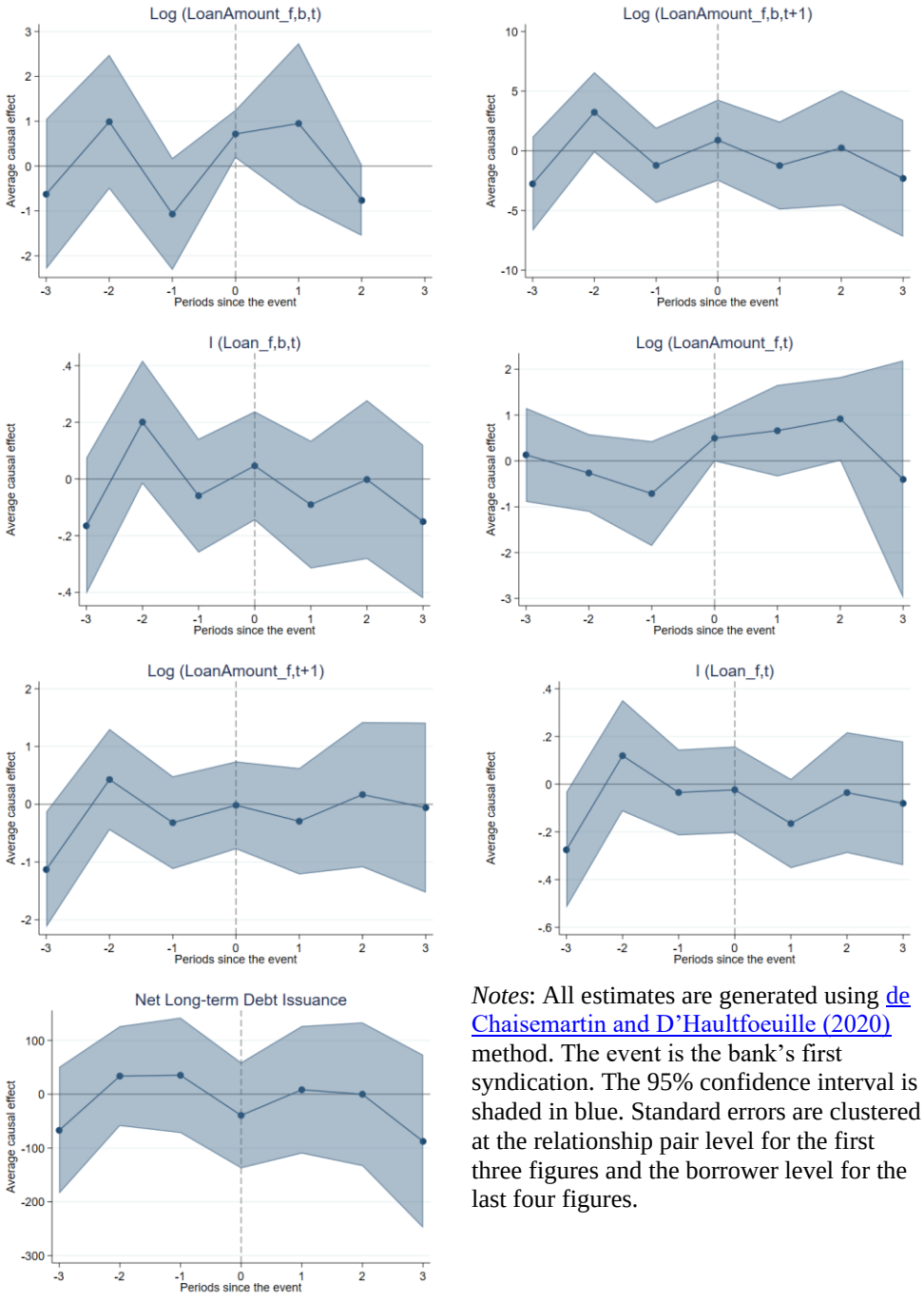
Notes: Panels A-E plot the dynamic impact on firms in a BP relationship. I consider a 10-year window, spanning from 10 years before bank syndication status change until 10 years after the status change. The dashed lines represent 95% confidence intervals clustered by firm-bank relationship pairs level. Panel F shows the dynamic impact of bank first syndication on the number of syndicated loan participation for banks in a BP relationship. The dashed lines represent 95% confidence intervals clustered by bank level. TreatmentTime=0 represents the bank's year of the first syndication. TreatmentTime<0 represents the pre-treatment period. TreatmentTime≥0 represents the post-treatment period. I exclude TreatmentTime=-1 from the regression, thus estimating the dynamic effects relative to that year. The reference year is highlighted using a red dashed line.

Figure 12. New estimates using Sun and Abraham (2021) for BL relationship



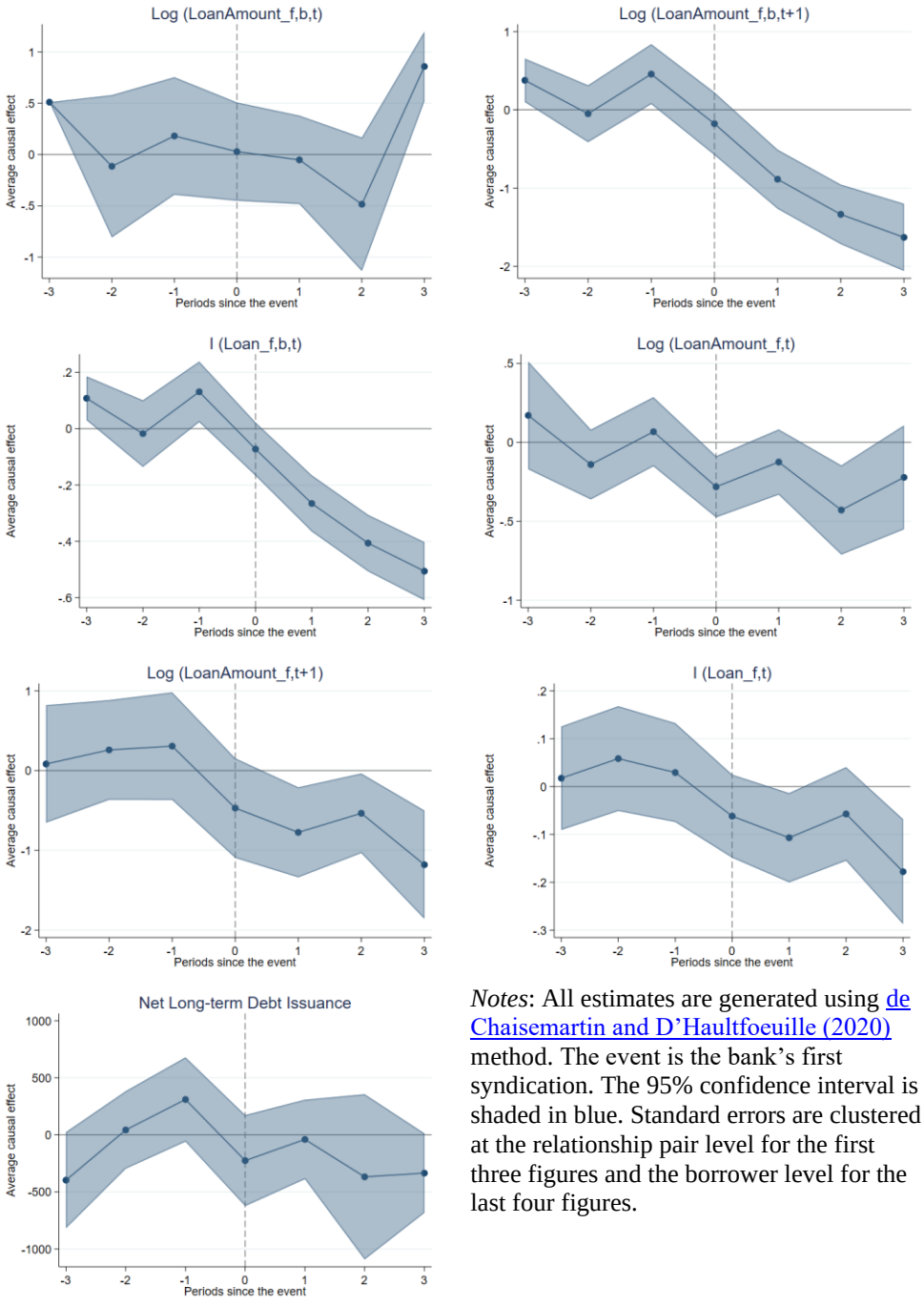
Notes: Each figure represents estimates generated from an event study specification using Sun and Abraham (2021) method. The event is the bank's first syndication. EventTime=-1 is excluded from the regression, thus estimating the dynamic effects relative to that year. The 95% confidence interval is shaded in blue. Standard errors are clustered at the relationship pair level for the first three figures and the borrower level for the last four figures.

Figure 13. New estimates using de Chaisemartin and D'Haultfoeuille (2020) for BL relationship



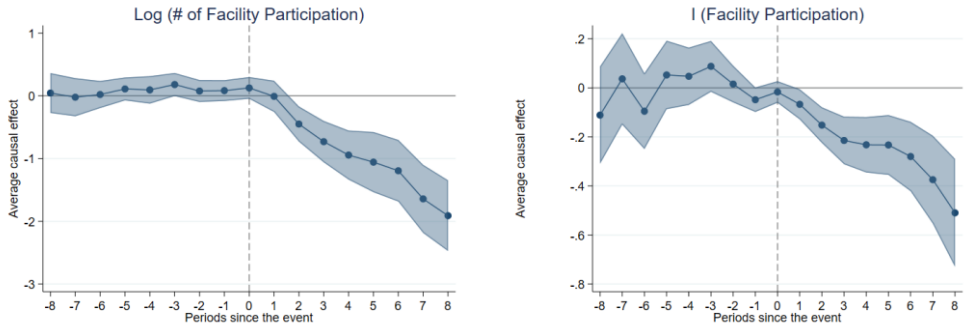
Notes: All estimates are generated using de Chaisemartin and D'Haultfoeuille (2020) method. The event is the bank's first syndication. The 95% confidence interval is shaded in blue. Standard errors are clustered at the relationship pair level for the first three figures and the borrower level for the last four figures.

Figure 14. New estimates using de Chaisemartin and D'Haultfoeuille (2020) for BP relationship



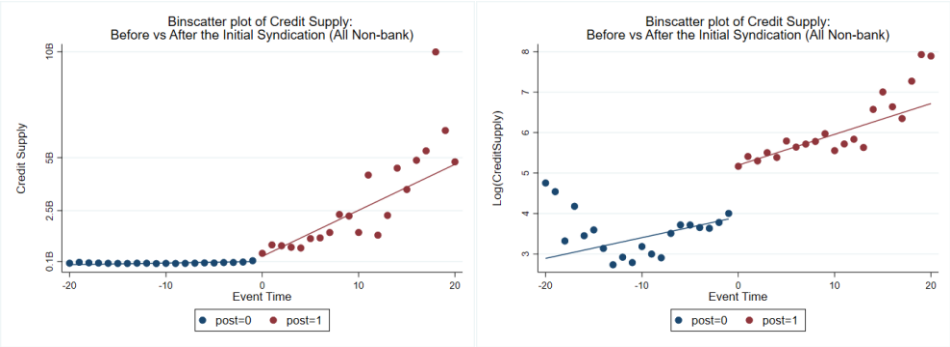
Notes: All estimates are generated using de Chaisemartin and D'Haultfoeuille (2020) method. The event is the bank's first syndication. The 95% confidence interval is shaded in blue. Standard errors are clustered at the relationship pair level for the first three figures and the borrower level for the last four figures.

Figure 15. New estimates using de Chaisemartin and D'Haultfoeuille (2020) for loan participation by banks in the BP sample



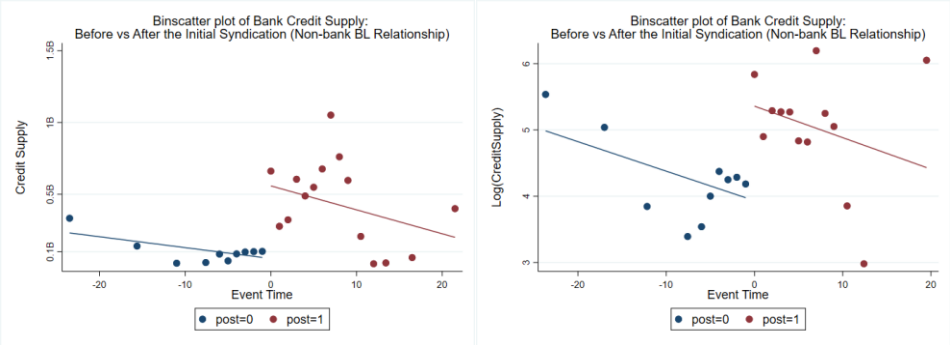
Notes: All estimates are generated using de Chaisemartin and D'Haultfoeuille (2020) method. The event is the bank's first syndication. $I\ (Facility\ Participation_{b,t})$ is a dummy variable equals one if $Facility\ Participation_{b,t} > 0$. The 95% confidence interval is shaded in blue. Standard errors are clustered at the relationship pair level for the first three figures and the borrower level for the last four figures.

Figure 16. Binscatter plot of credit supply before and after the first syndication for non-bank institutions.



Notes: Left graph shows the institutional lender's total credit supply, including the year non-bank institutions supply 0 credit (intensive and extensive margin) in pre- and post-entry periods. The right graph shows the natural logarithm of the total amount of credit supplied by non-bank institutions, excluding the year the bank supplies 0 credit (intensive margin) before and after the initial syndications. EventTime=0 represents the non-bank institution's year of the first syndication. EventTime<0 represents the pre-entry period. EventTime≥0 represents the post-entry period. Syndicated loan participant includes lead arrangers in "Sample linked with Compustat" for non-bank institutions.

Figure 17. Binscatter plot of credit supply before and after the first syndication for non-bank institutions.



Notes: Left graph shows the institutional lender's total credit supply, including the year non-bank institutions supply 0 credit (intensive and extensive margin) in pre- and post-entry periods. The right graph shows the natural logarithm of the total amount of credit supplied by non-bank institutions, excluding the year the bank supplies 0 credit (intensive margin) before and after the initial syndications. EventTime<0 represents the pre-treatment period. EventTime≥0 represents the post-treatment period. Syndicated loan participant includes lead arrangers in the sample for estimating the non-bank relationship lending effects.

Table 1. Summary Statistics

	Sample Linked with Compustat			Sample for BL Relationship 186 firms			Sample for BP Relationship 287 firms		
	Median	Mean	StdDev	Median	Mean	StdDev	Median	Mean	StdDev
Facility Amount ($M)	115.79	350.68	866.25	13.67	108.75	361.84	421.04	827.56	1526.98
Log (Assets)	6.70	6.68	2.09	4.48	4.85	1.99	8.00	8.05	1.66
Leverage	0.32	0.38	4.55	0.24	0.29	0.26	0.31	0.31	0.17
Profitability	0.28	0.34	0.25	0.29	0.33	0.22	0.33	0.39	0.26
Current Ratio	1.54	1.95	3.59	1.84	2.39	2.37	1.44	1.70	1.25
$Loan\ Amount_{fbt}$ ($M)				13.92	35.94	101.2	28.18	106.2	779.7
$Loan\ Amount_{ft}$ ($M)				33.58	262.0	784.8	622.51	1,395	2,877
$Log\ (Loan\ Amount_{fbt})$				2.63	2.58	1.38	3.34	3.40	1.02
$Log\ (Loan\ Amount_{ft})$				3.51	3.70	2.01	6.43	6.43	1.30
$I\ (Loan\ Amount_{fbt})$				0	0.36	0.48	0	0.21	0.41
$I\ (Loan\ Amount_{ft})$				1	0.60	0.50	1	0.63	0.48
$Net\ Long\ Term\ Debt_{ft}$ ($M)				0	39.52	255	0	184.1	1581
$\#\ of\ Facility_{fbt}$				0	0.57	0.90	0	0.34	0.67
$\#\ of\ Lead\ Arranger_{ft}$				1	1.62	1.86	2	2.65	2.65

This table reports summary statistics for loan facilities included in the following three samples. "Sample linked with Compustat" is obtained by linking the DealScan and Compustat databases for facilities to US borrowers between 1981 and 2017, which has lead arranger information, excluding facilities to firms with SIC codes between 6000 and 6999. "Sample for BL Relationship" and "Sample for BP Relationship" are subsets of "Sample linked with Compustat" that include facilities to firms in BL or BP relationships. Borrowers' characteristics are computed as of the earliest date prior to the loan's origination. For a definition of the variables, please see Appendix A. For BL and BP sample descriptions, please see Appendix B..

Table 2. Balance test with bank characteristics

	(1) Year of Syndicate	(2) Active (0/1)
Capital-to-Asset Ratio	-7.224	1.706
	(6.198)	(3.567)
Log (Asset)	-0.501**	0.382***
	(0.249)	(0.134)
Number of Participations	0.129	0.007
	(0.091)	(0.029)
Number of Loans	-0.190**	0.005
	(0.086)	(0.025)
Constant	2,008.170***	-5.858***
	(3.564)	(1.902)
Observations	64	143
R-squared	0.068	
F-Stat / Ward-chi2	7.828	17.24
Prob > F / Prob > chi2	8.83e-06	0.0041

Notes: This table reports OLS and Probit estimates of the balance tests, which examine whether banks' base year characteristics are correlated with their syndication status or the timing of their first syndicated loan. The sample only includes banks in a BL relationship. The sample includes both banks that have ever syndicated a loan and those that have never syndicated a loan. Banks' initial syndication takes place after 1992. The first column regression corresponds to the bank's first syndication year. The second column regression corresponds to the banks' syndication active status. Active=0 if the bank never originates a syndicated loan. The banks' characteristics are based on 1992 FDIC call report data. I create dummy variables equal to 1 if corresponding bank characteristics are missing, and the coefficients for the dummies are not shown in the table. For the definitions of the variables, please see Appendix A. Standard errors are clustered by lenders in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. The impact of the bank's first syndication on banks' credit supply

	$Log\ (Loan\ Amount_{bt})$			$Log\ (Loan\ Amount_{bt}+1)$			I ($Loan\ Amount_{bt}$)		
	(1) All banks	(2) Banks in BP Sample	(3) Banks in BL Sample	(4) All banks	(5) Banks in BP Sample	(6) Banks in BL Sample	(7) All banks	(8) Banks in BP Sample	(9) Banks in BL Sample
Bank First Syndication	1.362*** (0.081)	1.182***(0. 160)	0.975*** (0.210)	5.507*** (0.292)	2.936*** (0.743)	3.603*** (0.963)	0.247*** (0.015)	0.094** (0.036)	0.142*** (0.047)
Mean of Dependent Var	18.74	19.13	18.08	9.533	15.12	12.30	0.51	0.79	0.68
Observations	13,369	1,975	1,316	27,289	2,499	1,935	27,289	2,499	1,935
R-squared	0.774	0.666	0.788	0.524	0.317	0.432	0.451	0.261	0.366
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the lender's initial syndication on its credit supply. The observation in the regression refers to the total loan amount originated at the lender-year level. Columns 1,4&7 correspond to all banks in Dealscan that ever or never became a lead arranger between 1982-2017. Columns 2,5&8 correspond to banks in the sample used to generate estimates in Tables 4&7 (BP relationships). Columns 3,6&9 correspond to banks in the sample used to generate estimates in Tables 3&5 (BL relationships). Columns 1-3 are intensive margins, and columns 7-9 are extensive margins. The lenders' facilities are originated between 1982-2017 for US non-finance, non-real estate, or non-insurance companies. Standard errors are clustered by lenders in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. The impact of the bank's first syndication on the BL relationship firm's access to credit within the relationship pair

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt}+1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{fbt}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship$	0.414*	0.377*	-0.008	0.026	-0.041	-0.025	-0.022	-0.008
$*\ Active$	(0.214)	(0.215)	(0.224)	(0.227)	(0.070)	(0.069)	(0.145)	(0.146)
Leverage		-0.166		-0.447		-0.142		-0.091
		(0.374)		(0.362)		(0.093)		(0.189)
Profitability		-0.621		-0.586		-0.137		-0.216
		(0.674)		(0.583)		(0.166)		(0.307)
Log (Assets)		0.347***		-0.124		-0.076**		-0.056
		(0.099)		(0.111)		(0.034)		(0.047)
Mean of Dependent Var	2.581	2.581	0.980	0.980	0.358	0.358	0.573	0.573
Observations	467	467	1,303	1,303	1,303	1,303	1,303	1,303
# of Firms	186	186	186	186	186	186	186	186
R-squared	0.866	0.877	0.227	0.232	0.271	0.283	0.297	0.299
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the relationship bank. The firm-bank BL relationship is established through a sole lender loan between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 186 BL relationship pairs borrowing loans between 1987 and 2015.[20] The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowing from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

[20] Singleton group means groups with only one observation. The results could overstate statistical significance if maintain singleton groups in linear regression where fixed effects are nested within clusters. See Correia (2015).

Table 5. The impact of the bank's first syndication on the BP relationship firm's access to credit within the relationship pair

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{fbt}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	-0.068	-0.078	0.184*	0.169*	0.051*	0.048*	0.042	0.040
	(0.101)	(0.100)	(0.097)	(0.098)	(0.027)	(0.027)	(0.048)	(0.049)
Leverage		-0.684*		-0.296*		-0.071		-0.042
		(0.379)		(0.156)		(0.045)		(0.075)
Profitability		1.680**		-0.143		-0.071		-0.176
		(0.809)		(0.337)		(0.099)		(0.157)
Log (Assets)		0.241**		0.073		0.013		0.011
		(0.098)		(0.050)		(0.013)		(0.026)
Mean of Dependent Var	3.398	3.398	0.599	0.599	0.174	0.174	0.281	0.281
Observations	777	777	4,467	4,467	4,467	4,467	4,467	4,467
# of Firms	287	287	287	287	287	287	287	287
R-squared	0.772	0.783	0.129	0.131	0.125	0.126	0.145	0.146
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the relationship bank. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 287 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowing from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. The impact of the bank's first syndication on the BL relationship firm's access to credit from the markets

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft} + 1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Relationship * Active$	0.380*	0.247	-0.301	-0.340	-0.083	-0.062	-6.803	-12.059	0.106	0.081
	(0.224)	(0.189)	(0.279)	(0.278)	(0.063)	(0.061)	(39.229)	(39.757)	(0.301)	(0.313)
Leverage		0.154		-0.478		-0.094		-53.692		0.001
		(0.249)		(0.425)		(0.096)		(42.722)		(0.206)
Profitability		-0.153		-0.052		-0.082		47.223		0.318
		(0.536)		(0.626)		(0.149)		(56.530)		(0.661)
Log (Assets)		0.658***		0.144		-0.061**		19.573**		0.099
		(0.098)		(0.133)		(0.028)		(9.809)		(0.118)
Mean of Dependent Var	3.701	3.701	2.126	2.126	0.559	0.559	39.52	39.52	1.616	1.616
Observations	729	729	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303
# of Firms	186	186	186	186	186	186	186	186	186	186
R-squared	0.843	0.869	0.364	0.367	0.253	0.262	0.411	0.413	0.625	0.627
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the capital market. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 186 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. The impact of the bank's first syndication on BP relationship firm's access to credit from the markets

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft}+1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Relationship$	0.018	-0.087	-0.087	-0.151	-0.024	-0.024	46.549	68.498	0.093	0.034
$*\ Active$	(0.060)	(0.054)	(0.154)	(0.153)	(0.023)	(0.023)	(114.988)	(117.698)	(0.169)	(0.170)
Leverage		0.145		0.006		-0.017		-737.702***		1.201***
		(0.178)		(0.459)		(0.061)		(177.585)		(0.454)
Profitability		-0.565**		-0.488		-0.036		279.287		0.605
		(0.261)		(0.773)		(0.114)		(348.881)		(0.854)
Log (Assets)		0.561***		0.314***		-0.005		-49.809		0.279**
		(0.037)		(0.087)		(0.014)		(40.279)		(0.120)
Mean of Dependent Var	6.479	6.479	4.000	4.000	0.617	0.617	192.2	192.2	2.862	2.862
Observations	2,756	2,756	4,467	4,467	4,467	4,467	4,467	4,467	4,467	4,467
# of Firms	287	287	287	287	287	287	287	287	287	287
R-squared	0.631	0.681	0.262	0.265	0.187	0.188	0.090	0.096	0.524	0.530
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the capital market. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 287 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. The impact of the bank's first syndication on the number of facility participations

	$Number\ of\ Facility\ Participation_{l,t}$				$Log\ (Number\ of\ Facility\ Participation_{l,t} + 1)$			
	(1) Lenders in the BP Sample	(2) All Bank Lenders	(3) All Non-Bank Lenders	(4) All Lenders	(5) Lenders in the BP Sample	(6) All Bank Lenders	(7) All Non-Bank Lenders	(8) All Lenders
Bank First Syndication	19.890***	8.042***	3.235***	7.038***	0.589***	0.471***	0.231***	0.409***
	(4.481)	(1.828)	(0.684)	(1.363)	(0.143)	(0.051)	(0.057)	(0.041)
Mean of Dependent Var	23.81	15.77	3.755	11.37	2.254	1.263	0.901	1.130
Observations	2,399	27,272	15,725	43,023	2,399	27,272	15,725	43,023
R-squared	0.456	0.563	0.444	0.564	0.469	0.664	0.551	0.644
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the lender's initial syndication on its facility participation. Each observation in the regression refers to the number of facility participation at the lender-year level, where columns 1-4 are the number of counts in levels, and columns 5-8 are based on $log\ (y + 1)$ transforms. Columns 1&5 correspond to banks in the sample used to generate estimates in Tables 4&6 (BP relationships). Columns 2-4 & 6-8 reexamine the result for all banks, non-banks, and all lenders, respectively. The lenders' facilities originated between 1982-2017 for US non-finance, non-real estate, or non-insurance companies. The sample includes both syndication active and inactive lenders. Standard errors are clustered by lenders in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9. The impact of bank's first syndication on BL relationship firm's access to credit- Including banks' first syndicated borrowers

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_f$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	0.677***	0.613***	0.288	0.341	0.020	0.042	0.073	0.093
	(0.188)	(0.188)	(0.219)	(0.221)	(0.064)	(0.064)	(0.132)	(0.133)
Leverage		-0.153		-0.358		-0.110		-0.072
		(0.409)		(0.353)		(0.088)		(0.178)
Profitability		-0.564		-0.249		-0.039		-0.008
		(0.693)		(0.628)		(0.166)		(0.321)
Log (Assets)		0.360***		-0.190*		-0.089**		-0.082*
		(0.095)		(0.110)		(0.035)		(0.048)
Mean of Dependent Var	2.734	2.734	1.023	1.023	0.356	0.356	0.568	0.568
Observations	509	509	1,432	1,432	1,432	1,432	1,432	1,432
# of Firms	200	200	200	200	200	200	200	200
R-squared	0.875	0.885	0.234	0.240	0.262	0.274	0.286	0.289
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the relationship bank. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, or firms that fail to link with Compustat are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 200 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10. The impact of bank's first syndication on BP relationship firm's access to credit- Including banks' first syndicated borrowers

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{fb}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	-0.023	-0.031	0.209**	0.195**	0.055*	0.052*	0.051	0.050
	(0.105)	(0.104)	(0.096)	(0.097)	(0.027)	(0.027)	(0.047)	(0.049)
Leverage		-0.677*		-0.307*		-0.075*		-0.050
		(0.358)		(0.157)		(0.045)		(0.075)
Profitability		1.383*		-0.200		-0.076		-0.173
		(0.793)		(0.341)		(0.099)		(0.156)
Log (Assets)		0.251**		0.073		0.013		0.010
		(0.097)		(0.050)		(0.013)		(0.026)
Mean of Dependent Var	3.415	3.415	0.606	0.606	0.175	0.175	0.282	0.282
Observations	784	784	4,483	4,483	4,483	4,483	4,483	4,483
# of Firms	289	289	289	289	289	289	289	289
R-squared	0.774	0.783	0.133	0.135	0.126	0.128	0.146	0.147
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the relationship bank. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, or firms that fail to link with Compustat are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 289 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11. The impact of the bank's first syndication on BL relationship firm's access to credit- Including banks' first syndicated borrowers

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft}+1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Relationship$	0.572***	0.408**	0.067	0.015	-0.058	-0.045	-5.631	-11.920	0.257	0.212
$*\ Active$	(0.193)	(0.164)	(0.259)	(0.257)	(0.060)	(0.059)	(32.320)	(32.944)	(0.260)	(0.273)
Leverage		0.026		-0.196		-0.020		-57.377		0.086
		(0.245)		(0.424)		(0.101)		(39.283)		(0.203)
Profitability		0.141		-0.108		-0.082		55.134		0.213
		(0.568)		(0.630)		(0.157)		(55.194)		(0.650)
Log (Assets)		0.660***		0.190		-0.055*		20.226**		0.166
		(0.085)		(0.133)		(0.030)		(8.913)		(0.106)
Mean of Dependent Var	3.741	3.741	2.121	2.121	0.553	0.533	37.16	37.16	1.573	1.573
Observations	792	792	1,432	1,432	1,432	1,432	1,432	1,432	1,432	1,432
# of Firms	200	200	200	200	200	200	200	200	200	200
R-squared	0.836	0.864	0.338	0.340	0.238	0.244	0.444	0.447	0.613	0.616
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the capital market. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, or firms that fail to link with Compustat are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 200 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 12. The impact of the bank's first syndication on BP relationship firm's access to credit- Including banks' first syndicated borrowers

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft} + 1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Relationship	0.020	-0.085	-0.096	-0.160	-0.027	-0.027	46.118	67.537	0.096	0.039
$*\ Active$	(0.060)	(0.053)	(0.154)	(0.153)	(0.024)	(0.023)	(115.098)	(117.799)	(0.167)	(0.168)
Leverage		0.144		-0.014		-0.020		-735.299***		1.208***
		(0.178)		(0.464)		(0.063)		(176.859)		(0.451)
Profitability		-0.565**		-0.545		-0.045		280.951		0.628
		(0.260)		(0.775)		(0.116)		(350.385)		(0.857)
Log (Assets)		0.560***		0.313***		-0.005		-48.918		0.279**
		(0.037)		(0.087)		(0.014)		(40.126)		(0.119)
Mean of Dependent Var	6.472	6.472	3.998	3.998	0.617	0.617	191.5	191.5	2.857	2.857
Observations	2,768	2,768	4,483	4,483	4,483	4,483	4,483	4,483	4,483	4,483
# of Firms	289	289	289	289	289	289	289	289	289	289
R-squared	0.633	0.682	0.262	0.264	0.186	0.187	0.089	0.096	0.525	0.531
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the capital market. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, or firms that fail to link with Compustat are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 289 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 13. The impact of bank's first syndication on BL relationship firm's access to credit- Banks' initial syndications after 1996

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{fb}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	0.291	0.275	0.031	0.037	-0.029	-0.018	0.068	0.072
	(0.245)	(0.248)	(0.283)	(0.300)	(0.083)	(0.083)	(0.135)	(0.139)
Leverage		-0.196		-0.601		-0.207*		-0.235
		(0.359)		(0.425)		(0.111)		(0.210)
Profitability		-0.586		-0.760		-0.210		-0.187
		(0.728)		(0.593)		(0.166)		(0.322)
Log (Assets)		0.329***		-0.049		-0.059		-0.033
		(0.104)		(0.121)		(0.036)		(0.050)
Mean of Dependent Var	2.734	2.734	0.959	0.959	0.361	0.361	0.572	0.572
Observations	387	387	1,076	1,076	1,076	1,076	1,076	1,076
# of Firms	161	161	161	161	161	161	161	161
R-squared	0.875	0.885	0.234	0.240	0.310	0.322	0.286	0.289
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the relationship bank. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1996. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 161 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to firm-bank-year level outcome variables, including the intensive and extensive margin of the loan amount borrowed from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 14. The impact of bank's first syndication on BP relationship firm's access to credit- Banks' initial syndications after 1996

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	-0.031	-0.037	0.198*	0.182*	0.052*	0.049*	0.051	0.048
	(0.114)	(0.112)	(0.106)	(0.107)	(0.029)	(0.029)	(0.051)	(0.053)
Leverage		-0.830**		-0.182		-0.023		0.040
		(0.383)		(0.176)		(0.053)		(0.088)
Profitability		1.660*		-0.327		-0.131		-0.293*
		(0.864)		(0.349)		(0.100)		(0.159)
Log (Assets)		0.229**		0.070		0.012		0.018
		(0.111)		(0.052)		(0.013)		(0.025)
Mean of Dependent Var	3.449	3.449	0.595	0.595	0.170	0.170	0.278	0.278
Observations	702	702	4,122	4,122	4,122	4,122	4,122	4,122
# of Firms	260	260	260	260	260	260	260	260
R-squared	0.778	0.790	0.132	0.133	0.126	0.127	0.147	0.149
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the relationship bank. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1996. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 260 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 15. The impact of bank's first syndication on BL relationship firm's access to credit- Banks' initial syndications after 1996

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft} + 1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Relationship * Active$	0.576**	0.456**	-0.324	-0.356	-0.121	-0.117	51.405	48.362	-0.109	-0.165
	(0.272)	(0.226)	(0.328)	(0.335)	(0.077)	(0.075)	(31.361)	(30.361)	(0.204)	(0.193)
Leverage		0.086		-0.236		-0.061		7.786		-0.003
		(0.303)		(0.427)		(0.115)		(21.766)		(0.176)
Profitability		0.016		-0.277		-0.132		23.904		-0.037
		(0.619)		(0.684)		(0.171)		(59.690)		(0.650)
Log (Assets)		0.619***		0.224*		-0.051		14.020		0.294***
		(0.105)		(0.127)		(0.031)		(11.058)		(0.066)
Mean of Dependent Var	3.598	3.598	2.084	2.084	0.562	0.562	42.46	42.46	1.520	1.520
Observations	605	605	1,076	1,076	1,076	1,076	1,076	1,076	1,076	1,076
# of Firms	161	161	161	161	161	161	161	161	161	161
R-squared	0.849	0.872	0.367	0.370	0.277	0.284	0.468	0.469	0.586	0.599
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the capital market. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1996. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 161 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 16. The impact of bank's first syndication on BP relationship firm's access to credit- Banks' initial syndications after 1996

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft} + 1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Relationship	0.058	-0.057	-0.034	-0.109	-0.020	-0.021	128.435	142.101	0.171	0.116
$*$ *Active*	(0.065)	(0.059)	(0.162)	(0.161)	(0.024)	(0.024)	(129.255)	(131.599)	(0.182)	(0.184)
Leverage		0.235		0.028		-0.017		-692.364***		0.957*
		(0.178)		(0.463)		(0.061)		(175.685)		(0.513)
Profitability		-0.521**		-0.789		-0.075		301.738		0.128
		(0.260)		(0.795)		(0.116)		(393.081)		(0.980)
Log (Assets)		0.566***		0.335***		-0.003		-36.088		0.317**
		(0.039)		(0.090)		(0.014)		(42.027)		(0.128)
Mean of Dependent Var	6.565	6.565	4.078	4.078	0.621	0.621	200.2	200.2	3.006	3.006
Observations	2,558	2,558	4,122	4,122	4,122	4,122	4,122	4,122	4,122	4,122
# of Firms	260	260	260	260	260	260	260	260	260	260
R-squared	0.625	0.679	0.263	0.266	0.185	0.186	0.089	0.095	0.522	0.527
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the capital market. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1996. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 260 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 17. The impact of bank's first syndication on BL relationship firm's access to credit- Missing lender share

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{fl}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	0.435*	0.398*	0.053	0.096	-0.025	-0.006	0.071	0.090
	(0.223)	(0.224)	(0.226)	(0.231)	(0.070)	(0.070)	(0.119)	(0.120)
Leverage		-0.178		-0.416		-0.135		-0.088
		(0.379)		(0.364)		(0.094)		(0.189)
Profitability		-0.563		-0.654		-0.149		-0.238
		(0.679)		(0.585)		(0.167)		(0.311)
Log (Assets)		0.321***		-0.131		-0.077**		-0.065
		(0.103)		(0.111)		(0.034)		(0.047)
Mean of Dependent Var	2.564	2.564	0.974	0.974	0.358	0.358	0.566	0.566
Observations	456	456	1,273	1,273	1,273	1,273	1,273	1,273
# of Firms	183	183	183	183	183	183	183	183
R-squared	0.867	0.876	0.232	0.238	0.277	0.288	0.306	0.308
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the relationship bank. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 183 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the firms that have taken out loans with a missing lender share during the pre-treatment period. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 18. The impact of bank's first syndication on BP relationship firm's access to credit- Missing lender share

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt} + 1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)		$Number\ of\ Facility_{fb}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	-0.037	-0.058	0.249**	0.242**	0.055*	0.051*	0.128**	0.128**
	(0.116)	(0.114)	(0.106)	(0.108)	(0.029)	(0.029)	(0.051)	(0.052)
Leverage		-0.586		-0.550***		-0.144***		-0.153
		(0.438)		(0.187)		(0.055)		(0.104)
Profitability		1.591*		-0.017		-0.030		-0.126
		(0.943)		(0.333)		(0.104)		(0.153)
Log (Assets)		0.209*		0.062		0.011		0.003
		(0.121)		(0.054)		(0.014)		(0.025)
Mean of Dependent Var	3.419	3.419	0.611	0.611	0.176	0.176	0.266	0.266
Observations	681	681	3,868	3,868	3,868	3,868	3,868	3,868
# of Firms	252	252	252	252	252	252	252	252
R-squared	0.784	0.793	0.141	0.144	0.133	0.136	0.154	0.155
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the relationship bank. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 252 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to a firm-bank-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the relationship bank and the number of facilities obtained by the firm that has the relationship bank as one of the lenders. If the bank is the lead arranger, the loan amount made to the firm is equal to the whole facility amount; otherwise, it is equal to the lender share*facility amount. I exclude the firms that have taken out loans with a missing lender share during the pre-treatment period. For definitions of the variables, please see Appendix A. Standard errors are clustered by relationship pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 19. The impact of bank's first syndication on BL relationship firm's access to credit- Missing lender share

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft}+1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Relationship$	0.451*	0.299	-0.209	-0.246	-0.108	-0.094	-7.402	-12.866	0.081	0.046
$*\ Active$	(0.233)	(0.196)	(0.278)	(0.277)	(0.066)	(0.065)	(40.610)	(41.287)	(0.314)	(0.327)
Leverage		0.161		-0.463		-0.091		-54.442		-0.053
		(0.250)		(0.429)		(0.103)		(42.848)		(0.202)
Profitability		-0.232		-0.079		-0.081		59.419		0.486
		(0.539)		(0.630)		(0.161)		(54.558)		(0.651)
Log (Assets)		0.652***		0.127		-0.063**		16.845*		0.109
		(0.101)		(0.135)		(0.030)		(9.532)		(0.122)
Mean of Dependent Var	3.634	3.634	2.075	2.075	0.555	0.555	25.76	25.76	1.581	1.581
Observations	707	707	1,273	1,273	1,273	1,273	1,273	1,273	1,273	1,273
# of Firms	183	183	183	183	183	183	183	183	183	183
R-squared	0.840	0.866	0.347	0.349	0.250	0.259	0.180	0.183	0.617	0.618
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BL relationship borrowers' access to credit from the capital market. The firm-bank BL relationship is fostered through a sole lender loan made between 1981 and 2017 and before the bank's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. I exclude the firms that have taken out loans with a missing lender share during the pre-treatment period. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 183 BL relationship pairs borrowing loans between 1987 and 2015. The observation in the regression refers to firm-year level outcome variables, including the intensive and extensive margin of the loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 20. The impact of bank's first syndication on BP relationship firm's access to credit- Missing lender share

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft}+1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$		$\#\ of\ Lead\ Arrangers_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Relationship$	0.021	-0.059	-0.190	-0.244	-0.038	-0.038	72.901	97.107	0.171	0.134
$* Active$	(0.065)	(0.063)	(0.166)	(0.166)	(0.025)	(0.025)	(131.183)	(132.929)	(0.212)	(0.215)
Leverage		-0.049		-0.653		-0.104		-837.756***		0.844**
		(0.166)		(0.404)		(0.064)		(230.882)		(0.418)
Profitability		-0.559**		0.026		0.056		280.254		0.605
		(0.283)		(0.819)		(0.124)		(398.589)		(0.862)
Log (Assets)		0.516***		0.255***		-0.011		-47.581		0.188
		(0.038)		(0.089)		(0.014)		(43.589)		(0.128)
Mean of Dependent Var	6.485	6.485	3.983	3.983	0.614	0.614	194.1	194.1	2.926	2.926
Observations	2,372	2,372	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868
# of Firms	252	252	252	252	252	252	252	252	252	252
R-squared	0.631	0.675	0.266	0.268	0.266	0.268	0.087	0.093	0.593	0.595
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the bank's first syndication on BP relationship borrowers' access to credit from the capital market. The firm-bank BP relationship is fostered through a syndicated loan made three years before the bank's first syndication activity between 1981 and 2017; meanwhile, the relationship lender is a participant. The sample includes only ever-treated relationship pairs. Relationship pairs between banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received banks' first syndicated loans are excluded from the sample. I exclude the firms that have taken out loans with a missing lender share during the pre-treatment period. Banks are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 252 BP relationship pairs borrowing loans between 1987 and 2017. The observation in the regression refers to firm-year level outcome variables, including the intensive and extensive margin of loan amount borrowed from the loan market, firm net long-term debt issuance, and the number of lead arrangers. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 21. The impact of non-bank first syndication on firms' access to credit from relationship institutions

	$Log\ (Loan\ Amount_{fbt})$		$Log\ (Loan\ Amount_{fbt}+1)$		$I\ (Loan\ Amount_{fbt})$ (0/1)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Relationship$	0.369	0.558	0.596*	0.772**	0.124	0.168
$* Active$	(0.323)	(0.342)	(0.323)	(0.332)	(0.103)	(0.104)
Leverage		1.157		2.329***		0.598***
		(0.919)		(0.758)		(0.188)
Profitability		2.461		-0.473		-0.085
		(1.882)		(1.852)		(0.524)
Log (Assets)		-0.107		0.123		0.035
		(0.224)		(0.179)		(0.054)
Mean of Dependent Var	3.200	3.200	1.245	1.245	4.174	4.174
Observations	118	118	306	306	306	306
# of Firms	50	50	50	50	50	50
R-squared	0.899	0.921	0.353	0.381	0.303	0.329
Borrower FE	Y	Y	Y	Y	Y	Y
Lender FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

This table reports DID estimates of the effect of relationship lending on borrowers' credit availability. The firm-nonbank relationship is established through a sole lender loan made between 1981 and 2017 before the institution's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between non-banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received institutions' first syndicated loans are excluded from the sample. Non-bank institutions are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 50 relationship pairs borrowing loans between 1987 and 2007. The observation in the regression refers to a firm-financial institution-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the relationship institution. The loan amount firm received is equal to the total deal amount if the institutional lender is a lead arranger; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by firm-institution pairs in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 22. The impact of non-bank first syndication on firms' access to credit from the loan market

	$Log\ (Loan\ Amount_{ft})$		$Log\ (Loan\ Amount_{ft}+1)$		$I\ (Loan\ Amount_{ft})$ (0/1)		$Net\ Long\ Term\ Debt\ Issuance_{ft}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Relationship * Active$	0.008	0.027	-0.411	-0.249	-0.072	-0.033	6.085	2.729
	(0.229)	(0.221)	(0.414)	(0.429)	(0.092)	(0.101)	(33.176)	(28.502)
Leverage		0.640		1.719*		0.466**		-59.600
		(0.509)		(0.938)		(0.228)		(67.864)
Profitability		-0.315		0.009		0.317		-254.674
		(0.897)		(1.618)		(0.431)		(162.908)
Log (Assets)		0.362**		0.261		-0.003		62.221**
		(0.142)		(0.258)		(0.061)		(23.969)
Mean of Dependent Var	4.174	4.174	2.688	2.688	0.637	0.637	23.00	23.00
Observations	192	192	306	306	306	306	306	306
# of Firms	50	50	50	50	50	50	50	50
R-squared	0.845	0.856	0.402	0.414	0.263	0.283	0.327	0.351
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

This table reports DID estimates of the effect of relationship lending on borrowers' credit availability. The firm-nonbank relationship is established through a sole lender loan made between 1981 and 2017 before the institution's first syndication activity. The sample includes both ever-treated and never-treated relationship pairs. Relationship pairs between non-banks and any US finance, real estate, insurance borrowers, non-US firms, firms that fail to link with Compustat, or firms who have received institutions' first syndicated loans are excluded from the sample. Non-bank institutions are removed from the sample if they have originated their first syndicated loans before 1993. If a firm has multiple relationship pairs, I only keep the earliest one. As singleton groups are dropped from the sample, eventually, the sample contains 50 relationship pairs borrowing loans between 1987 and 2007. The observation in the regression refers to a firm-year level outcome variable, including the intensive and extensive margin of the loan amount borrowed from the loan market and the firm net long-term debt issuance. The loan amount firm received is equal to the total deal amount if the institutional lender is a lead arranger; otherwise, it is equal to the lender share*facility amount. I exclude the loan deal if the lender share was not specified. For definitions of the variables, please see Appendix A. Standard errors are clustered by borrowers in parentheses for columns 5-10. *** p<0.01, ** p<0.05, * p<0.1.

Chapter 2

INTERAGENCY GUIDANCE ON LEVERAGED LENDING AND ITS IMPACT ON FIRMS' ACCESS TO LEVERAGED CREDIT

2.1 Introduction

In the wake of the 2007-2009 global financial crisis, regulatory authorities across numerous nations implemented micro and macro prudential measures—such as stress testing, countercyclical capital buffers, and supervisory guidelines—with the goal of reducing financial instability and fortifying the robustness of their banking sectors. These measures were intended to deter unwarranted risk-taking and ensure that the escalation of significant banks' credit risk exposure does not surpass capital accrual. Studies have centered on evaluating the effectiveness of these regulatory tools and their influence on financial stability, capital levels at banks, and the supply of credit.[21] Despite the considerable focus on the effects of these prudential measures on lenders, the repercussions for the borrower remain largely unexplored. Changes in lenders' behaviors, prompted by these regulatory tools, may instigate shifts in credit supply, subsequently affecting the market equilibrium, corporate access to credit, cost

[21] Literature such as Lim et al. (2011) and International Monetary Fund (2013) explore the potential of macroprudential tools for moderating the credit cycle and alleviating financial vulnerabilities using cross-country analysis and macroeconomic data. Micro-level data are used by Jiménez et al. (2017), Kim et al. (2018), and Calem et al. (2020) to examine the effects on credit supply. See also Lopez (2007), Kuttner and Shim (2016), Basset and Marsh (2017), Akinci and Olmstead-Rumsey (2018), Cerutti et al. (2017), and Flannery et al. (2017) for more literature that attempt to evaluate macroprudential polies.

of credit, and outcomes at the firm level. Therefore, diverging from existing literature that predominantly evaluates the impact of prudential instruments on lenders, the present study seeks to investigate their effects on the borrowing entities.

The practice of leveraged finance serves as a vital source of financing, not only for the U.S. economy, but on a global scale as well. Given the significant role the U.S. banking system plays in ensuring credit availability, primarily through the syndication of loans to investors, it becomes imperative to curtail banks from inducing undue risk within the financial system. This can be achieved through rigorous oversight of their underwriting and distribution processes related to high-risk leveraged loans. Responding to the significant expansion in leveraged credit volume and an evident dilution of credit standards coupled with minimal protection for lenders, US bank regulators introduced the 2013 Interagency Guidance on Leveraged Lending (IGLL) and a subsequent Frequently Asked Questions (FAQ) document in 2014. These initiatives aimed to foster prudent underwriting practices, confine banks' exposure to risk, and maintain robust safety-and-soundness standards.[22] While numerous studies

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[22] Detailed information about the guidance can be found at: https://www.federalreserve.gov/supervisionreg/srletters/sr1303a1.pdf.

Detailed information about the FAQ can be found at: https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20141107a3.pdf.

US leveraged loan issuance from 2000 to 2020 are shown in Figure 1. According to the IGLL, the regulated financial institutions includes "*national banks, federal savings associations, and federal branches and agencies supervised by the OCC; state member banks, bank holding companies, savings and loan holding companies, and all other institutions for which the Federal Reserve is the primary federal supervisor; and state nonmember banks, foreign banks having an insured branch, state savings associations, and all other institutions for which the FDIC is the primary federal supervisor*."

have scrutinized the influence of the IGLL and FAQ on the leveraged lending market, their primary concentration has been on assessing the impact of the guidance on banks' leveraged credit supply or the effectiveness of this prudential tool. Kim et al. (2018), for instance, discovered that the guidance successfully curtailed banks' leveraged lending activity, particularly in the case of large, closely supervised banks. Similarly, Calem et al. (2020) observed a significant decline in the proportion of speculative-grade term-loan originations by regulated banks following the publication of the FAQ notice. Schenck and Shi (2022), on the other hand, focused on examining the influence of the guidance on the risk and configuration of syndicated loans arrangement, concluding that the occurrence and risk of leveraged lending saw a decrease post-guidance. Distinct from these studies, the focus of this paper is on the diverse impacts on firms' access to leveraged credit, including the volume, the source, and the cost of credit.

Given that the guidance neither establishes a universal definition for leveraged lending, nor places explicit restrictions on certain categories of borrowers or specific types of loans that banks should avoid issuing, it could inadvertently incentivize banks to manage credit risk by reducing the availability of credit to borrowers at higher risk of default, while maintaining the supply of leveraged credit to borrowers of relatively higher creditworthiness. In such a scenario, one could anticipate a more pronounced effect on the accessibility of leveraged credit for firms of lower credit quality. Meanwhile, if regulated banks indeed become more conservative in their leveraged lending practices following the guidance, the impact on credit accessibility may differ for firms depending on their reliance on bank loans. For instance, relatively smaller and less transparent firms that depend heavily on relationship lending might

experience a form of "lock-in" effect, finding it difficult to change lenders or identify alternative sources of credit (such as unregulated institutions or public debt) and hence, potentially bearing a greater brunt of this guidance. On the other hand, larger and publicly traded firms, which have access to multiple financing sources and a wealth of publicly available information, might have the flexibility to shift and secure credit from other avenues.[23]

In this study, I investigate the impact of the guidance on firms' access to leveraged credit from two perspectives by implementing a difference-in-differences specification with variations across firms' default risk or the strength of firm-lender relationship, and the timing of the issuance of the leveraged lending guidance. In some regressions, I divide the post-guidance period into two sub-periods: the interval between the IGLL and the FAQ, and the duration following the FAQ, with the aim of capturing any differences in response to IGLL and FAQ. Since the firm's ability to issue public debt restricts the relationship bank's monopolistic power (Rajan (1992) and Diamond (1991)), firms with the exact duration of borrower-lender relationship but varying degrees of external finance limitations may experience different impacts. Thus, I employ a difference-in-difference-in-differences (DDD/triple differences) identification strategy to capture any treatment effects on firms with a prolonged borrower-lender relationship and a high external finance constraint. This method facilitates an examination of how the guidance influences the access to leveraged credit and the cost of credit by firms that are heavily reliant on bank loans.

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[23] The hold-up theory is first formulated by Sharpe (1990) and Rajan (1992), and has been empirically supported by literatures, including Santos and Winton (2008), Schenone (2010), and Ioannidou and Ongena (2010).

The findings indicate that the IGLL and subsequent FAQs brought about a shift in bank lending behavior, which in turn influenced firms' ability to secure leveraged credit. Firms of lower quality, which generally depend on leveraged loans and exhibit a higher probability of default, experienced a significant decrease in the total volume of leveraged credit they were able to secure from the market and regulated institutions. Specifically, the volume of leveraged credit obtained by high default risk firms from the market plummeted significantly (by 45.2% on the intensive margin), and the decline was even steeper (45.8% on the intensive margin) for leveraged credit obtained from regulated banks. Companies that had established a longer tenure in their borrower-lender relationships with any regulated banks encountered a decrease of 16.1 percentage points in their probability of procuring leveraged credit from the market, and a decrease of 16.8 percentage points in their likelihood of acquiring leveraged credit from regulated financial institutions. Moreover, companies with extended borrower-lender relationships, coupled with significant external financing constraints, witnessed a reduction of 10 percentage points in their probability of accessing leveraged credit from the market and an 11.7 percentage point decline in their likelihood of securing leveraged credit from regulated banks. At the same time, the volume of loans on the intensive margin of loan borrowing from the market or regulated banks saw a dramatic reduction of approximately 68.7% and 71.8% respectively. Concurrently, following the issuance of the FAQ, the cost of borrowing for firms with a higher default risk decreased by 40.3 and 39.5 basis points over LIBOR when securing loans from the market or regulated banks respectively. This equates to a 13% and 13.6% reduction relative to the average. In addition, companies maintaining long-term relationships with banks saw their

borrowing costs decrease by 36.1 or 34.7 basis points over LIBOR, when borrowing from the market or regulated banks respectively, equating to a 12% or 11.9% reduction relative to the average.

The introduction of a scenario featuring a steep decline in corporate credit quality in the 2015 Comprehensive Capital Analysis and Review (CCAR) stress test may have influenced the origination of speculative-grade syndicated loans by regulated banks around the same time as the FAQ document was released. This could be a potentially confounding factor that has obstructed firms' access to leveraged credit. In order to confirm the robustness of my findings, I conducted separate analyses of corporate borrowing from banks that are subject to both the CCAR and the IGLL, banks that are regulated only by the IGLL, and non-regulated entities that are not bound by either the CCAR or the IGLL. High-risk firms have found it more challenging to secure leveraged credit since the introduction of the IGLL. The effect of the IGLL is more pronounced on borrowings from smaller banks (those with consolidated assets up to $100 billion) which aren't subject to the CCAR. After the year 2015, it became increasingly difficult for high-risk companies to obtain leveraged credit from larger banks (those with consolidated assets more than $100 billion) which are subject to both IGLL and CCAR. However, it's not clear whether this increased difficulty is a result of the subsequent FAQ or the implementation of the 2015 CCAR. Firms with longer relationships with a single lender have difficulty obtaining leveraged credit from both CCAR banks and non-CCAR banks, indicating that the issuance of the guidance and the introduction of the 2015 CCAR stress test have a negative impact on relationship firms’ access to credit, which further implies that these firms have been held by the relationship lender and find it difficult to switch lenders.

The remainder of the paper is organized as follows. Section 2 presents a background on leveraged lending and a brief overview of the IGLL. Section 3 defines leveraged loans. Section 4 describes the empirical framework. Section 5 provides the data used in the empirical analysis and summary statistics. Section 6 summarizes the main findings. Section 7 discusses the robustness of the findings. Section 8 concludes.

2.2 Leveraged lending guidance

Citing the substantial post-crisis growth in leveraged lending, a significant increase in the participation of unregulated investors, a substantial easing in loan underwriting standards, and a potential mismatch in the market for risky assets with institutions holding large pipelines of higher-risk commitments at a time when buyer demand for such assets had significantly diminished, the Office of the Comptroller of the Currency (OCC), Board of Governors of the Federal Reserve System (Board), and Federal Deposit Insurance Corporation (FDIC) (collectively the "agencies") issued the leveraged lending guidance in March 2013. This guidance was designed to update and replace the April 2001 Interagency guidance, with the aim of assisting financial institutions in providing leveraged lending to creditworthy borrowers in a manner that is safe and sound. The guidance outlines expectations for sound risk management of leveraged lending activities, establishing what are considered to be minimum standards. These standards cover a range of areas including underwriting and valuation standards, pipeline management, risk ratings, credit analytics, problem credit management, credit review, and stress testing. The goal of these standards is to enhance financial institutions' risk management frameworks and thereby support a robust financial system in the United States. The guidance and subsequent FAQ document are clear in their expectation that banks should arrange and make fewer

high-risk loans to firms with excessive debt. The goal is to ensure that banks only underwrite or issue loans to creditworthy borrowers. The guidance encourages banks to be prudent in their underwriting practices, taking into account the borrower's ability to repay the debt. It also recommends that banks establish clear, written, and measurable underwriting standards reflecting their risk appetite. This was further clarified in the 2014 FAQ document, which aimed to foster a better understanding of the guidance and supervisory expectations among industry and examiners, promoting consistent execution of the guidance.

It is worth noting that the guidance left room for interpretation in several key areas. The absence of a universal definition of leveraged lending gave financial institutions some discretion in establishing their own definitions, reflecting their unique business models and risk tolerance. The guidance encouraged institutions to develop and maintain a definition of leveraged lending that can be applied across all business lines. It also provided examples of loan terms common in leveraged lending definitions, but it did not specify a precise definition that all institutions should adopt. Furthermore, the lack of explicit penalties for non-compliance may have also led to ambiguity in how stringently the guidelines were to be implemented. However, it is worth noting that regulatory guidelines often work through "soft power," with non-compliant institutions potentially facing increased scrutiny from regulators, potential downgrades in supervisory ratings, and even reputational risks. Meanwhile, the issuance of the FAQ document over a year after the guidance suggests regulators' commitment to clarifying the guidelines and ensuring their effective implementation. The FAQ document served to clarify various aspects of the guidance and address

questions from the industry, indicating a continued effort by the regulators to ensure the guidelines were understood and adhered to.

2.3 Leveraged Loan

A syndicated loan involves multiple lenders ("syndicate") providing funds to a single borrower. The syndicate is usually organized by a lead bank, often called the "arranger," "lead underwriter," or "lead manager." This bank is responsible for negotiating the loan terms with the borrower, distributing the loan among the syndicate members, and managing the loan after it has been issued. The loan agreement typically includes a provision that allows the lenders to vote on any proposed changes, ensuring that each lender has a say in the management of the loan.

Leveraged loans, on the other hand, are a type of syndicated loan issued to companies or individuals that already have considerable amounts of debt or a poor credit history. Because these borrowers are considered to be at a higher risk of defaulting on the loan, leveraged loans are associated with higher interest rates than other types of loans. This makes them similar to "junk bonds," which are bonds issued by companies with lower credit ratings. While these loans can be risky, they also present opportunities for both lenders and borrowers. For lenders, the higher interest rates on leveraged loans can lead to larger profits. For borrowers, leveraged loans can provide access to larger amounts of capital, which can be crucial for growth, acquisitions, or other strategic objectives.

While there is no universally accepted definition of what constitutes a leveraged loan, they often have several characteristics in common. These typically include:

- **Purpose of the loan:** Leveraged loans are often used to finance leveraged buyouts, mergers and acquisitions, and recapitalizations. They can also be used to refinance existing debt or for general corporate purposes.
- **High debt-to-earnings ratio:** The borrower typically has a high level of debt relative to its earnings. One common threshold is when a borrower's total debt exceeds four times its earnings before interest, taxes, depreciation, and amortization (EBITDA), or when its senior debt exceeds three times its EBITDA.
- **Non-investment-grade credit rating:** The borrower is typically considered a non-investment-grade firm by credit rating agencies. This means that it has a higher risk of defaulting on its debt payments.
- **High leverage ratios:** The borrower's leverage ratios, such as its debt-to-assets or debt-to-net-worth ratios, are typically higher than the industry norm or its historical levels. These high leverage ratios indicate that the company is heavily reliant on borrowed money to finance its operations or growth.

It's worth noting that while these characteristics are common to leveraged loans, not all leveraged loans will necessarily have all these features. Additionally, the specific criteria used to classify a loan as "leveraged" can vary between different lenders, regulators, and market participants.

According to the Loan Pricing Corporation (LPC), a leveraged loan is characterized as a syndicated loan with a rating of BB+ or lower, or an unrated loan that maintains an interest rate spread exceeding 150 basis points over LIBOR.

However, as Figure 2 shows, loans belonging to borrowers rated below the investment grade typically exhibit spreads surpassing 200 basis points. If we consider loans with an interest rate spread larger than 150 basis points as leveraged loans, then these loans would constitute approximately 75% of the total loan facilities issued within the period from 2010 to 2017, based on the sample in this study. The primary aim of the leveraged lending guideline was not to encompass a broad portion of the loan market but rather to limit the origination of the most hazardous loans. Thus, in line with the approach used by Kim et al. (2018), my principal analysis designates loans with an interest rate spread exceeding 200 basis points over LIBOR as leveraged loans. In Section 2.7.2, I assess the robustness of my results by considering loans with an interest rate spread greater than 250 basis points over LIBOR.

2.4 Empirical framework

The Interagency Guidance on Leveraged Lending (IGLL) was designed with a dual purpose: to serve both micro-prudential and macro-prudential objectives. From the micro-prudential viewpoint, it focused on the safety and soundness of individual institutions and aimed to reduce risk on bank balance sheets. In contrast, the macro-prudential goal was to limit the degree to which firms could amass substantial leverage that could potentially destabilize the financial system. This study predominantly focuses on evaluating the effectiveness of the IGLL through a dual lens, considering both micro-prudential and macro-prudential perspectives. It delves into IGLL's implications on banks' lending practices and subsequently probes its potential influence on corporations' leveraged financing. IGLL was established with the aim of ensuring that federally regulated financial institutions engage in leveraged lending activities in a manner that safeguards the stability of both the banking system and the

larger financial system. The guidance seeks to prevent institutions from escalating systemic risk by originating and distributing poorly underwritten loans of low quality or by extending credit to high-risk borrowers, thereby increasing the risk profile of their balance sheets. Lower-quality firms may particularly feel the brunt of this impact, given that the guidance's primary objective is to mitigate risk in the banking system and curtail lending activities to highly leveraged entities. Furthermore, banks may become more circumspect in their provision of leveraged credit, potentially complicating the process for firms, particularly smaller or private ones that are heavily reliant on relationship-based lending for project financing. In this context, firms may face a "hold up" scenario within the borrower-lender relationship, whereby the institution that is subject to the IGLL can no longer offer a leveraged loan to the firm. Additionally, such a firm may encounter difficulties in securing financing from alternative lenders or financial sources following IGLL's implementation. Therefore, in this research, I aim to explore the effect of guidance on firms' access to leveraged credit through two distinct lenses. I propose to differentiate firms based on their default probability, indicating their quality, and the degree of their relationship with the lender, which reflects the depth of their firm-bank relationship. This approach allows me to investigate the implications of IGLL and the subsequent FAQ on these firms' ability to access leveraged credit. Beyond examining the impact on the amount borrowed, this study also scrutinizes the pricing of loans. Given that the loan's price represents an equilibrium outcome reflecting the risk associated with the financed project, investigating this aspect can provide insights into the efficacy of the guidance in controlling financial system risk by constraining the extent of risky projects firms can finance. This examination of loan pricing complements the investigation of

borrowing amounts, offering a comprehensive assessment of the guidance's impact on firms' financial activities.

2.4.1 The impact of IGLL on firms with high default risk

One of the important risk management practices for leveraged lending outlined in the guidance requires banks to consider the "*borrower's capacity to repay and to de-lever to a sustainable level over a reasonable period*," which may encourage banks to be more cautious when extending leveraged credit to firms with high default risk. To measure firms' default risks, I follow Merton's (1974) model. In Merton's model, the equity of a firm is considered as a call option on the firm's assets with a strike price equal to the face value of the firm's liabilities and a time-to-maturity of T. The equity value at maturity equals zero when the firm's assets value is less than the strike price. Following Vassalou and Xing (2004) and Bharath and Shumway (2008), I assume that the capital structure of the firm includes both equity and debt, and the market value of the firm's underlying assets follows a geometric Brownian motion of the form:

$$dV = \mu V dt + \sigma_v V dW, \quad (1)$$

where V is the value of the firm's assets, μ is the expected continuously compounded return on V, σ_v is the firm's volatility, and dW is a standard Wiener process. Then, by the Black-Scholes Formula for a call option, the value of the firm's equity E can be described as a function of the firm's assets V and the face value of the debt F,

$$E = V\mathcal{N}(d_1) - e^{-rT}F\mathcal{N}(d_2), \quad (2)$$

$$\text{where } d_1 = \frac{\ln\left(\frac{V}{F}\right) + \left(r + 0.5\sigma_V^2\right)T}{\sigma_V\sqrt{T}}, \; d_2 = d_1 - \sigma_V\sqrt{T}, \quad (3)$$

r is the risk-free rate and $\mathcal{N}(\square)$ is the cumulative density function of the standard normal distribution.

I apply an iteration process to calculate σ_v. I start by obtaining daily stock return data from the past 12 months, calculating the standard deviation to estimate the daily volatility of equity, and then calculate the annualized daily volatility of equity σ_E, which is then used as an initial value for the estimation of σ_v. Using Equation (2), by knowing the firm's daily market equity E, face value of the debt F, the 1-year T-bill rate r observed at the end of the month, and the initial estimation of σ_v, I compute the daily value of the firm's assets V. I then calculate the log return on assets $Ln(\frac{V_t}{V_{t-1}})$ and compute the standard deviation of it as the value of σ_v for the next iteration. The iteration procedure is repeated until it converges with the absolute difference between two consecutive σ_vs is less than 10^{-3}. After obtaining the converged σ_v, I use it to back out V though Equation (2). The above process is performed at the end of 2009, resulting in the estimation of σ_v for 2009. Using the estimated daily values of $Ln(\frac{V_t}{V_{t-1}})$ from the last iteration, I compute the drift μ by calculating the mean of the $Ln(\frac{V_t}{V_{t-1}})$.

The default probability is the likelihood that the firm's assets will be worth less than the face value of the firm's liabilities, which means

$$PD_t = Prob\ (V_{t+T}\ \leq F_t|V_t) = Prob\ (ln(V_{t+T}) \leq \ln(F_t)|\ V_t). \quad (4)$$

As the market value of the firm's underlying assets follows a geometric Brownian motion in Equation (1), the market value of the firm's underlying assets at any point in time t is given by:

$$\ln(V_{t+T}) = \ln(V_t) + (\mu - 0.5\sigma_v^2)T + \sigma_v\sqrt{T}\varepsilon_{t+T}, \quad (5)$$

$$\varepsilon_{t+T} = \frac{W(t+T)-W(t)}{\sqrt{T}}, \text{ and } \varepsilon_{t+T} \sim N(0,1). \quad (6)$$

Therefore, the probability of default can be written as follows:

$$PD_t = Prob\ (\ln(V_t) - \ln(F_t) + (\mu - 0.5\sigma_v^2)T + \sigma_v\sqrt{T}\varepsilon_{t+T} \leq 0)$$

$$= Prob\ (\varepsilon_{t+T} \leq -\frac{\ln\left(\frac{V_t}{F_t}\right)+(\mu-0.5\sigma_v^2)T}{\sigma_v\sqrt{T}}). \quad (7)$$

Thus, the theoretical probability of default will be given by:

$$PD_t = \mathcal{N}\left(-\frac{\ln\left(\frac{V_t}{F_t}\right)+(\mu-0.5\sigma_v^2)T}{\sigma_v\sqrt{T}}\right). \quad (8)$$

I use difference-in-differences identification with variations in the probability of default and the timing of the implementation of the IGLL to assess the impact of the guidance on firms' access to leveraged credit. The specification is as follows:

$$Y_{f,t} = \alpha + \gamma_t + \gamma_f + \rho Post_t * PD_f + \varepsilon_{f,t}, \quad (9)$$

where $Y_{f,t}$ is a set of outcome variables, including the intensive and extensive margins of total leveraged loan obtained by firm f in year t and total leveraged loan originated for firm f by regulated banks in year t, which are $Log\ (Total\ Leveraged\ Credit)$, $Log\ (Total\ Leveraged\ Credit + 1)$, $I\ (Total\ Leveraged\ Credit)$, $Log\ (Bank\ Leveraged\ Credit)$, $Log\ (Bank\ Leveraged\ Credit + 1)$, $I\ (Bank\ Leveraged\ Credit)$; and the cost of the leveraged credit, estimated by the average spread per dollar borrowed by firm f in year t, using the sum of the product of the spread on a leveraged loan facility l and the facility amount, divided by the total facility amount borrowed in year t to calculate. $I\ (Total\ Leveraged\ Credit)$ and $I\ (Bank\ Leveraged\ Credit)$ are dummy variables equal to 1 if the firm obtained a leveraged loan from the market or regulated bank, respectively. γ_t are year fixed effects, γ_f are firm fixed effects. PD_f is a dummy variable equals one if firm f's probability of default in 2009, calculated using Equation (8), is greater than the median of the probability of default for all the firms in 2009. $Post_t$ is a dummy variable equals one in the years after the issuance of the interagency guidance (in some specifications, I split the $Post_t$ into two subperiods: $Post1_t$ is a dummy variable that equals one in the year between the interagency guidance in 2013 and the issuance of the clarification in 2014 and $Post2_t$ is a dummy variable that takes the value one in

years after 2014).[24] The coefficient of interest, ρ, therefore indicates the average treatment effect of IGLL and FAQ on leveraged credit accessibility of firms with higher default risks. This study only focuses on the accessibility of leveraged credit. Only companies that took out leveraged loans between 2010 and 2017 are included, i.e., high-risk companies. Thus, the regression compares the treatment effect between relatively higher risk and lower risk among high-risk firms.

2.4.2 The impact of IGLL on firms with a longer length of borrower-lender relationship

Relationship lending plays an essential role in alleviating the information asymmetry between borrower and lender and mitigating agency problems (Garleanu and Zwiebel (2009) and Agarwal and Hauswald (2010)). It benefits both borrowers and lenders and improves the efficiency of the financial market. However, relationship banking has costs. One of the "dark sides" of relationship banking is the "hold-up" problem that was first formulated by Sharpe (1990) and Rajan (1992). The firm-bank relationship fostered through multiple interactions with the borrower provides the bank with proprietary information about the firm, granting it an information monopoly and widening the information gap between the bank and potential lenders, exacerbating the adverse selection problem between the borrower and prospective lenders. Thus, firms may incur higher costs when switching lenders, and banks may demand (ex-post) high

[24] I do not include any firms' time-varying characteristics as control in the regression like most researchers do for credit accessibility analysis because those variables may correlate with treatment assignment, the degree of probability of default in this regression, and the outcome variable. Controlling for those variables will induce bias by opening the backdoor path X ← U1→ Z← U2→Y, where X is the treatment, Y is the outcome, Z is the potential "controls" and U is unobservable, thus spoiling previously unbiased estimates, making Z a bad control.

loan interest rates. For example, consider a firm that relies mostly on a single lender to fund its operations. Through the first loan, the bank learns how to work with the company's management, whose data it can trust, what information it needs, where it can get it from, and how to analyze it. When the loan matures, the bank learns how well it was able to acquire and analyze information to estimate the risk and repayment capacity of the company. As the relationship intensity increases through granting more loans, the bank will focus its information-gathering efforts on what prior interactions have proven to be important and instructive in appropriately evaluating the firm's risk. In addition, Hauswald and Marquez (2003) demonstrate that acquiring and digesting information involves a positive self-feeding mechanism: "*As banks become better at processing information, the return to exerting effort increases, so that banks choose a higher effort level. Hence an inside bank's information advantage should increase as well.*" Thus, firms in a long-term relationship with a lender may find it challenging to switch lenders when they have an incentive to do so.

As the guidance may constrain bank leveraged lending activities and cause regulated banks to be cautious when extending leveraged credits, long-term relationships with a single lender may make it difficult for a company to switch lenders or access other sources of finance. Therefore, firms who depend more heavily on relationship lending may see a more significant negative effect on their access to leveraged credit from regulated banks or the leveraged loan market.[25]

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[25] A negative credit supply shock should be better to examine the "hold-up" problem than a positive supply shock in chapter one because firms are incentivized to switch lenders when experiencing a negative credit supply shock.

I use a difference-in-differences specification to assess the impact of the guidance on relationship firms' access to leveraged credit based on the following regression setup:

$$Y_{f,t} = \alpha + \gamma_t + \gamma_f + \rho Post_t * Relation_f + \varepsilon_{f,t} \quad (10)$$

where the outcome variables $Y_{f,t}$, dummy variable $Post_t$ and the fixed effects γ_t and γ_f are the same as Equation 9; $Relation_f$ is a dummy variable equal one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Firms' borrower-lender relationship length is defined in the next paragraph. The coefficient of interest, ρ, therefore indicates the average treatment effect of IGLL and FAQ on relationship borrowers' leveraged credit availabilities.

Similar to Botsch and Vanasco (2019), I define relationship length as the maximum duration of a firm's relationships with any single bank lead arranger in the leveraged loan market. I determine this by counting a firm's cumulative number of loan facilities with any regulated bank lead arranger in the market over the last five years and using the maximum number as a proxy for how a firm bonds with a lead arranger in the leveraged loan market.[26] My definition of relationship length is inherently tied to the average maturity of a firm's loans. A firm that regularly borrows short-term and often refinances will have a longer relationship length than a company that usually borrows long-term and seldom refinances. I do not see this as problematic. Schenone (2010) argues that *"the resolution of uncertainty regarding the firm's*

[26] I only consider relationship between firm and regulated banks in this paper not because firms do not engage in relationship lending with other financial institutions, but because the leveraged lending guidance would encourage firms that have a long-term relationship with the regulated bank to switch lenders.

repayment ability [...] allows the lender to accurately assess the firm's creditworthiness before granting a subsequent loan." Additionally, borrowers must gather up-to-date information every time a loan is originated or renewed. Thus, we should expect the informational asymmetries to be more alleviated between lenders and borrowers that borrow short-term and refinance more frequently.

2.4.3 Triple-difference Specification

Section 2.4.2 attempts to reflect any treatment effect of the leveraged lending guidance on the accessibility of leveraged credit to firms that "hold up" in a borrower-lender relationship and find it difficult to obtain leveraged credit from alternative financing sources. However, the setup can only reveal that firms with a strong borrower-lender relationship often get leveraged credit through leveraged loans from a particular lender; it cannot rule out the possibility that the firm might readily obtain leveraged credit from other sources. Since the firm's ability to issue public debt restricts the relationship bank's monopolistic power (Rajan (1992) and Diamond (1991)), firms with the same length of borrower-lender relationship may have different levels of external finance constraints and experience different degrees of the "lock-in" effects. To further examine how the guidance affects relationship firms' access to leveraged credit, I use a triple-difference identification strategy to capture any treatment effects on longer borrower-lender relationship firms with a high external finance constraint.

I use the HP index proposed by Hadlock and Pierce (2010) to measure firms' external finance constraints. The HP index indicates the likelihood of a firm report being significantly liquidity constrained. They find that firm size and age are useful predictors of financial constraint levels, and the index increases with higher levels of

financial constraints. Meanwhile, they claim their index outperforms other financial constraint measures, including Kaplan and Zingales (KZ index, 1997) and Whited and Wu (WW index, 2006). The HP index is defined as follows:

$$HP_t = -0.737 \ln(Assets_t) + 0.043(\ln(Assets_t))^2 - 0.040Age_t, \quad (11)$$

where $Assets$ is the firm's total assets; Age represents the number of years of non-missing stock price data on Compustat.

I use the following triple differences specification to investigate if relationship firms with high bank dependency find it challenging to obtain leveraged loans after the implementation of the guidance:

$$Y_{f,t} = \alpha + \gamma_f + \gamma_t + \beta_1 Post_t * Relation_f + \beta_2 Post_t * HPScore_f + \beta_3 Relation_f * HPScore_f + \rho Post_t * Relation_f * HPScore_f + \varepsilon_{f,t}, \quad (12)$$

where the outcome variables $Y_{f,t}$, dummy variable $Post_t$, $Relation_f$ and the fixed effects γ_t and γ_f are the same as Equation 10; $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms, represents external financing liquidity constraints. The coefficient of interest, ρ, therefore indicates the average treatment effect of IGLL and FAQ on firms.

2.5 Data

The primary loan data are obtained from the LPC DealScan database between 2010 and 2017, containing extensive information on the global commercial loan market, including syndicated loan contracts, such as the loan's spread over LIBOR, maturity, purpose, and type; lender information, such as the role of the lender in the

syndicate, lender type and share of the syndicate.[27] I restricted my sample only to include loan deals made to US firms. As is standard in corporate finance, I dropped loans to finance, insurance, and real estate borrowers (SIC 6000-6999) from the sample. As syndicated loans can be structured in several tranches, also called facilities, DealScan offers both deal (package) and tranche (facility) level data. I use facility-level data to do the analysis.[28] Following Kim et al. (2018), I define a loan as a leveraged loan if the facility is a term loan with a spread over LIBOR of 200 bps or more. A possible challenge with my definition is that spreads rely on macroeconomic variables in addition to borrower quality. However, this concern is not significant to my analysis since the difference-in-differences setting will eliminate any impact on both treatment and control groups. Each observation in my sample sums up the total leveraged credit the firm obtained each year between 2010 and 2017.

I define banks when lenders type (institution type) in DealScan as "US Bank" or "Thrift/S&L." I manually exclude observations classified as a bank by DealScan but are not. Then I manually add lenders whose SIC code is between 6011 and 6082, or 6712 or 6719 if the lender is a commercial bank. In the robustness check Section 2.7.1, I manually identify the banks participating in the 2015 CCAR stress testing and

[27] I begin my study period in 2010 in order to minimize any possible effects of the Great Recession from 2007 to 2009. Meanwhile, the IGLL stops in March 2018, and I close my study time in 2017.

[28] I use facility level data for two reasons: First, a loan package may comprise multiple facilities with different origination dates, and the origination date for the whole package will be determined by the earliest facility date. As I use firm-year level data, if a package contains facilities that are originated across different years, using deal level data to calculate the year level loan amount borrowing would be inappropriate. Second, as Chava and Roberts's linking table is based on facility level data, using facility level data to match the firm's annual accounting data would be more accurate.

separate lenders into three groups: banks subject to IGLL but CCAR, banks subject to IGLL and CCAR, and financial institutions that do not comply with either IGLL or CCAR.[29] As the guidance mainly restricts banks' behavior at the loan origination phase, this study focuses on the change in behavior of leveraged loan originators or leveraged loan lead arrangers following the guidance. Similar to Ivashina (2009) and Prilmeier (2017), I define lenders as lead arrangers when the variable "Lead Arranger Credit" is marked "Yes." In addition, I define the following roles as lead arrangers when "Lead Arranger Credit" is "No": agent, administrative agent, arranger, lead bank. The rest of the lenders in a loan facility are defined as participants. For each year t the total bank leveraged loan credit is the amount of all leveraged credit obtained by the firm via a bank lead arranger.

To calculate the borrower's probability of default and HP-Score and obtain borrowers' time-variant controls, I obtain the firm's characteristics from the Compustat Fundamentals Annual database and match the firm with the borrower in DealScan using the link table created by Chava and Roberts (2008). I exclude firms when a loan deal cannot be linked with Compustat. I exclude firms with missing required characteristics in any year within the research period from the sample. The borrower's face value of debt F is calculated using the "Debt in Current Liabilities" plus half the "Long-Term Debt." I get the daily stock price for firms from the CRSP daily files. Then, the daily market value of each firm's equity E is calculated as the

[29] According to https://www.federalreserve.gov/bankinforeg/stress-tests/2015-Supervisory-Stress-Test-Results.htm, 31 bank holding companies with total consolidated assets of more than $100pply billion participate in the 2015 Dodd-Frank Act Stress Test.

product of the share price and the number of shares outstanding. I use monthly observations of the 1-year Treasury Constant Maturity Rate obtained from the Federal Reserve Board Statistics as the risk-free rate r. Then, following the iteration process described in Section 2.4.1, I compute the probability of default PD_{2009} for each publicly traded borrower; using Equation 11, I compute the HP_{2009}. The summary statistics are shown in Table 1.

2.6 Result

2.6.1 Difference-in-Differences Estimates

The estimates for Equation 9 are shown in Table 2 and Table 3, where firms with a high risk are categorized based on their probability of default. The estimated coefficients in these tables represent the average effect of the IGLL and FAQ on firms' ability to access leveraged credit. Columns 1-3 detail the effect on both the intensive and extensive margins of total leveraged credit borrowed from the market. Columns 4-6 outline the impact on the intensive and extensive margins of leveraged credit borrowed from regulated banks. Meanwhile, Columns 4 and 8 show the effect on the average spread of the loans borrowed from the market and regulated banks, respectively. Both the intensive and extensive margin coefficients for total leveraged loan borrowings are negative, with the intensive margin statistically significant at the 1% level. This implies that among high-risk firms, those with higher default risk face challenges in obtaining leveraged credit from the market. The volume of leveraged credit they borrowed decreased significantly (as indicated by the intensive margin) by 0.373 log points, which corresponds to a 45.2% reduction in the total volume of leveraged credit borrowed. The estimates for both the intensive and extensive margins

of loan borrowing from regulated banks are negative, with the intensive margin being statistically significant at the 1% level. This suggests that when high-risk firms manage to secure loans from either the market or regulated institutions, the volume of leveraged credit they obtain sees a significant reduction. Specifically, the intensive margin falls by 0.377 log points, corresponding to a 45.8% decrease in the total loan volume borrowed from regulated banks by lower-quality firms. It is reasonable to expect regulated bank borrowings to decline more than total borrowings, as the company has other sources of financing that are not subject to the guidance. As demonstrated in Table 3, the major impact stems from the publication of the FAQ, aligning with the findings of Kim et al. (2018) and Calem et al. (2020). They found that the FAQ had a more pronounced effect on banks' issuance of speculative-grade loans. The decline in the total quantity of leveraged credit borrowed following the introduction of the guidelines is less than the decrease in loans secured from regulated banks. This suggests that non-regulated financial institutions may be stepping in to meet the leveraged loan requirements of lower-quality firms. This is in line with the findings of Kim et al. (2018) who pointed out that the guidance led to a shift of leveraged lending towards nonbank institutions. However, following the release of the FAQ, the total amount of leveraged borrowing experienced a more marked drop. This might suggest that the financial markets as a whole have become more cautious in extending leveraged credit, demonstrating a spillover effect. There is a significant negative impact on loan spreads. Since the observed loan prices are an equilibrium outcome, the negative impact suggests that high-risk firms borrow lower price loans after the FAQ, indicating that high-default-risk firms find it difficult to finance risky projects from the market or regulated banks.

Table 4 and Table 5 show the estimates for Equation 10, where firms are grouped by the length of the borrower-lender relationship. Firms with a longer borrower-lender relationship with any lead arranger incurred a 16.1 percentage point reduction in the chance of getting leveraged credit from the market and a 16.8 percentage point reduction in the probability of getting leveraged credit from the regulated banks. Furthermore, I estimate that firms with a longer relationship experienced a relative decrease in the cost of borrowing of 30.066 or 31.640 bps over LIBOR from the market or regulated banks, a 10% or 10.9% reduction relative to the mean, indicating a potential hardship in obtaining funds for risky projects. The impact is much more pronounced after the FAQ publication, which is expected given that the FAQ aims to explain any ambiguity and promote more rigorous risk management. The results indicate that firms with a borrower-lender relationship experience difficulty getting a leveraged loan after the guidance. The reduction in the accessibility of leveraged credit for relationship firms reveals two things: first, relationship lending does not secure credit for firms when the relationship bank is cautious about extending credit, so the advantage of greater access to credit relative to firms with shorter relationship duration is diminishing; and second, relationship firms are "locked-in" by relationship lender, and the information gap between the relationship lender and prospective lenders is widening, making it difficult for firms with a long-standing relationship with a borrower to switch lenders and acquire essential credits, which supports the “hold up” theory. Furthermore, relationship firms tend to receive low-risk loans, suggesting that firms have difficulty raising funds for risky projects due to the issuance of the leveraged guidance.

2.6.2 Difference-in-Difference-in-Differences Estimates

I estimate the impact of the guidance on firms that may be more likely to be held and rely on relationship lending to get financed using a triple-difference specification in Equation 12. I present the parameter estimate associated with $Post_t * Relation_f * HPScore_f$ in Table 6 and Table 7. Firms with a longer borrower-lender relationship and high external finance constraints incurred a 10 percentage point reduction in the chance of getting leveraged credit from the market and an 11.7 percentage point reduction in the probability of getting leveraged credit from the regulated banks (extensive margin). Furthermore, in columns 1 and 5, the results indicate that firms with a heavy reliance on bank loans incurred around 68.7% and 71.8% loan amount reduction when they had the opportunity to obtain a loan from the market or regulated banks (intensive margin). According to the estimated coefficients in Columns 4 and 8, the loan spread does not observe a significant decrease as the difference-in-differences estimates present, implying that the relationship lender does not distinguish the firm with their ability to access external finance sources when financing risky projects. Finally, as a robustness check, I use an alternative proxy for firms' external finance constraints, and the results are similar to what I have here. Detailed information is illustrated in Section 2.7.3.

2.6.3 Event Study Framework

I study the timing of the effect in an event study framework. I do this by including a series of dummy variables in the standard regression to trace out the year-by-year effects of the guidance on firms' access to leveraged credit:

$$Y_{f,t} = \gamma_t + \gamma_f + \sum_{\tau=-3}^{4} \delta_\tau PD_f * Post_{t+\tau} + \varepsilon_{f,t}, \quad (13)$$

$$Y_{f,t} = \gamma_t + \gamma_f + \sum_{\tau=-3}^{4} \delta_\tau Relation_f * Post_{t+\tau} + \varepsilon_{f,t}, \quad (14)$$

$$Y_{f,t} = \gamma_t + \gamma_f + \sum_{\tau=-3}^{4} \delta_\tau Relation_f * Post_{t+\tau} * HPScore_f + \varepsilon_{f,t}, \quad (15)$$

where the outcome variables $Y_{f,t}$, dummy variable $Post_t$, firm's default risk PD_f, the length of borrower-lender relationship $Relation_f$, firm's external finance constraint $HPScore_f$, and the fixed effects γ are the same as defined in Equation 9 and Equation 12. $Post_{t+\tau}$ is a dummy variable that equals one in the $|\tau|th$ year before, if τ is a negative number, or after, if τ is a positive number, the issuance of the IGLL. At the endpoints, $Post_{t+\tau} = 1$ for all three or more years before or four or more years after the IGLL was issued. Figure 3-5 plot the point estimates and 95% confidence intervals corresponding with Equation 13-15, adjusting for borrower-level clustering. All coefficients on the treated dummy variables are insignificantly different from zero for all the years before the status change, meaning the changes in outcome variables did not precede the issuance of the IGLL. In Figure 3, when firms are differentiated by quality among high-risk firms, the estimates for both intensive and extensive margins of total leveraged loan borrowing as well as leveraged loan borrowing from regulated banks are trend downward after the issuance of the IGLL. After the release of the FAQ, the intensive margin of leveraged loans for poor-quality enterprises decreased significantly at the 5% significance level, and the impact lasted for several years, indicating that relatively higher default risk enterprises obtained less funds when they were able to borrow, because the issuance of FAQ. The negative impact on loan spreads happens in the years 2015 and 2017, indicating the issuance of the follow-up FAQ have an immediate impact on relationship firms to finance risky projects. For the impact on relationship firms, the point estimates of the extensive margin of leveraged credit borrowing in Figure 4 are generally negative after the issuance of the guidance. They are statistically significant at the 5% level in the subsequent years after the implementation of the IGLL, implying that the introduction of the IGLL had a

persistent effect on the borrowing opportunities of relationship firms and that they had difficulties switching to an alternative source of financing. I get a similar conclusion for loan amount borrowing in the triple-difference specification with the estimates in Figure 5. In the first two years after the issuance of the IGLL, firms with a significant reliance on bank loans are less likely to get leveraged credit, especially from regulated firms, showing a temporary negative effect on access to leveraged credit.

2.7 Robustness Check

2.7.1 The potential impact of the 2015 Comprehensive Capital Analysis and Review (CCAR)

The Comprehensive Capital Analysis and Review (CCAR) is a stress testing protocol for bank holding companies (BHCs) and U.S. Intermediate Holding Companies (IHCs) of foreign banking organizations with $100 billion or more in total consolidated assets. Its purpose is to confirm whether these financial institutions possess adequate capital to weather significant economic disruptions and to scrutinize their risk modeling approaches. The inclusion of a scenario in the 2015 CCAR featuring a drastic decline in corporate credit quality could have influenced the issuance of speculative-grade syndicated loans by regulated banks. This occurred concurrently with the FAQ documentation, creating a possible complicated factor that may have obstructed corporate access to leveraged credit. Considering this, I separately examined corporate borrowing from banks subject to both CCAR and IGLL, banks regulated solely by IGLL, and non-regulated entities not bound by CCAR and IGLL to ensure the validity and resilience of my conclusions.

The impacts on firms with high risk are presented in Tables 8a and 8b. Columns 4-6 offer insights into borrowings from banks solely under the IGLL. Both

intensive and extensive margin coefficients are negative, with the negative effect of the intensive margin statistically significant at the 1% level, confirming the robustness of the findings presented in Section 2.6.1. Firms with higher default risk have experienced difficulties in securing leveraged credit following the introduction of the IGLL. When comparing the results in columns 1 and 4, it is evident that the IGLL has a greater impact on leveraged credit borrowings from smaller banks (those with consolidated assets of up to $100 billion) not subjected to the CCAR. However, it should be noted that due to a limited sample size, the estimated power was low. In Table 8b's first column, the coefficients for loan amounts borrowed from banks under both IGLL and CCAR weren't statistically significant prior to the FAQ issuance, suggesting that the release of the leveraged loan guidelines didn't impede high-risk borrowers from acquiring leveraged credit from larger banks. Nevertheless, after 2015 (in the second post-analysis period), obtaining leveraged credit from large banks has become increasingly challenging for high-risk companies. Yet, it remains unclear whether this difficulty stems from the subsequent FAQ or the implementation of the 2015 CCAR.

Based on the findings detailed in Tables 9a and 9b, the introduction of the guidelines appears to adversely affect the ability of relationship firms to secure leveraged loans from banks subject to IGLL and CCAR (large banks whose consolidated assets are over $100 billion) as well as banks that only follow IGLL (smaller banks with consolidated assets of up to $100 billion). This suggests that the implementation of IGLL can present challenges for businesses with longstanding relationships with banks when trying to acquire leveraged credit from relatively smaller banks. However, it's premature to infer the same for larger banks as the

negative impact might stem solely from the 2015 CCAR. To delve deeper into this, the post-period was divided into two phases to assess if the 2015 CCAR had any effect on a firm's ability to borrow from larger banks. Evidenced by the data in column 1 of Table 9b, the first phase (prior to the initiation of the 2015 CCAR) witnessed a significant negative impact on borrowing. This implies that the introduction of IGLLs has substantially hindered firms with long-term bank relationships from acquiring leveraged credit from larger banks. When comparing these results with the treatment effect on loan borrowing from non-CCAR banks in column 4, it's evident that there are larger negative impacts on loan borrowing from CCAR banks post the FAQ issuance, which coincided with the introduction of the 2015 CCAR stress tests. This indicates that both the guidelines and the 2015 CCAR may dissuade banks from issuing leveraged credit. In sum, firms with longer relationships with a single lender have difficulty obtaining leveraged credit from regulated banks. The impact could be a mix of decreased relationship lending advantages and switching lender obstacles.

Tables 10a and 10b present the DDD estimates. There is a notable decrease in the intensive margin of loan borrowings from banks subject to the CCAR in the initial period following the implementation of the IGLL but preceding the issuance of the FAQ. This suggests that firms with a higher reliance on bank loans faced challenges in procuring leveraged financing from larger institutions due to IGLL's introduction. However, because of the scarcity of data points available for evaluating the treatment effect on loan borrowing from non-CCAR banks, it becomes challenging to discern any effects resulting from the implementation of the FAQ. As such, to support the assertion that the FAQ, the 2015 CCAR, or both, have adverse impacts on firms, further data might be required.

2.7.2 Different thresholds to define leveraged loan

The findings presented up to this point are predicated on the categorization of leveraged loans as loans with an initial spread of at least 200 basis points over LIBOR. I've repeated the difference-in-differences and triple-differences methodologies using a threshold of 250 basis points, with the estimated coefficients displayed in Tables 11-16. These estimates align with my prior findings concerning the effect of the leveraged lending guidance on firms of lower quality, those with long-standing bank relationships, and firms heavily reliant on bank loans. This suggests that the conclusions remain robust even when the criteria for defining a leveraged loan are altered.

2.7.3 Different proxy for firm's bank dependency

Due to informational opacity, financially limited firms cannot obtain capital to achieve their growth potential (Whited and Wu, 2006), suggesting reliance on financial intermediaries and, hence, bank dependency. Following their methodology, I use the following WW index to represent the shadow cost of external funds and test the robustness of my findings in Section 2.6.2:

$$WW_t = -\frac{0.091EBITDA_t}{Assets_{t-1}} - 0.062PDIVD_t + \frac{0.021LTD_t}{Asset_t} - 0.044\,ln(Assets_t) + 0.102ISG_t - 0.035SG_t, \quad (16)$$

where $EBITDA$ represents earnings before interest, taxes, and depreciation; $Assets$ is the firm's total assets; $PDIVD$ is a dummy variable equals one if cash dividend is positive; LTD is the firm's long-term debt; ISG is the firm's 3-digit industry sales growth; SG is the firm's sales growth. Higher WW index values indicate greater constraint. Whited and Wu find that firms with a high WW index have limited public bond ratings and minimal coverage from stock analysts, features associated with bank

dependency. The triple-difference estimates are shown in Table 17 and Table 18. $WWScore_f$ is a dummy variable equals one if firms' WW_{2009} is greater than the median of WW_{2009} for all firms. The obtained results suggest that companies heavily reliant on bank loans face more difficulties securing leveraged loans from regulated banks or the leveraged loan market following the guidance's enactment. This effect is further amplified after the FAQ was issued, which aligns with previous findings using the HP index. Therefore, these results, using various proxies for a firm's external finance constraints, reinforce the consistency and robustness of my findings.

2.8 Conclusion

This study contributes to the contemporary body of work examining the efficacy of prudential policies and their influences on financial markets. It resonates with studies such as those conducted by Kim et al. (2018) and Calem et al. (2020), which also scrutinize the implications of the 2013 leveraged lending guidance. However, whereas their analyses predominantly center on the perspective of the lenders, my study uniquely assesses the impacts from the viewpoint of the borrowers. This study classifies firms based on two criteria: quality and dependency on bank loans. By examining variations across firms and over time, I found that high-risk firms, which frequently rely on leveraged loans, saw a significant decrease in the total volume of leveraged credit they obtained from the market. This decrease was 0.373 log points on the intensive margin, translating to a substantial 45.2% reduction. Additionally, the amount of leveraged credit these firms secured from regulated banks dropped by 0.377 log points on the intensive margin, indicating a 45.8% reduction in the loan volume borrowed from regulated banks by lower-quality firms. Firms that maintained a longer borrower-lender relationship with any regulated bank experienced

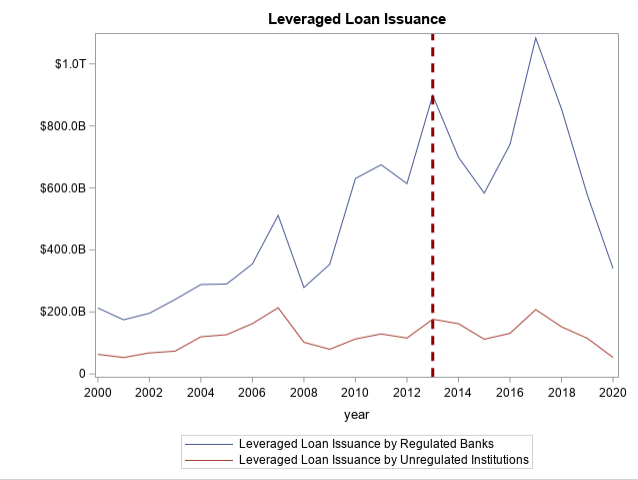
a 16.1 percentage point decrease in their likelihood of obtaining leveraged credit from the market and a 16.8 percentage point decrease in their chances of securing leveraged credit from regulated banks. Furthermore, firms with a longer borrower-lender relationship and high external financing constraints faced a 10 percentage point decrease in the likelihood of obtaining leveraged credit from the market and an 11.7 percentage point decrease in their chances of securing leveraged credit from regulated bank. Simultaneously, there was an approximately 68.7% and 71.8% decrease in loan volume on the intensive margin of loan borrowing from the market or regulated banks, respectively. Meanwhile, the borrowing cost for firms with higher default risk saw a decrease of 40.3 and 39.5 basis points over LIBOR when securing loans from either the market or regulated banks, respectively, following the FAQ's release. This represents a 13% and 13.6% reduction relative to the mean. Furthermore, firms that have long-standing relationships with banks experienced a decrease of 36.1 or 34.7 basis points over LIBOR when borrowing from either the market or regulated banks respectively, which translates to a 12% or 11.9% reduction relative to the mean.

Firms of lower quality or those with longstanding bank relationships have seen a significant reduction in their access to leveraged credit. Concurrently, the noted decreases in the overall cost of loans procured by these firms indicate a shift towards funding relatively safer projects. These changes are attributable not only to the prudent approach adopted by regulated banks in extending leveraged credit as a direct consequence of the IGLL, but also to the cautious stance taken by the broader market in providing leveraged credit due to the spillover effects of the IGLL. In conclusion, the IGLL and subsequent FAQ effectively achieved their microprudential objectives by altering the underwriting standards upheld by banks to ensure the safety and

soundness of individual institutions. Simultaneously, they met their macroprudential objectives by limiting the extent of risky projects that firms could finance, thereby controlling the systemic risks within the financial system as a whole.

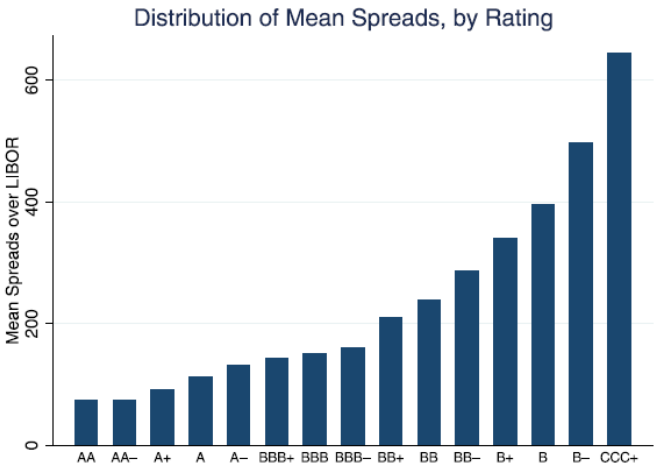
This article introduces a new perspective on evaluating the impact of prudential policies. My findings corroborate the notion that regulated banks exercise greater caution when originating leveraged credit, consistent with studies by Kim et al. (2018) and Calem et al. (2020). Moreover, the leveraged lending guidance appears to curtail high-risk firms' access to leveraged credit. However, the scope of this analysis is primarily focused on the guidance's direct influence on firms' access to leveraged finance. Future research could expand on this and delve into the effects on firm-level outcomes. Finally, this paper leverages a negative credit supply shock to investigate how firms, which heavily depend on relationship lending, face challenges when switching lenders and seeking leveraged credit. I have uncovered evidence suggesting that extended lending relationships may act as a barrier for firms when attempting to switch lenders to obtain sufficient leveraged credit. This finding provides support for the "hold up" theory.

Figure 1. US Leveraged Loan Issuance



Notes: This figure demonstrates the total leveraged loan originated to US borrowers between 2000 and 2020. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The red dashed line refers to the year that the IGLL was implemented. Loans are originated by regulated banks if at least one lead arranger is regulated by OCC, Board, or FDIC (the "agencies). Loans are originated by unregulated institutions if all the lead arrangers are not regulated by the agencies.

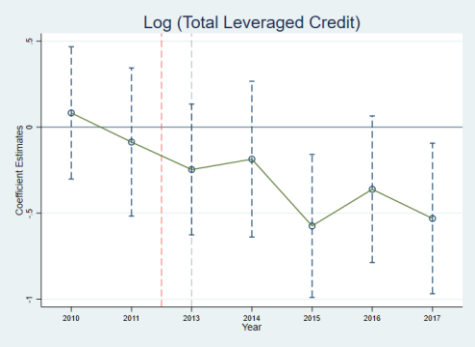
Figure 2. Spreads for term loans originated between 2011 (Mar) and 2015 (Dec)



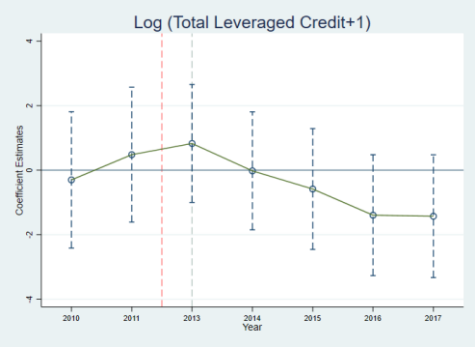
Notes: Adapted from Kim, S., Plosser, M. C., & Santos, J. A. (2018). Macroprudential policy and the revolving door of risk: Lessons from leveraged lending guidance. Journal of Financial Intermediation, 34, 17-31.

Figure 3. Differential Effect by Year (Firm differentiated by quality)

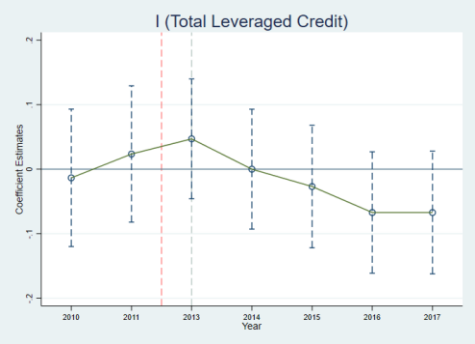
Panel A. Log (Total Leveraged Credit)



Panel B. Log (Total Leveraged Credit+1)

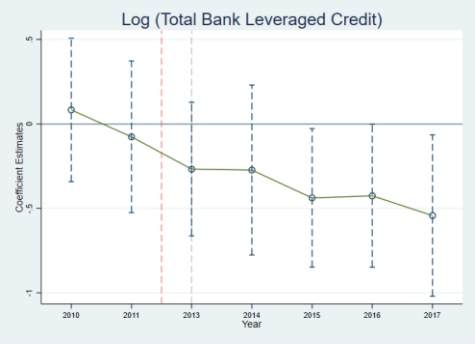


Panel C. I (Total Leveraged Credit) (0/1)

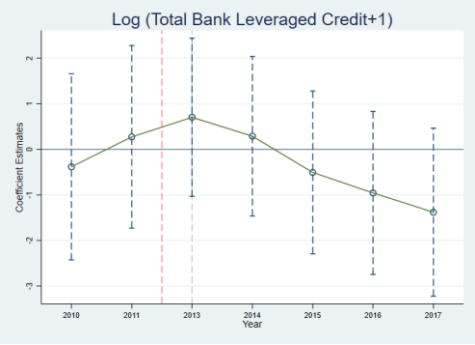


Panel D. Average Loan Spread

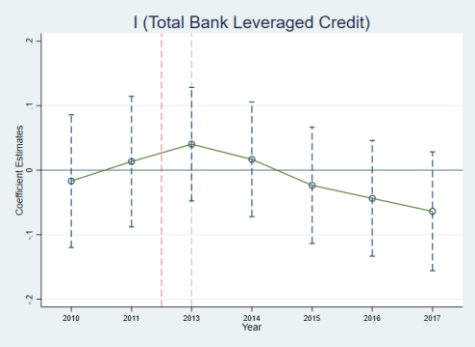
Panel E. Log (Bank Leveraged Loan)



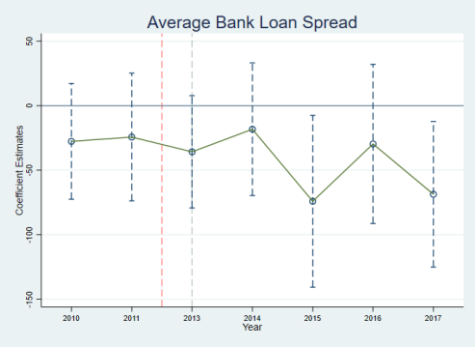
Panel F. Log (Bank Leveraged Loan+1)



Panel G. I (Bank Leveraged Credit) (0/1)



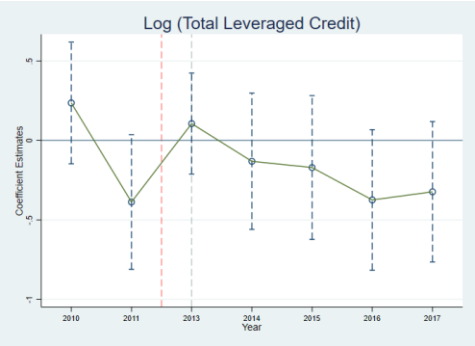
Panel H. Average Bank Loan Spread



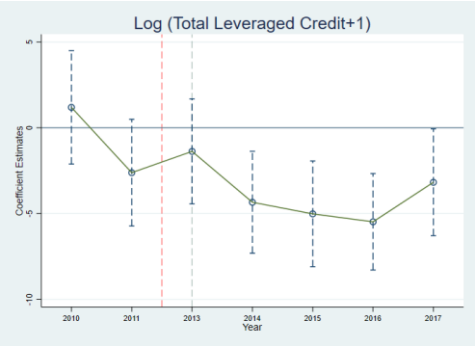
Notes: Section 2.4.1 difference-in-differences specification is estimated for each year relative to 2012. The IGLL was implemented in 2013, and the following FAQ was issued in 2014. Panels A-C and E-G refer to the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks. I (Leveraged Loan) and I (Bank Leveraged Loan) are equal to 1 if and only if the bank obtained a leveraged loan from the market and regulated bank, respectively. Panel D and H refer to the average loan spread per dollar borrowed. Estimates are dynamic effects relative to 2012. The reference year is highlighted using a red dashed line. All estimates are generated using OLS. The 95% confidence interval is shown in the graphs. Standard errors are clustered at the borrower level.

Figure 4. Differential Effect by Year (Firm differentiated by borrower-lender relationship)

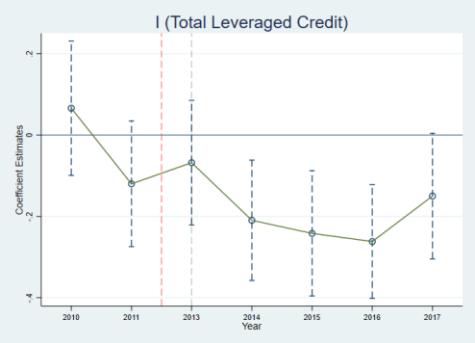
Panel A. Log (Total Leveraged Credit)



Panel B. Log (Total Leveraged Credit+1)

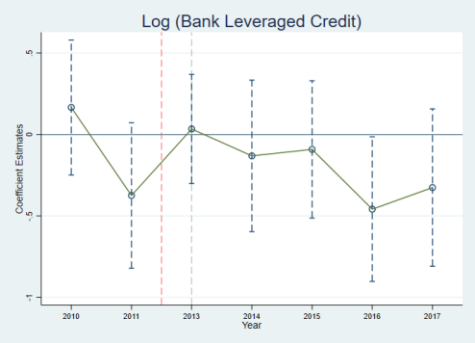


Panel C. I (Total Leveraged Loan) (0/1)

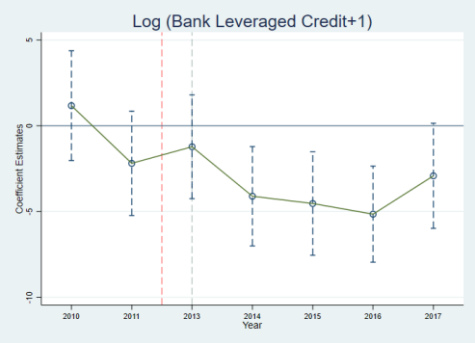


Panel D. Average Loan Spread

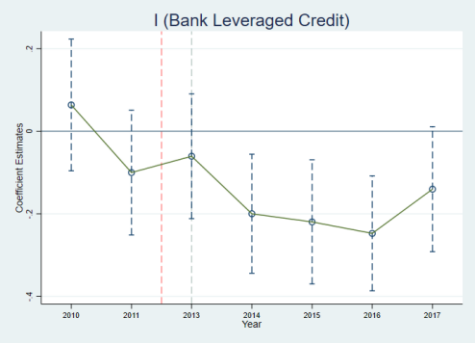
Panel E. Log (Bank Leveraged Credit)



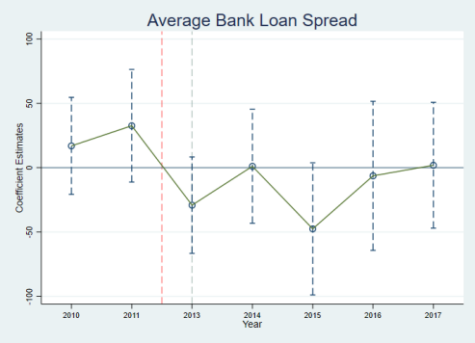
Panel F. Log (Bank Leveraged Credit+1)



Panel G. I (Bank Leveraged Loan) (0/1)



Panel H. Average Bank Loan Spread

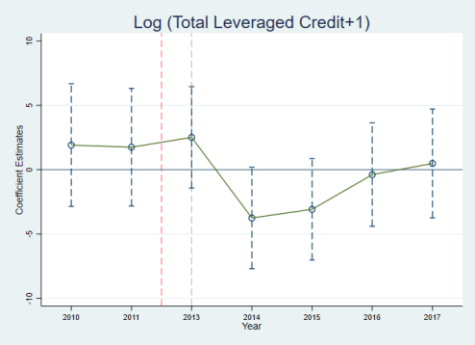


Notes: Section 2.3.2 difference-in-differences specification is estimated for each year relative to the year 2012. The IGLL was implemented in 2013, and the following FAQ was issued in 2014. Panels A-C and E-G refer to the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks. I (Leveraged Loan) and I (Bank Leveraged Loan) are equal to 1 if and only if the bank obtained a leveraged loan from the market and regulated bank, respectively. Panel D and H refer to the average loan spread per dollar borrowed. Estimates are dynamic effects relative to 2012. The reference year is highlighted using a red dashed line. All estimates are generated using OLS. The 95% confidence interval is shown in the graphs. Standard errors are clustered at the borrower level.

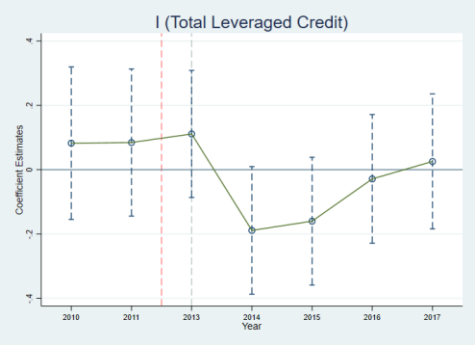
Figure 5. Differential Effect by Year (Firm differentiated by degrees of bank loan reliance)

Panel A. Log (Total Leveraged Credit)

Panel B. Log (Total Leveraged Credit+1)

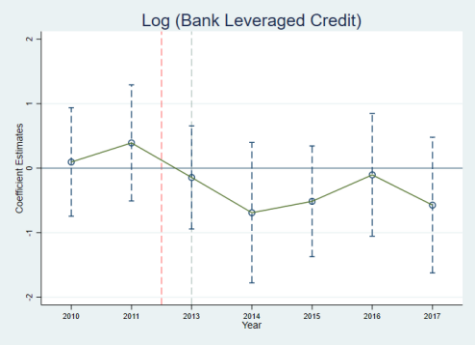


Panel C. I (Total Leveraged Loan) (0/1)

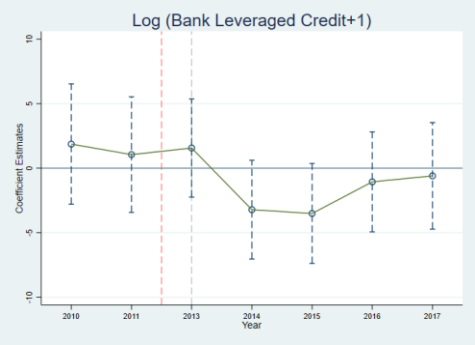


Panel D. Average Loan Spread

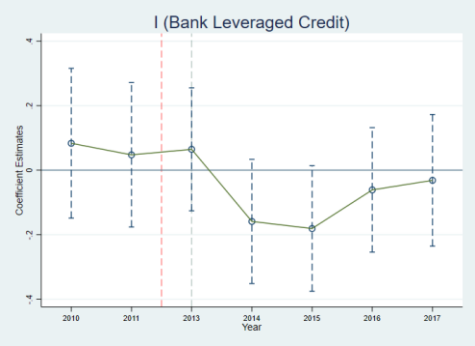
Panel E. Log (Bank Leveraged Credit)



Panel F. Log (Bank Leveraged Credit+1)



Panel G.I (Bank Leveraged Loan) (0/1)



Panel H. Average Bank Loan Spread

Notes: Section 2.3.3 triple-differences specification is estimated for each year relative to the year 2012. The IGLL was implemented in 2013, and the following FAQ was issued in 2014. Panels A-C and E-G refer to the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks. I (Leveraged Loan) and I (Bank Leveraged Loan) are equal to 1 if and only if the bank obtained a leveraged loan from the market and regulated bank, respectively. Panel D and H refer to the average loan spread per dollar borrowed. Estimates are dynamic effects relative to 2012. The reference year is highlighted using a red dashed line. All estimates are generated using OLS. The 95% confidence interval is shown in the graphs. Standard errors are clustered at the borrower level.

Table 1. Summary Statistics

	Mean	StdDev	Min	Max
Assets ($M)	5,858	16,528	24.75	274,098
Total Long-term Debt ($M)	1,923	5,613	0	110,536
Sale ($M)	4,439	11,534	-6.741	230,859
I (Cash Dividends>0)	0.505	0.500	0	1
Current Assets ($M)	1,430	3,323	0.802	108,461
Debt in Current Liability ($M)	233.2	1,782	0	49,669
Total Current Liability ($M)	1,028	2,677	2.398	90,281
SIZE	7.551	1.436	3.209	12.52
Leverage	0.347	0.222	3.21e-05	1.978
PD_{2009}	0.426	0.365	0	1.000
HP_{2009}	-3.880	0.692	-5.118	-2.202
WW_{2009}	-0.351	0.130	-0.621	1.409
$Relation_{2009}$	2.094	1.847	0	10
Total Leveraged Credit ($M)	251.6	834.2	0	21,970
Bank Leveraged Credit ($M)	228.3	792.3	0	21,970

Notes: This table reports summary statistics for all the variables used in calculating the firms' probability of default, the proxies of firms' external finance constraints, and as control variables in the baseline regression. E is the daily market value of equity in millions of dollars and is taken from CRSP as the product of the number of shares outstanding (SHROUT) and daily share price. F is the face value of debt in millions of dollars computed using debt in current liability plus half of the total long-term debt. r, as the risk-free rate, is the monthly 1-year Treasury Bill rate obtained from the Federal Reserve Board Statistics. V, the market value of firm assets; σ_v, the volatility of the asset per annum; μ, expected return on the firm's assets; DD, distance to default; PD, expected probability of default is generated as the result of solving the Merton DD model for each firm-year using the iterative procedure described in Section 2.3.1. Age is estimated using the number of years of non-missing stock price data on Compustat. HP_Score and WW_Score are proxies of firms' external finance constraints, following Hadlock and Pierce (2010) and Whited and Wu (2006), respectively (see Section 2.3.2). Relation, a proxy of the lender-borrower relationship, is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Loan information is obtained from LPC DealScan. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. Firm-year level Bank Leveraged Credit contains loans originated by regulated banks if at least one lead arranger is regulated by OCC, Board, or FDIC (the "agencies).

Table 2. The impact of the 2013 IGLL on high default risk firms' access to leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * PD$	-0.373***	-0.580	-0.026	-27.873*	-0.377***	-0.334	-0.014	-25.364
	(0.104)	(0.555)	(0.028)	(14.689)	(0.113)	(0.538)	(0.027)	(15.625)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.723	0.195	0.189	0.557	0.733	0.199	0.195	0.529
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on borrowers' access to leveraged credit. PD_f is a dummy variable equals one if firm f's probability of default in 2009 is greater than the median of the probability of default for all the firms in 2009. The borrowers' probability of default is estimated using Merton's (1974) model. Leveraged credit is defined as a loan with a spread larger than 200 bps over LIBOR. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3. The impact of the 2013 IGLL and 2014 FAQ on high default risk firms' access to leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * PD$	-0.238**	0.343	0.020	-15.083	-0.269**	0.532	0.030	-10.236
	(0.118)	(0.614)	(0.031)	(14.520)	(0.130)	(0.600)	(0.031)	(15.302)
$Post2 * PD$	-0.505***	-1.195*	-0.057*	-40.301**	-0.477***	-0.911	-0.043	-39.511**
	(0.134)	(0.643)	(0.032)	(18.440)	(0.139)	(0.618)	(0.031)	(19.412)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.724	0.197	0.190	0.559	0.734	0.200	0.196	0.531
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on borrowers' access to leveraged credit. PD_f is a dummy variable equals one if firm f's probability of default in 2009 is greater than the median of the probability of default for all the firms in 2009. The borrowers' probability of default is estimated using Merton's (1974) model. Leveraged credit is defined as a loan with a spread larger than 200 bps over LIBOR. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. The impact of the 2013 IGLL on relationship firms' access to leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * Relation$	-0.106	-3.402***	-0.168***	-30.066**	-0.112	-3.245***	-0.161***	-31.640**
	(0.106)	(0.553)	(0.028)	(14.567)	(0.116)	(0.546)	(0.027)	(15.596)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.719	0.203	0.196	0.558	0.729	0.206	0.202	0.530
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the controls are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. The impact of the 2013 IGLL and 2014 FAQ on relationship firms' access to leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * Relation$	0.046	-2.382***	-0.121***	-25.977*	0.029	-2.324***	-0.118***	-33.295**
	(0.122)	(0.637)	(0.032)	(14.764)	(0.135)	(0.625)	(0.031)	(15.708)
$Post2 * Relation$	-0.256*	-4.081***	-0.200***	-34.072*	-0.243*	-3.860***	-0.190***	-30.097
	(0.139)	(0.637)	(0.032)	(17.954)	(0.145)	(0.627)	(0.031)	(19.099)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.720	0.204	0.197	0.558	0.731	0.207	0.203	0.530
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the controls are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. The impact of the 2013 IGLL on bank loan reliance firms' access to leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * Relation * HP\_Score$	-0.523**	-2.063*	-0.104*	-28.475	-0.541**	-2.337**	-0.117**	-39.026
	(0.216)	(1.125)	(0.057)	(29.820)	(0.232)	(1.104)	(0.056)	(30.721)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.721	0.204	0.197	0.560	0.731	0.208	0.204	0.535
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms. HP_t is a proxy of firms' external finance constraints, following Hadlock and Pierce (2010). Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following three variables, $HPScore$, $Relation$ and $Post$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. The impact of the 2013 IGLL and 2014 FAQ on bank loan reliance firms' access to leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * Relation$	-0.434*	-1.840	-0.094	-14.527	-0.490*	-1.799	-0.091	-13.820
$* HP\_Score$	(0.243)	(1.271)	(0.064)	(31.056)	(0.266)	(1.243)	(0.063)	(32.704)
$Post2 * Relation$	-0.603**	-2.212*	-0.110*	-42.077	-0.594**	-2.695**	-0.135**	-60.620
$* HP\_Score$	(0.284)	(1.296)	(0.065)	(36.290)	(0.297)	(1.268)	(0.063)	(37.139)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.724	0.205	0.199	0.561	0.733	0.210	0.205	0.536
Year FE.	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms. HP_t is a proxy of firms' external finance constraints, following Hadlock and Pierce (2010). Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following four variables, $HPScore$, $Relation$, $Post1$ and $Post2$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8a. Robustness check for high default risk firms' access to leveraged credit if considering the potential impact of the 2015 CCAR

$y_{f,t}$	Leveraged Credit from CCAR Bank			Leveraged Credit from Non-CCAR Bank			Leveraged Credit from Unregulated Institutions		
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Log ($y_{f,t}$)	(5) Log ($y_{f,t}$+1)	(6) I ($y_{f,t}$) (0/1)	(7) Log ($y_{f,t}$)	(8) Log ($y_{f,t}$+1)	(9) I ($y_{f,t}$) (0/1)
$Post * PD$	-0.302***	-0.224	-0.010	-2.237***	-0.131	-0.005	-0.454	-0.198	-0.010
	(0.116)	(0.506)	(0.026)	(0.360)	(0.245)	(0.013)	(0.285)	(0.237)	(0.012)
Mean of Dependent Var	19.94	4.609	0.231	19.51	0.622	0.0319	19.56	0.734	0.0375
Observations	861	4,768	4,768	79	4,768	4,768	111	4,768	4,768
R-squared	0.733	0.208	0.206	0.878	0.214	0.214	0.722	0.279	0.273
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on borrowers' access to leveraged credit. PD_f is a dummy variable equals one if firm f's probability of default in 2009 is greater than the median of the probability of default for all the firms in 2009. The borrowers' probability of default is estimated using Merton's (1974) model. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from CCAR banks, non-CCAR banks, and unregulated institutions. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8b. Robustness check for high default risk firms' access to leveraged credit if considering the potential impact of the 2015 CCAR

$y_{f,t}$	Leveraged Credit from CCAR Bank			Leveraged Credit from Non-CCAR Bank			Leveraged Credit from Unregulated Institutions		
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Log ($y_{f,t}$)	(5) Log ($y_{f,t}$+1)	(6) I ($y_{f,t}$) (0/1)	(7) Log ($y_{f,t}$)	(8) Log ($y_{f,t}$+1)	(9) I ($y_{f,t}$) (0/1)
$Post1 * PD$	-0.153	0.176	0.009	-2.419***	0.414	-0.114	-0.097	-0.004	-0.153
	(0.135)	(0.568)	(0.029)	(0.394)	(0.269)	(0.363)	(0.274)	(0.014)	(0.135)
$Post2 * PD$	-0.439***	-0.491	-0.022	-1.817***	-0.494*	-0.906*	-0.265	-0.013	-0.439***
	(0.145)	(0.580)	(0.029)	(0.537)	(0.280)	(0.528)	(0.263)	(0.013)	(0.145)
Mean of Dependent Var	19.94	4.609	0.231	19.51	0.622	0.0319	19.56	0.734	0.0375
Observations	861	4,768	4,768	79	4,768	4,768	111	4,768	4,768
R-squared	0.747	0.209	0.206	0.889	0.217	0.217	0.752	0.280	0.274
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on borrowers' access to leveraged credit. PD_f is a dummy variable equals one if firm f's probability of default in 2009 is greater than the median of the probability of default for all the firms in 2009. The borrowers' probability of default is estimated using Merton's (1974) model. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from CCAR banks, non-CCAR banks, and unregulated institutions. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9a. Robustness check for relationship firms' access to leveraged credit if considering the potential impact of the 2015 CCAR

$y_{f,t}$	Leveraged Credit from CCAR Bank			Leveraged Credit from Non-CCAR Bank			Leveraged Credit from Unregulated Institutions		
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Log ($y_{f,t}$)	(5) Log ($y_{f,t}$+1)	(6) I ($y_{f,t}$) (0/1)	(7) Log ($y_{f,t}$)	(8) Log ($y_{f,t}$+1)	(9) I ($y_{f,t}$) (0/1)
$Post * Relation$	-0.107	-2.460***	-0.122***	0.816	-0.780***	-0.039***	0.112	-0.284	-0.013
	(0.119)	(0.520)	(0.026)	(0.605)	(0.293)	(0.015)	(0.334)	(0.243)	(0.012)
Mean of Dependent Var	19.94	4.609	0.231	19.51	0.622	0.0319	19.56	0.734	0.0375
Observations	861	4,768	4,768	79	4,768	4,768	111	4,768	4,768
R-squared	0.731	0.213	0.210	0.810	0.217	0.216	0.716	0.279	0.273
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the controls are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from CCAR banks, non-CCAR banks, and unregulated institutions. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9b. Robustness check for relationship firms' access to leveraged credit if considering the potential impact of the 2015 CCAR

$y_{f,t}$	Leveraged Credit from CCAR Bank			Leveraged Credit from Non-CCAR Bank			Leveraged Credit from Unregulated Institutions		
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Log ($y_{f,t}$)	(5) Log ($y_{f,t}$+1)	(6) I ($y_{f,t}$) (0/1)	(7) Log ($y_{f,t}$)	(8) Log ($y_{f,t}$+1)	(9) I ($y_{f,t}$) (0/1)
$Post1 * Relation$	-0.030	-1.519**	-0.077**	0.816	-0.841***	-0.043***	0.464	-0.085	-0.004
	(0.140)	(0.598)	(0.030)	(0.605)	(0.307)	(0.016)	(0.359)	(0.294)	(0.015)
$Post2 * Relation$	-0.176	-3.087***	-0.152***		-0.740**	-0.036**	-0.275	-0.417	-0.020
	(0.150)	(0.595)	(0.030)		(0.333)	(0.017)	(0.569)	(0.260)	(0.013)
Mean of Dependent Var	19.94	4.609	0.231	19.51	0.622	0.0319	19.56	0.734	0.0375
Observations	861	4,768	4,768	79	4,768	4,768	111	4,768	4,768
R-squared	0.731	0.214	0.211	0.810	0.217	0.216	0.726	0.280	0.273
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the controls are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from CCAR banks, non-CCAR banks, and unregulated institutions. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10a. Robustness check for bank loan reliance firms' access to leveraged credit if considering the potential impact of the 2015 CCAR

$y_{f,t}$	Leveraged Credit from CCAR Bank			Leveraged Credit from Non-CCAR Bank			Leveraged Credit from Unregulated Institutions		
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Log ($y_{f,t}$)	(5) Log ($y_{f,t}$+1)	(6) I ($y_{f,t}$) (0/1)	(7) Log ($y_{f,t}$)	(8) Log ($y_{f,t}$+1)	(9) I ($y_{f,t}$) (0/1)
$Post * Relation$	-0.549**	-1.541	-0.074	1.331	-0.633	-0.036	0.608	0.080	0.003
$* HP\_Score$	(0.242)	(1.054)	(0.053)	(1.089)	(0.608)	(0.031)	(0.602)	(0.505)	(0.026)
Mean of Dependent Var	19.94	4.609	0.231	19.51	0.622	0.0319	19.56	0.734	0.0375
Observations	861	4,768	4,768	79	4,768	4,768	111	4,768	4,768
R-squared	0.733	0.214	0.211	0.816	0.217	0.217	0.720	0.279	0.273
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms. HP_t is a proxy of firms' external finance constraints, following Hadlock and Pierce (2010). Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from CCAR banks, non-CCAR banks, and unregulated institutions. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following three variables, $HPScore$, $Relation$ and $Post$, are not in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10b. Robustness check for bank loan reliance firms' access to leveraged credit if considering the potential impact of the 2015 CCAR

$y_{f,t}$	Leveraged Credit from CCAR Bank			Leveraged Credit from Non-CCAR Bank			Leveraged Credit from Unregulated Institutions		
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Log ($y_{f,t}$)	(5) Log ($y_{f,t}$+1)	(6) I ($y_{f,t}$) (0/1)	(7) Log ($y_{f,t}$)	(8) Log ($y_{f,t}$+1)	(9) I ($y_{f,t}$) (0/1)
$Post1 * Relation$	-0.461*	-1.565	-0.074	1.657	-0.338	-0.023	1.016	-0.060	-0.005
$* HP\_Score$	(0.279)	(1.184)	(0.059)	(1.105)	(0.640)	(0.033)	(0.692)	(0.602)	(0.031)
$Post2 * Relation$	-0.616*	-1.524	-0.073		-0.830	-0.045	0.048	0.173	0.009
$* HP\_Score$	(0.313)	(1.217)	(0.061)		(0.688)	(0.035)	(0.851)	(0.541)	(0.027)
Mean of Dependent Var	19.94	4.609	0.231	19.51	0.622	0.0319	19.56	0.734	0.0375
Observations	861	4,768	4,768	79	4,768	4,768	111	4,768	4,768
R-squared	0.734	0.215	0.212	0.822	0.218	0.218	0.750	0.280	0.273
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms. HP_t is a proxy of firms' external finance constraints, following Hadlock and Pierce (2010). Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from CCAR banks, non-CCAR banks, and unregulated institutions. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following four variables, $HPScore$, $Relation$, $Post1$ and $Post2$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11. Robustness check: the impact of the 2013 IGLL on high default risk firms' access to high leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * PD$	-0.437***	-0.147	-0.005	-35.374*	-0.513***	0.261	0.016	-30.826
	(0.147)	(0.655)	(0.033)	(19.196)	(0.166)	(0.633)	(0.032)	(20.214)
Mean of Dependent Var	19.77	5.25	0.265	349.2	19.82	5.54	0.229	339.8
Observations	726	3,496	3,496	726	602	3,496	3,496	602
R-squared	0.720	0.179	0.173	0.549	0.727	0.190	0.186	0.523
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on borrowers' access to leveraged credit. PD_f is a dummy variable equals one if firm f's probability of default in 2009 is greater than the median of the probability of default for all the firms in 2009. The borrowers' probability of default is estimated using Merton's (1974) model. Leveraged credit is defined as a loan with a spread over LIBOR 250 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 12. Robustness check: The impact of the 2013 IGLL and 2014 FAQ on high default risk firms' access to high leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * PD$	-0.307*	0.788	0.042	-26.884	-0.370**	1.091	0.057	-24.887
	(0.160)	(0.711)	(0.037)	(19.003)	(0.182)	(0.692)	(0.036)	(19.621)
$Post2 * PD$	-0.606***	-0.770	-0.036	-46.370*	-0.691***	-0.292	-0.011	-38.280
	(0.190)	(0.768)	(0.039)	(26.139)	(0.201)	(0.733)	(0.037)	(27.716)
Mean of Dependent Var	19.77	5.25	0.265	349.2	19.82	5.54	0.229	339.8
Observations	726	3,496	3,496	726	602	3,496	3,496	602
R-squared	0.721	0.180	0.174	0.550	0.729	0.191	0.187	0.524
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on borrowers' access to leveraged credit. PD_f is a dummy variable equals one if firm f's probability of default in 2009 is greater than the median of the probability of default for all the firms in 2009. The borrowers' probability of default is estimated using Merton's (1974) model. Leveraged credit is defined as a loan with a spread over LIBOR 250 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 13. Robustness check: The impact of the 2013 IGLL on relationship firms' access to high leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * Relation$	-0.159	-3.851***	-0.192***	-20.763	-0.196	-3.732***	-0.187***	-12.626
	(0.148)	(0.652)	(0.033)	(19.096)	(0.169)	(0.646)	(0.033)	(20.870)
Mean of Dependent Var	19.77	5.25	0.265	349.2	19.82	5.54	0.229	339.8
Observations	726	3,496	3,496	726	602	3,496	3,496	602
R-squared	0.715	0.189	0.183	0.546	0.721	0.201	0.196	0.520
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Leveraged credit is defined as a loan with a spread over LIBOR 250 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the controls are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 14. Robustness check: The impact of the 2013 IGLL and 2014 FAQ on relationship firms' access to high leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * Relation$	-0.059	-2.433***	-0.125***	-26.718	-0.063	-2.478***	-0.128***	-21.591
	(0.168)	(0.723)	(0.037)	(20.371)	(0.196)	(0.711)	(0.036)	(21.316)
$Post2 * Relation$	-0.285	-4.797***	-0.237***	-13.246	-0.352*	-4.568***	-0.227***	-2.125
	(0.194)	(0.761)	(0.038)	(24.614)	(0.204)	(0.748)	(0.038)	(27.119)
Mean of Dependent Var	19.77	5.25	0.265	349.2	19.82	5.54	0.229	339.8
Observations	726	3,496	3,496	726	602	3,496	3,496	602
R-squared	0.716	0.192	0.185	0.547	0.722	0.203	0.198	0.521
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

This table reports DID estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. Leveraged credit is defined as a loan with a spread over LIBOR 250 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the controls are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant is not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 15. Robustness check: The impact of the 2013 IGLL on bank loan reliance firms' access to high leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * Relation$	-0.416	-3.370***	-0.170**	14.462	-0.481	-3.351***	-0.168**	-10.129
$* HP\_Score$	(0.292)	(1.293)	(0.066)	(41.486)	(0.341)	(1.277)	(0.065)	(40.874)
Mean of Dependent Var	19.77	5.25	0.265	349.2	19.82	5.54	0.229	339.8
Observations	726	3,496	726	602	3,496	3,496	602	726
R-squared	0.718	0.192	0.185	0.546	0.723	0.203	0.199	0.521
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms. HP_t is a proxy of firms' external finance constraints, following Hadlock and Pierce (2010). Leveraged credit is defined as a loan with a spread over LIBOR 250 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following three variables, $HPScore$, $Relation$ and $Post$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 16. Robustness check: The impact of the 2013 IGLL and 2014 FAQ on bank loan reliance firms' access to high leveraged credit

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * Relation$	-0.377	-2.640*	-0.137*	7.861	-0.458	-2.228	-0.113	8.095
$* HP\_Score$	(0.320)	(1.436)	(0.074)	(45.063)	(0.379)	(1.415)	(0.072)	(44.161)
$Post2 * Relation$	-0.316	-3.856**	-0.192**	26.490	-0.390	-4.100***	-0.204***	-16.902
$* HP\_Score$	(0.389)	(1.495)	(0.076)	(52.223)	(0.432)	(1.465)	(0.074)	(54.095)
Mean of Dependent Var	19.77	5.25	0.265	349.2	19.82	5.54	0.229	339.8
Observations	726	3,496	3,496	726	602	3,496	3,496	602
R-squared	0.724	0.194	0.188	0.547	0.727	0.206	0.201	0.526
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $HPScore_f$ is a dummy variable equals one if firms' HP_{2009} is greater than the median of HP_{2009} for all firms. HP_t is a proxy of firms' external finance constraints, following Hadlock and Pierce (2010). Leveraged credit is defined as a loan with a spread over LIBOR 250 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following four variables, $HPScore$, $Relation$, $Post1$ and $Post2$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 17. Robustness check: The impact of the 2013 IGLL on bank loan reliance firms' access to leveraged credit (new proxy)

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post * Relation$	0.082	-2.982**	-0.163***	-30.754	0.038	-2.716**	-0.148**	-32.375
$* WW\_Score$	(0.220)	(1.176)	(0.060)	(28.183)	(0.238)	(1.160)	(0.059)	(30.511)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.719	0.205	0.199	0.561	0.730	0.209	0.205	0.534
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $WWScore_f$ is a dummy variable equals one if firms' WW_{2009} is greater than the median of WW_{2009} for all firms. WW_t is a proxy of firms' external finance constraints, following Whited and Wu (2006). Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following three variables, $WWScore$, $Relation$ and $Post$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 18. Robustness check: The impact of the 2013 IGLL and 2014 FAQ on bank loan reliance firms' access to leveraged credit (new proxy)

$y_{f,t}$	Total Leveraged Credit				Leveraged Credit from Regulated Banks			
	(1) Log ($y_{f,t}$)	(2) Log ($y_{f,t}$+1)	(3) I ($y_{f,t}$) (0/1)	(4) Loan Price	(5) Log ($y_{f,t}$)	(6) Log ($y_{f,t}$+1)	(7) I ($y_{f,t}$) (0/1)	(8) Loan Price
$Post1 * Relation$	0.058	-2.896**	-0.157**	-13.678	-0.056	-2.548*	-0.137**	-18.392
$* WW\_Score$	(0.248)	(1.343)	(0.068)	(28.484)	(0.274)	(1.316)	(0.067)	(31.628)
$Post2 * Relation$	0.145	-3.040**	-0.166**	-47.480	0.168	-2.827**	-0.155**	-44.896
$* WW\_Score$	(0.299)	(1.329)	(0.067)	(35.392)	(0.310)	(1.306)	(0.066)	(37.591)
Mean of Dependent Var	19.87	5.71	0.287	299.40	19.90	5.12	0.257	290.2
Observations	1,119	4,768	4,768	1,119	976	4,768	4,768	976
R-squared	0.722	0.206	0.200	0.562	0.733	0.210	0.206	0.535
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: This table reports DDD estimates of the effect of the 2013 Interagency Guidance on Leveraged Lending (IGLL) and the subsequent "frequently asked questions" (FAQ) on relationship borrowers' access to leveraged credit. $Relation_f$ is a dummy variable equal to one if firm f's borrower-lender relationship length in 2009 is greater than the median of the relationship length for all the firms in 2009. Relationship length is measured using the maximum number of loan facilities the firm obtained from any single lender in the previous five years. $WWScore_f$ is a dummy variable equals one if firms' WW_{2009} is greater than the median of WW_{2009} for all firms. WW_t is a proxy of firms' external finance constraints, following Whited and Wu (2006). Leveraged credit is defined as a loan with a spread over LIBOR 200 bps. The sample is LPC Dealscan facilities originated between 2010 and 2017 to US borrowers appearing in the Compustat-CRSP Merged database, for whom loan terms and the proxy are available. Loans to finance, real estate, and insurance borrowers (SIC 6000-6999) are excluded from the sample. Each observation in the regression corresponds to a firm-year level outcome variable, including the intensive and extensive margin of the total leveraged loan amount borrowed from the market or regulated banks, and the average loan price. For definitions of the variables, please see Appendix D. Constant and the interaction terms between any two of the following four variables, $WWScore$, $Relation$, $Post1$ and $Post2$, are not reported in this table. Standard errors are clustered by borrowers in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

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Appendix A

VARIABLE DESCRIPTION

Variable	Definition	Source
Outcome Variables		
Loan Amount ($M)	If at the facility level, it represents the total facility amount. If at year level, it represents the total loan amount borrowed from a relationship lender for a given year or the total loan amount borrowed from the loan market.	DealScan
Long-term Debt Reduction ($M)	Reduction in long-term debt caused by long-term debt maturing (being classified as a current maturity), payments of long-term debt, and the conversion of debt to stock.	Compustat
Net Long-term Debt Issuance ($M)	Long-term Debt Issuance - Long-term Debt Reduction	Compustat
Number of Facilities	The annual number of facilities borrowed from the relationship bank	DealScan
Number of Lead Arrangers	The number of distinct lead arrangers in the past three years	DealScan
Explanatory Variables (Firm)		
Total Assets ($M)	Total assets/liabilities of a company at a point in time	Compustat
Log (Assets) (Log ($M))	Natural logarithm of total assets	Compustat
Debt in current liability ($M)	The total amount of short-term notes and debt due in one year	Compustat
EBITDA ($M)	Earnings Before Interest	Compustat
Current Assets ($M)	Cash and other assets that are expected to be realized in cash or used in the Production of revenue within the next 12 months	Compustat
Current Liability ($M)	Liabilities due within one year, including the current portion of long-term debt.	Compustat
Leverage	(Long-term Debt+ Debt in current liability)/ Total Assets	Compustat
Profitability	EBITDA/ Total Assets	Compustat
Current Ratio	Current Assets/ Current Liability	Compustat
Explanatory Variables (Bank)		

Capital-to-asset Ratio	(Tier 1 capital + Tie 2 capital)/Risk Weighted Asset	FDIC Call Reports
Total Assets ($)	Total assets/liabilities of a bank at a point in time	FDIC Call Reports
Number of Participations	Number of loans involved as a participant	DealScan
Number of Loans	Number of loans involved as a participant or lead-arranger	DealScan

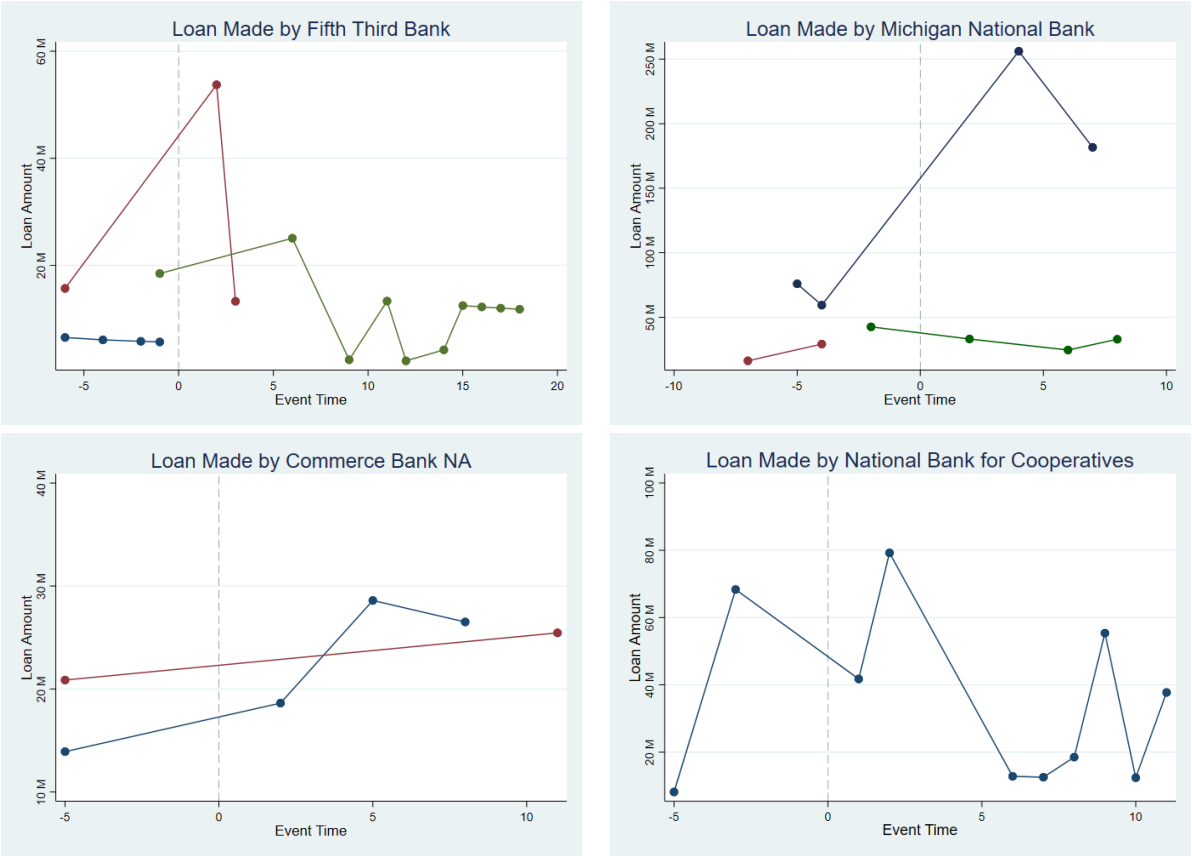
Appendix B

SAMPLE DESCRIPTION

	Sample linked with Compustat	Sample for BL Relationship	Sample for BP Relationship
# of Facilities	70888	747	1255
# of BL Relationship	10985	186	-
# of BP Relationship	110100	-	287
# of Borrowers	11199	186	287
# of Banks	2813	147	137
# of Syndication Active Banks	1167	64	137

Appendix C

EXAMPLES OF LOANS MADE WITHIN A BL RELATIONSHIP



Notes: The four figures above provide some examples of the loan amount BL relationship firms borrow from the relationship banks. Each line corresponds to a relationship pair, and each dot represents a loan facility. $EventTime$=0 represents the bank's year of the first syndication. $EventTime < 0$ represents the pre-treatment period. $EventTime \geq 0$ represents the post-treatment period.

Appendix D

VARIABLE DESCRIPTION

Variable	Definition	Source
Outcome Variables		
Loan Amount	If at the facility level, it represents the total facility amount. If at year level, it represents the total loan amount borrowed from a relationship lender for a given year or the total loan amount borrowed from the loan market.	DealScan
Loan Spread	Reduction in long-term debt caused by long-term debt maturing (being classified as a current maturity), payments of long-term debt, and the conversion of debt to stock.	DealScan
Explanatory Variables (Firm)		
Total Assets ($M)	Total assets/liabilities of a company at a point in time	Compustat
SIZE	Natural logarithm of total assets	Compustat
Long-term Debt ($M)	Debt obligations due more than one year from the company's balance sheet date	Compustat
Debt in current liability ($M)	The total amount of short-term notes and debt due in one year	Compustat
EBITDA	Earnings Before Interest	Compustat
Current Assets ($M)	Cash and other assets that are expected to be realized in cash or used in the Production of revenue within the next 12 months	Compustat
Current Liability ($M)	Liabilities due within one year, including the current portion of long-term debt.	Compustat
Leverage	(Long-term Debt+ Debt in current liability)/ Total Assets	Compustat
Sale ($M)	Gross sales	Compustat
Cash Dividends	The total amount of cash dividends paid for common/ordinary capital, preferred/preference capital, and other share capital.	Compustat
SHROUT (K)	Number of publicly held shares	CRSP Daily Stock

PRC ($)	Closing price or the negative bid/ask average for a trading day	CRSP Daily Stock
E ($M)	The daily market value of equity= SHROUT*PRC	CRSP Daily Stock
F ($M)	Face value of the debt= Current Liability+0.5*Long-term Debt	Compustat
V ($M)	The market value of firm assets	Iteration
σ_v	Assets volatility per annum	Iteration
μ	Expected return on the firm's assets	Iteration
Age	The number of years of non-missing stock price data on Compustat	Compustat
r	Monthly 1-year Treasury Bill rate	Federal Reserve Board Statistics