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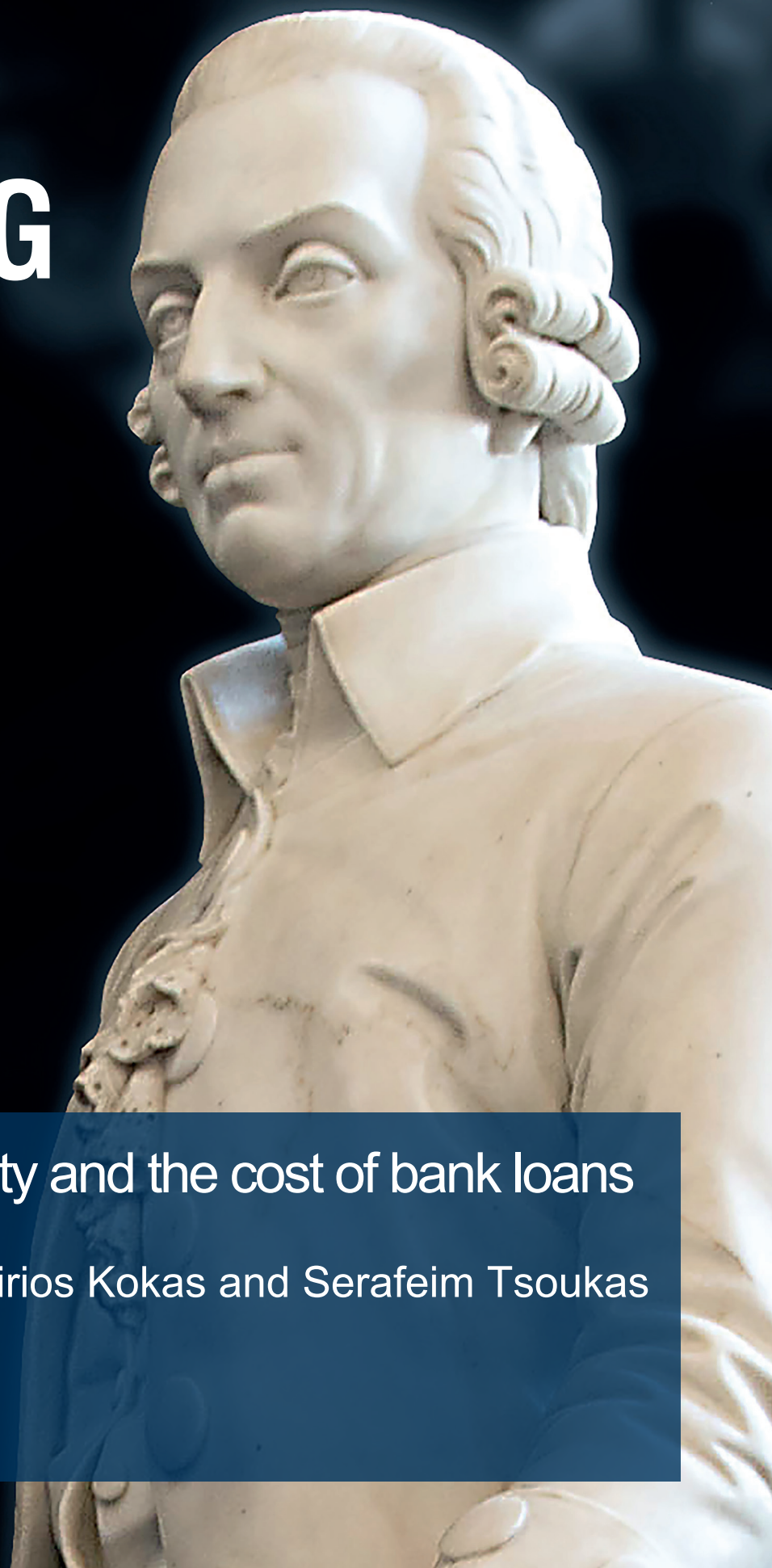

Gender board diversity and the cost of bank loans

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Abstract

We examine the relationship between female board representation and the cost of lending, using a dataset of 13,714 loans from 386 banks matched with 2,432 non-financial firms from 1999 to 2013. We find that firms with female directors command lower loan spreads. In addition, female independent directors have a stronger impact on lowering spreads compared to female directors' other attributes. However, as firms build relationships with their lenders this effect becomes less potent. Finally, when we introduce firm-level heterogeneity we document that changes in gender diversity exert a stronger impact on the cost of lending in the case of bank-dependent firms, especially for relationship borrowers.

Key words: Gender diversity; Board of directors; Bank loans; Relationship lending
JEL: G21, G30

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1 Introduction

The extant literature on corporate governance uses a combination of legislation and agency costs alleviation to explain why, in various settings, boards are central in governing organizations (Hermalin and Weisbach (2003)). Importantly, the structure of the board is a critical factor in influencing the integrity of the financial accounting process through auditing and disciplining senior management (Anderson, Mansi and Reeb (2004)). In turn, recent turmoil in the financial markets has focused attention on corporate social responsibility (CSR), particularly on the role and the composition of corporate boards of directors (Terjesen, Sealy and Singh (2009)).[1] For instance, one way improved CSR performance can generate value in the long run is by relaxing credit constraints that firms face on the supply side, from financial markets and financial intermediaries (Cheng, Ioannou and Serafeim (2014)). Hence, superior CSR levels are more likely to ease access to external financing, which may then also improve financial costs.

Why would improving board diversity, especially gender diversity, matter for the cost of external financing? Female presence is key to enhancing corporate financial performance and reputation (Bear, Rahman and Post (2010)). In addition, board diversity could improve the quality of board discussions and increase the ability of a board to provide greater transparency (Carter, Simkins and Simpson (2003). Adams and Ferreira (2009) note that female representation provides greater oversight of managers' actions and accounting reports through promoting better board attendance, more auditing, and demanding greater accountability from managers. Finally, female directors tend to be more concerned with reducing negative business practises (Cumming, Leung and Rui (2015)). Therefore, previous research on women on corporate boards examines the characteristics of female directors and their favourable traits that may enhance board decision-making, tasks, and roles, paying attention to firm performance (Tanaka (2014)).

[1] CSR is difficult to conceptualize and remains open to different interpretations (Wood (2010)). A widely adopted interpretation is that CSR is made of demonstrable actions and outcomes reflecting business responsibility for societal good (Galbreath and Shum (2012)).

In this paper, we argue that the cost of obtaining bank loans hinges, at least to some extent, on the board of directors and female presence more specifically. We follow the line of inquiry in Anderson, Mansi and Reeb (2004), which shows that female board representation is related to improved accounting processes. This is achieved through transparent financial reporting that complements screening and monitoring, which ultimately implies a reduction in agency costs. Therefore, our hypothetical argument is: When female board representation increases, accounting practices improve and loan interest rates decrease. Hence, banks observe this favourable trait of gender diverse boards and provide those firms with lower-interest loans.

The motivation to focus on bank financing stems from two important considerations. First, board attributes influence the validity of accounting statements by increasing the disclosure of firm-specific information and improving incentives for collecting private information (Gul, Srinidhi and Ng (2011)). This is of great importance for the lending process because accounting-based information is the traditional standard that potential lenders use to assess a firm's credit quality using public information. Second, bank loans provide a major source of financing, even for large public companies significantly affecting firms' financial structure (Bradley and Roberts (2015)). Finally, we examine the extent to which this link differs at firms that have established relationships with their lenders compared to their counterparts, as well as to firms that are more and less bank dependent.

To implement our empirical analysis we use data from four different data sources: Thomson Reuters LPCs DealScan database, Call Reports from the Federal Reserve Board of Governors (FRB), Compustat, and BoardEx over the period 1999 to 2013. Our dataset has two appealing characteristics to study the above questions. First, it disentangles internal and independent directors and enables us to delve deeper into the role of different female directors' attributes. Second, the matching between firms and their corresponding lenders allows us to evaluate the impact of gender diversity taking into account relationship lending.

The empirical challenge to estimate the impact of gender-diverse boards on the cost of

borrowing lies in dealing with the endogeneity between the various measures of "firm-specific performance" and firms' choices about corporate governance (e.g., see Hermalin and Weisbach (1998), Minnick and Noga (2010), among others). Our research design enables us to mitigate significantly these endogeneity concerns. First, to identify the impact of female directors on the cost of lending, we control not only for firm-specific (e.g., see Anderson, Mansi and Reeb (2004)) but also for bank-specific attributes. Second, the multi level structure of our sample stemming from multiple loans provided by the same bank to different firms allows us to include comprehensive sets of time-invariant and time-varying fixed effects to saturate our empirical identification from omitted factors.

We perform a number of additional tests to corroborate our results. Notably, we focus on a two-stage instrumental variable (IV) analysis that circumvents endogeneity concerns by exploiting the role of directors' retirements. In doing so, we establish the appropriateness of *Retired director* as an exclusion restriction for female participation, and then, we utilize it to mitigate concerns about simultaneity bias. In addition, we control for the firms' credit ratings at the time of the loan origination to deal with a major factor that may affect loan pricing. The credit rating reflects the probability of default, and thus we alleviate credit-quality differences on top of the gender diversity, such as expected losses.

In the first set of estimates, we find evidence that gender diversity on boards has a negative and significant effect on firms' cost of lending. More precisely, increasing the fraction of females on the board by 1% reduces, on average, the loan spread by 20.8 basis points. However, the effect diminishes by 4.2 basis points for repeated borrowing from the same lender because the quality of the financial reporting has already been discounted from the bank in the first interaction. Moreover, the effect is more potent for highly bank-dependent firms. Thus, we conclude that gender diversity improves reporting quality and reduces loan costs. However, bank acquisition of private information from relationship lending reduces the verification cost and the discount rate. These results unify the mixed evidence on the board's gender diversity, providing new insights from a bank's perspective. Our findings are

robust to non-pricing characteristics and respecification models.

We contribute to the literature in three main ways. First, we examine the extent to which female board representation reduces information asymmetry between lenders and borrowers with implications for the cost of bank lending. Previous empirical studies find that female CFOs reduce the cost of bank loans (Francis, Hasan and Wu (2013)), while Pandey, Biswas, Ali and Mansi (2019) and Usman, Farooq, Zhang, Makki and Khan (2019) conclude that female presence on the board is negatively associated with the cost of debt, as proxied by interest expense over debt. The latter approach relies on approximating the cost of debt and, due to the aggregation, it can be influenced both by increases in expenses (numerator) and reduction in debt (denominator). Our approach using granular data allows us not only to remove demand-side influences, but also to examine the channel through which women directors influence firms' cost of bank borrowing. When we distinguish between female executives and female independent directors, we observe that the effect is stronger for the latter. Hence, our results suggest female independent directors affect the cost of borrowing.

Second, we account for the role of relationship lending in examining how gender diversity affects the cost of bank lending. Building relationships is a major way for banks to find out more about their borrowers, cherry-pick good projects, and consequently be associated with a lower degree of adverse selection (Boot (2000)). We add to the literature on gender diversity and firm performance by recognizing that gender diversity may affect firms' cost of lending, especially as they establish relationships (or track records) with banks through repeated interactions. Exploiting the link between gender diversity and the cost of bank loans, through the relationship-lending lens, provides an alternative explanation of the direct link between board gender diversity and the cost of borrowing. In other words, we highlight the lending relationships as a mechanism to mediate the direct impact. To this end, relationship lending presents a unified framework that nests the full spectrum of corporate governance.

Finally, although this study relates to the burgeoning literature on firm heterogeneity and real activities (Whited and Wu (2006) and Campello and Chen (2010)), we focus on

the interplay between board diversity and bank dependency. It is now well documented that during the most recent global financial crisis, banks incurred severe losses, which led them to significantly increase the cost of loans to bank-dependent firms (Santos (2011)). Also considering that not all firms' lending costs respond to changes in the board composition in the same way, we set out to examine the loan-pricing implications of firms' bank dependency.

The rest of the paper is structured as follows. Section 2 presents an overview of the related literature and develops our testable hypotheses. Sections 3 and 4 contain our methodology and data-set description, respectively. Section 5 presents the empirical results, while section 6 explains the robustness checks undertaken. Section 6 provides conclusions and policy implications.

2 Conceptual framework and hypotheses

2.1 The link between gender diversity and the cost of bank loans

The broad thrust of the empirical evidence supports the argument that board characteristics affect firm performance either in a direct or in an indirect way through the board's actions (Hermalin and Weisbach (2003)).[2] To begin with the mix of men and women on the board, the direct link is achieved primarily via a reduction of agency costs. Specifically, Gul, Srinidhi and Ng (2011) show that gender-diverse boards make firms more transparent by increasing the disclosure of firm-specific information by managers and by providing incentives for the collection of private information by investors. In addition, gender board diversity can improve the quality of board discussions, ensure that more information circulates from the board to investors, increase efforts being put into oversight and monitoring (Hillman, Shropshire and Cannella (2007), Adams and Ferreira (2009)), promote better board attendance, and lead to greater accountability for poor performance. Women can be more vocal than their male

[2]However, the empirical evidence of a direct link between gender diversity and financial performance remains mixed and inconclusive. See Terjesen, Sealy and Singh (2009) for a detailed review of the role of gender diversity in firms' performance.

counterparts (Carter, Simkins and Simpson (2003), Adams and Ferreira (2009)) and Ray (2005) argues that compared with men, women possess many favourable traits in value judgment, risk attitude, and decision-making. In sum, several studies document a positive relationship between gender diversity on the board and corporate performance (see, for example, Gul, Srinidhi and Ng (2011), Liu, Wei and Xie (2014), Chen, Leung and Goergen (2016)).

On the other hand, other researchers conclude that gender diversity in the boardroom does not necessarily improve firm outcomes (Gilbert and Ivancevich (2000), Mannix and Neale (2005), Adams and Ferreira (2009), Boone and Hendriks (2009), Sila, Gonzalez and Hagendorff (2016)).[3] In addition, Ahern and Dittmar (2012) and Matsa and Miller (2013) find that firm value decreases following the introduction of the 40% gender quota for directors in Norway.[4] Motivated by the inconsistent findings for a direct link between female directors and financial performance, Galbreath (2018) shows that female directors can enhance firms' financial performance by influencing corporate social responsibility. This finding paves the way for identifying an indirect link between gender diversity and firms' financial performance.

In the present study, we follow literature's insights on gender diversity on boards and firm performance. In doing so, we argue that female board representation can improve transparency by increasing managerial auditing and enhancing financial accounting processes.[5] Thus, female representation reduces adverse selection, stemming from the firm having private information that banks do not have, which complements the screening and monitoring

[3]Scholars posit that the ability to increase the amount of information available to investors can have a positive effect on firm risk. For instance, several studies find that gender-diverse boards reduce firm risk, because men are more likely to engage in risky decisions compared to their female counterparts (Hinz, McCarthy and Turner (1997), Byrnes, Miller and Schafer (1999), Barber and Odean (2001)). Adams and Ferreira (2004) also find that firms facing more variability in their stock returns have fewer women on their boards.

[4]Bøhren and Staubo (2014) further show that the mandatory gender balance in Norway may produce firms with inefficient boards.

[5]The boards of directors delegate direct oversight of the financial accounting process to the audit committee, which is a subcommittee of the full board. Audit committees are responsible for recommending the selection of external auditors to the full board (supervisory or non-executives), ensuring the soundness and quality of internal accounting and control practices, and monitoring external auditor independence from senior management. Boards meet routinely with the firm's accounting staff and external auditors to review financial statements, audit procedures, and internal control mechanisms (Klein (2002)).

role of banks and thus reduces the cost of borrowing.[6] This is supported by Francis, Hasan and Wu (2013), who show that female CFOs borrow with better terms from the banks. In addition, L.Paige-Fields, Fraser and Subrahmanyam (2012) find that firms' board quality and other governance characteristics influence the likelihood that lenders will provide debt covenants and lower-cost bank loans.[7] Finally, Pandey, Biswas, Ali and Mansi (2019) and Usman, Farooq, Zhang, Makki and Khan (2019) conclude that female directors are negatively related to the cost of debt, which is proxied by interest expenses over debt. In the present study, our main interest lies in understanding how banks perceive diversity on boards when it comes to the cost of lending. In light of the above discussion, we formulate the first hypothesis as follows.

Hypothesis 1a: Firms with more gender-diverse boards are likely to command lower loan spreads.

2.2 The mediating role of relationship lending

Having a gender-diverse board likely has a direct effect on the cost of borrowing, but there might be alternative explanations. Specifically, an alternative explanation is that female directors may influence loan spreads indirectly through bank relationships. Bank-firm relationship lending facilitates screening and monitoring because the bank accumulates inter temporal firm-specific information from repeated interactions with the firm, which adds value (Diamond (1984), Allen (1990), Winton (1995)). Relationship lending is a key mechanism to mitigate moral-hazard and adverse-selection problems in loan contracting (Boot (2000)). However, banks' acquisition of private information could effectively "lock-in" firms and make it possible to extract higher rents (Greenbaum, Kanatas and Venezia (1989)). Relationship

[6] In the era of financial technology, banks rely heavily on artificial intelligence and machine-learning methods to measure credit banking risk. The usage of high technology is more potent in the syndicated loan market, where aggregated bank' exposure is, on average, larger than in conventional corporate loans (Prez-Martn, Prez-Torregrosa and Vaca (2018)). Thus, the structure of the board becomes of grave importance for banks that become adversely exposed to new financial products and price the risks accordingly.

[7] The authors include the percentage of female directors among their board characteristics but find no significant effect.

lenders exploit their privileged information and exert monopolistic rates to compensate for the costly access to and processing of proprietary information that is unavailable to outside lenders.

As mentioned, female board diversity increases the transparency and reliability of firms, reducing adverse selection and consequently the cost of borrowing. We argue that once banks create relationship lending, the effect of female board diversity decreases in relationship loans, possibly due to an informational "lock-in." In other words, the impact of female diversity is likely short-lived as firms establish relationships with banks through repeated loans. Gender board diversity may reduce firm risk, and consequently, the cost of borrowing, the first time a firm borrows from a bank. However, this effect diminishes once firms establish bank relationships. Following this discussion, we formulate our next hypothesis.

Hypothesis 1b: The negative association between gender-diverse boards and loan spreads is less powerful for relationship borrowers.

2.3 The amplifying role of bank dependency

An implication of the mechanism described in the previous subsection is that when lending relationships evolve, for particular firms, the decrease in the cost of borrowing and financing economic activities attenuates. The "lock-in" effect is likely more prevalent for borrowers with few or no alternative sources of external financing beyond the relationship bank (Bharath, Dahiya, Saunders and Srinivasan (2009)). Therefore, we focus on bank-dependent firms. According to Kashyap, Stein and Wilcox (1993), bank-dependent firms are associated with higher degrees of information asymmetry. That is, bank-dependent firms face higher agency costs of borrowing (a higher "external premium") for raising capital from financial markets compared with the cost of internal financing from retained earnings as explained by subsequent effects on real activity (Bernanke and Gertler (1995)). In the context of the loan market, the cost of obtaining loans for financially constrained firms should be particularly sensitive to female board representation when firms become relationship borrowers.

Following Santos and Winton (2008) we classify firms as bank dependent if they have not had access to the public debt markets (bond or equity issuance) within a five-year window prior to the current loan issuance.

Our study is motivated by this literature and seeks to examine why financially weak firms, which are associated with a higher informational asymmetry, experience higher loan spreads when they become relationship firms. We postulate that financially constrained firms' business fundamentals are systematically more sensitive to aggregate economic movements than unconstrained firms' fundamentals (Kashyap, Stein and Wilcox (1993), Bernanke and Gertler (1995), Campello and Chen (2010) and Whited and Wu (2006)). Consequently, we anticipate that the effect of gender diversity is stronger for firms exhibiting financial constraints compared to their less constrained counterparts. In summary, we expect to find that bank-dependent firms' loans command higher ex-ante excess risk premia when they are "locked-in" lending relationships. Our next hypothesis is as follows.

Hypothesis 2: The effect of board diversity is stronger for firms classified as bank dependent when they become relationship borrowers.

3 Empirical implementation

3.1 Baseline model

To examine how gender diversity affects bank loan spreads, we estimate the following model:

$$AISD_{f,b,t} = \lambda_1 Female_{f,t} + \beta_1 L_{l,t} + \beta_2 F_{f,t-1} + \beta_3 B_{b,t} + \theta_f + \phi_{b,t} + \epsilon_{f,b,t}, \tag{3.1}$$

where $AISD_{f,b,t}$ (abbreviated from All-In-Drawn-Spread) is the coupon spread over Libor on the drawn amount plus the facility fee (in basis points) of loans from bank b to firm f in year t. $Female$ measures female participation on a board. Many studies in corporate governance literature measure board gender diversity as a proportion of females (see for example, Adams and Ferreira (2009), Ahern and Dittmar (2012), Liu, Wei and Xie (2014) and Sila, Gonzalez

and Hagendorff (2016)). Other studies rely on the number of women directors on a board (Simpson, Carter and D'Souza (2010) and Liu, Wei and Xie (2014)). This approach stems from the idea that female directors need to reach a threshold (otherwise known as a critical mass) before others feel their influence.[8] Following recent corporate governance literature (see for example Liu, Wei and Xie (2014), Gul, Srinidhi and Ng (2011), among others) we utilise both measures. More precisely, we employ the fraction of females on a board for our baseline analysis and the absolute number as an alternative measure of gender diversity. θ_f, and $\phi_{b,t}$ denote different levels of time-invariant and time-varying fixed effects (analyzed later), while ϵ is a loan-level shock, that captures stochastic disturbances. The coefficient of interest, λ_1, reflects the change in the cost of lending for firms with gender-diversified boards. If diversified firms have lower spreads compared to less diversified firms, then $\lambda_1 < 0$. This finding would support H1a.

Consistent with previous studies (e.g., Sufi (2007), Ivashina and Scharfstein (2010)), we include several loan-level (L) and bank-level (B) control variables to rule out other possible explanations for our results (for more extensive definitions, see table 1). Loan facilities mainly differ in maturity, loan scale, purpose, and loan type (term loan vs. revolver). Thus, we control for these differences by adding loan-level variables that include a dummy that equals 1 when a bank and firm have had a relationship in the previous five years (Bharath, Dahiya, Saunders and Srinivasan (2009)); a dummy that equals 1 if the loan has financial covenants to control for unobservable borrower risk factors (Carey and Nini (2007)); the loan duration in months; and a dummy that equals 1 if the loan is a term. Concerning the bank-level control variables, we use the natural logarithm of total assets ($Bank\ size$) and a dummy equal to 1 if the lead arranger is one of the top three arrangers (Bank of America, Citigroup, or JPMorgan Chase) in the syndicated loan market.

In vector F we use a number of firm-level variables that influence loan spreads. First, we use $Firm\ size$, measured as the natural logarithm of total assets, to control for the fact that

[8]The actual number of females on a board may be important for the composition of the various committees and the allocation of members (see for example Anderson, Mansi and Reeb (2004)).

larger firms have better access to external financing as they are less financially constrained, while smaller firms are more dependent on short-term bank financing (Bougheas, Mizen and Yalcin (2006), Almeida and Campello (2010)). Second, we construct a measure of profitability that proxies for a firm's ability to generate profits relative to total assets.[9] Third, we calculate $Tobin's\ Q$ using the market value of a firm's equity divided by the book value of equity. The literature postulates that firms with greater expansion opportunities are less likely to issue bonds earlier (Hale and Santos (2008)). Finally, we take into account the firm's participation in the New York Stock Exchange ($NYSE$) by generating a dummy variable for whether a firm is listed. We argue that quoted firms are likely to command lower loan spreads as they have alternative sources of external financing and can signal credit quality through previous market participation. The timing of the variables is in line with the idea that firms with certain characteristics at time t-1 seek loans at time t from a bank (or several banks). In addition, banks at time t will check firms' available financial statements from the previous period (t-1) to decide whether to make the loan.

The key identification challenge is to isolate changes from loan supply and demand. Firms with higher gender diversity that borrow from banks are on average bigger, so the cost of lending is likely correlated with diversified firms. Due to the granularity of our data (loan-level), we can overcome this issue using several fixed effects. First, bank and industry (at 3 digit SIC) fixed effects are particularly important because we control for time-invariant bank-and-industry characteristics that could lead to correlation between λ_1 and ϵ. The inclusion of year and purpose fixed effects accounts for annual common shocks and insulates our model from differences in syndicate structure due to purpose (Sufi (2007)).

Also, bank*year fixed effects ($\phi_{b,t}$) allow gender diversity to affect each bank at each point in time heterogeneously. We thus control for unobservable time-varying bank fundamentals (such as profitability, risk, and other balance sheet characteristics) to isolate credit supply. Essentially, we are comparing the same bank lending to different firms in a given year,

[9]More profitable firms have a greater cushion for servicing debt and would be expected to pay lower spreads on their loans (see Güntay and Hackbarth (2010)).

while using only the within variation of each bank-firm combination for estimation (Jiménez, Ongena, Peydró and Saurina (2014)). After absorbing any changes in loan supply, our estimates reflect loan demand effects.

3.2 Relationship lending

As argued in subsection 2.2, our focus is on the differential effect of relationship lending on loan spreads for firms with gender-diverse boards. Formally we test the following model:

$$AISD_{fbt} = \lambda_1 Female_{f,t} + \lambda_2 REL_{f,b,t} + \lambda_3 Female * REL_{f,b,t} + \beta_1 L_{l,t} + \beta_2 F_{f,t-1} + \beta_3 B_{b,t} + \theta_f + \phi_{b,t} + \epsilon_{f,b,t} \quad (3.2)$$

where REL is a measure of relationship strength that equals 1 if a bank lends to the same borrower in the last five years before the present loan, and zero otherwise (Bharath, Dahiya, Saunders and Srinivasan (2009)).[10] To support H1b, we should observe negative coefficients for both λ_1 and λ_2 and a positive coefficient on the double-interaction term λ_3. This would imply that loan spreads and gender diversity are negatively related, but less so for relationship borrowers.

3.3 Bank dependency

Finally, we take into account how bank dependency affects the relationship between the cost of lending and gender diversity. Following Santos and Winton (2008) we generate a dummy variable for bank-dependent firms that equals 1 if they have not had access to the public debt markets (bond or equity issuance) within a five-year time window prior to the current loan issuance. The intuition is this group of firms is more likely to face binding financing constraints and is associated with higher levels of information asymmetry. Thus, they are likely to suffer more from capital market imperfections than their less bank-

[10] Also, in section 6.3 we calculate continuous measures of relationship lending.

dependent counterparts. With reference to the "lock-in" effect, the greater the information opacity, the greater the borrower lock-in effect (Bharath, Dahiya, Saunders and Srinivasan (2009)).

Therefore, we estimate equation (3.2) for two sub-samples (bank-dependent and non-dependent firms). These specifications capture how firm-level heterogeneity, measured by firms' reliance on bank financing, affects the way loan spreads respond to gender diversity in firms more and less likely to suffer from financial constraints. To support H2 we would expect changes in gender diversity to exert a stronger impact on the cost of lending for bank-dependent firms, especially for relationship borrowers.

4 Data and summary statistics

4.1 Data description

We construct a unique dataset using information from four different data sources. Our data sources are the Thomson Reuters LPCs DealScan database, the Call Reports from the Federal Reserve Board of Governors (FRB), Compustat, and BoardEx. We combine them to cast light on how gender diversity affects the cost of borrowing in the United States. The data covers loan frequency from 1999 to 2013.

We begin with a brief description of the syndicated loan market, as it is extensively analyzed (e.g., Sufi (2007); Delis, Kokas and Ongena (2017) for further details). Syndicated loans are granted by a group of banks to a single borrower. Loan syndication allows banks to compete with capital markets for relatively large transactions that a sole lender would not otherwise be able (or willing) to undertake due to internal and regulatory restrictions. These loans are hybrid instruments bringing together features of relationship and transaction lending (Dennis and Mullineaux (2000)). They allow the sharing of credit risk among financial institutions without the disclosure and marketing burden that bond issuers face.

We obtain data on syndicated loans from DealScan. This database provides detailed in-

formation on the characteristics of the loan (amount, maturity, collateral, borrowing spread, performance pricing, etc.), as well as more limited information about the members of the syndicate, the lead bank, the share of each bank in the syndicate, and the borrower.[11] We categorize loans as a credit line, term A, B, C, D, and E, and we exclude term loans B because banks hold none of these loans after the syndication. Term loans B are structured specifically for institutional investors and almost entirely sold off in the secondary market. Also, following Roberts (2015), we drop loans that are more likely to be amendments to existing loans; these are misreported in DealScan as new loans, but they do not necessarily involve new money.

To obtain bank financial statements, we match these data with the Call Reports. We hand-match DealScan's lender ID with the commercial bank ID (RSSD9001) from the Call Reports. This process yields a unique identity for each lender. In turn, we link the lenders at their top holding-company level (RSSD9348) to avoid losing observations. Because these reports are available on a quarterly basis, we match the origination date of the loan with the relevant quarter. For example, we match all syndicated loans originated from April 1 to June 30 with the second quarter of that year of the Call Reports. Similarly, we obtain annual information for the financial statements of firms from Compustat using the link in Chava and Roberts (2008).

The BoardEx database contains data on college education, graduate education, past employment history, current employment status, and social activities. In this study we are interested in gender information. To this end, we utilize two widely used measures:

[11] We apply two selection rules to avoid bias in our sample. This is an essential part of the sample-selection process that is absent from most empirical studies using the DealScan database (for a similar strategy see Lim, Minton and Weisbach (2014)). First, we disentangle banks from non-banks. We consider a loan facility to have a non-bank institutional investor if at least one institutional investor that is neither a commercial nor an investment bank is involved in the lending syndicate. Non-bank institutions include hedge funds, private equity funds, mutual funds, pension funds and endowments, insurance companies, and finance companies. To identify commercial bank lenders, we start from lenders whose type in DealScan is *U.S. Bank*, *African Bank*, *Asian-Pacific Bank*, *Foreign Bank*, *Eastern Europe/Russian Bank*, *Middle Eastern Bank*, *Western European Bank*, or *Thrift/S&L*. We manually exclude observations classified as a bank by DealScan but actually are not, such as the General Motors Acceptance Corporation (GMAC) Commercial Finance. We review all syndicated loans manually, one-by-one. Second, we exclude loans to utilities or financial companies.

the absolute number of females, and the proportion of females. We then apply these two measures in four different categories. We examine: (i) the total number of female directors ($\#female\ on\ BD$) and the fraction of the total females on a board ($\%female\ on\ BD$), (ii) the number of female executive (internal) directors ($\#\ ED\ female\ on\ BD$) and the fraction of female executive (internal) directors ($\%\ ED\ female\ on\ BD$), (iii) the number of female non-executive (external) directors ($\#\ SD\ female\ on\ BD$) and the fraction of female non-executive (external) directors ($\%\ ED\ female\ on\ BD$), (iv) the number of female independent non-executive directors ($\#\ indep.\ NED\ female\ on\ BD$) and the fraction of female independent non-executive directors ($\%\ indep.\ NED\ female\ on\ BD$).

Due to the fact that BoardEx provides data for each director and year, we collapse this information by calculating the average per firm and year. We hand-match firms in BoardEx to Compustat. Specifically, we match the firm's name in BoardEx to the name as it appears in Compustat. This proved one of the most challenging and time-consuming tasks of the entire sample construction. In addition, we had to clean the initial data received by BoardEx. Each time a company acquires another company, BoardEx stops using the initial company ID and supplies a new one after the acquisition. This leads us to the same company name with different ID numbers for before and after the acquisition. We apply a fuzzy merge and hand-match one by one the same company before and after the acquisition by keeping the initial BoardEx company ID.

Following normal selection criteria in the literature, we control for the potential influence of outliers by excluding observations in the 1% from upper and lower tails of the distribution of the regression variables. The matching process yields a maximum of 13,714 loans from 386 banks involving 2,432 non-financial firms from 1999 to 2013. This sample is a so-called multi-level data set, which has observations on banks and firms (lower level) and loan deals (higher level).

4.2 Sample analysis

In table 1 we formally define all variables in the empirical analysis and provide the data sources. In table 2 we present information about the variables used in the empirical models. More precisely, in panel A we provide the descriptive statistics for the dependent and independent variables we utilize in this study. We find that firms have on average 10 directors (executive and non executive). Of those firms, we observe on average 1.2 female directors on the board, which translates to an average of 11.3% female board representation. These statistics are in line with other studies (e.g., Sila, Gonzalez and Hagendorff (2016), Gul, Srinidhi and Ng (2011), Liu, Wei and Xie (2014), Chen, Leung and Goergen (2016), Conyon and He (2017), Bennouri, Chtioui, Nagati and Nekhili (2018)) whose samples indicate around one female directors per board and female board participation of between 9.4% and 11%. The cost of borrowing, calculated by *AISD*, has a mean of 145.59 bps, while the *Relationship dummy* informs us that 51.7% of our sample consists of firms that received loans at least once in the last five years.

Our data allows us to analyze how the cost of bank borrowing changes over time for firms in our sample, as female board representation evolves at different rates. In panel B of table 2, we show that the cost of borrowing is much lower for firms with female representation on their boards. We observe that firms with female directors pay an average AISD of 130 basis points as opposed to 183 basis points for firms with no female directors. This difference, which is significant at a 1% level, implies that firms with women on the board command significantly lower loan spreads compared to firms that are dominated by male directors. The picture is similar for the rest of the measures of cost of borrowing in this study (i.e., *AISU, Commitment fee, Letter of credit fee*). In summary, our univariate analysis suggests a negative association between female participation on boards and the cost of borrowing. Unexamined is whether this relation continues to hold when employing our identification strategy and whether it is causal. Also, we document firm-level differences for boards without and with female directors. We observe that larger, listed, and better-rated firms have a higher

female representation on boards.

The Pearson correlation matrix in table A1 shows the bivariate relationships of the main variables of this study. Importantly, we continue to observe a negative association between loan spreads and female board presence. Our statistics also suggest that the negative association between the total number or percentage of female directors and the cost of borrowing derives not from female executive directors, but rather from external non executive and independent non executive female directors.

As mentioned, regression analysis determines whether these bivariate relationships carry over to a multivariate framework, and that is where we now turn our attention. Our empirical analysis proceeds in two steps. First, we examine whether and to what extent gender diversity affects the cost of borrowing once firms build relationships with banks. Second, we consider how banks perceive firms based on a number of board and firm-specific indicators.

5 Results

5.1 Baseline model

We begin our enquiry with a basic model of loan spread determination as shown in equation (3.1). We test the main hypothesis: firms with more gender-diverse boards, as measured by the number and fraction of females on the board, are more likely to command lower spreads. Table 3 presents the results when we incorporate time-invariant fixed effects.[12] In columns I and II we report the results for the number and fraction of females. The remaining columns vary in how we measure the variable. Specifically, in columns III and IV we report executive females on the board, in columns V and VI we show the number and percentage of non executive female directors on boards, and finally in columns VII and VIII we distinguish the number and fraction of independent non executive female directors.

[12] In table A2 in the appendix, we repeat the baseine specifications adding sequentially fixed effects. The findings support H1a.

The results show that the coefficients for female board representation are negative and highly significant in specifications I and II. That is, more gender-diverse boards, measured by the number and percentage of females on the board, have lower cost of bank lending, which is in line with H1a. This finding is statistically significant but also economically meaningful. Taking the point estimate in column II, increasing the fraction of females on the board by 1% reduces the loan spread by 20.8 basis points, representing around 14% of the sample mean. Our finding highlights the role of gender board diversity in reducing information asymmetry between firms and "arms-length" lenders, and this is reflected in banks charging lower spreads to their customers with gender-diverse boards.

When we delve deeper into the definition of female board representation, we uncover significant differences. We find in columns III and IV that the impact of the number and fraction of executive female directors is quantitatively insignificant and economically unimportant. This result echoes Liu, Wei and Xie (2014), who document that independent female directors have no effect on firm performance. We further find in the remaining specifications that the effect of female directors on loan spreads is driven primarily by non executive (external) females on the board and by independent non executive female directors. This result complements Chen, Leung and Goergen (2016), who show that dividend payout increases with the fraction of female directors, especially female independent directors. In addition, Anderson, Mansi and Reeb (2004) and Bhojraj and Sengupta (2003) find a negative association between the proportion of outside directors and bond borrowing costs. In our context, we show that independent directors maintain their independent status and strongly influence the cost of lending through the monitoring channel (L.Paige-Fields, Fraser and Subrahmanyam (2012) and Liu, Wei and Xie (2014)).

Judging from the signs of the estimated coefficients on the control variables, we find that an increase in $Firm\ size$, $Profitability$, and $Tobin's\ Q$, which are signs of strong balance sheets, reduce the cost of bank lending. In addition, listed firms attract lower spreads, which is consistent with the notion that presence in the stock market reduces information

asymmetry and external financing costs. Similarly, the point estimates for the loan and bank control variables are in line with the literature. We find that loans with covenant intensity and higher maturity increase the cost of lending because higher covenants are usually linked with riskier borrowers and higher exposure, (Dennis and Mullineaux (2000)). We pay special attention to the variable capturing relationship lending. We find that repeated borrowing from the same lender reduces loan spreads by 4.2 basis points. This supports the Boot and Thakor (1994) model, which shows that relationships lower spreads.

Next, we present more restrictive models of the baseline specification by controlling for unobservable time-varying bank fundamentals to isolate credit supply and by accounting for industry demand. The firm and loan controls in the previous models remain unchanged. The combination of bank*time and industry (SIC3) fixed effects allows female representation to affect each bank at each point in time heterogeneously and account for any changes in loan supply while we control for time-invariant industry fixed effects. Table 4 explores the variation among firms with different levels of gender diversity while controlling for within bank-year variation. The reported results in this table stand both quantitatively and qualitatively.

The AISD considers the sum of the spread over LIBOR plus the facility fee while ignoring other fee components, such as the commitment fee and letter-of-credit fee. As Berg, Saunders and Steffen (2016) note, fees are an important component of the syndicated loan market because about 60% of syndicated loans contain at least one fee type in the DealScan database. Consider, for example, a line of credit: In the syndicated loan market, only around 60% of borrowers' credit lines are actually drawn down; the rest is often used for letters of credit or remains undrawn. Therefore, for a typical credit line loan, the total price can be higher or lower than the AISD depending on the various fees on the drawn or undrawn components. In table 5, we identify different spread and fee types that characterize the cost of borrowing to further support our baseline results. In particular, we use all-in-spread-undrawn ($AISU$), the fee on the unused amount of loan commitments (*Commitment fee*), and the fee on

amounts drawn on letter-of-credit sub limits (*Letter of credit fee*). The results show a negative association between female board participation and the cost of borrowing; this supports our baseline results.[13]

Overall, the baseline specifications suggest that loan spreads decrease with the number and fraction of female directors. The evidence suggests that gender diversity helps to reduce the cost of lending. We point out, however, that the baseline model ignores one important characteristic of the lending process and of borrowers that are charged the relevant spreads. Specifically, the empirical model does not allow for the distinction between "relationship" and "transactional" borrowers, which is a significant factor in the relationship between firm characteristics and access to credit through bank lending. This distinction can be critically important because our explanatory variables have disproportionate effects on different types of firms classified by this criterion, as shown in table 3. In the next sub section, we interact dummies for relationship borrowers with the number and fraction of female directors to assess whether relationship lending is a dimension that financial markets consider.

5.2 The role of relationship lending

We now turn to our H1b, relating gender diversity to relationship finance. The results of estimating equation (3.2) are in table 6. Each column of table 6 corresponds to one of the alternative indicators that underlies the characterization of firms' gender diversity. For instance, columns I and II present the results exploring the number and percentage of female directors, while the remaining columns explore different attributes. In all models we interact the dummy variable for relationship lending with the variable capturing gender diversity to gauge the change in transactional borrowing. We find the net response under relationship lending by summing the coefficients.

According to the results reported in columns I and II, *Female*, measured both by the

[13] In appendix table A5, we report results controlling for information on collateral, refinancing, and covenant intensity. This is to ensure that our findings remain unchanged when we disentangle secure loans from unsecured loans. The results are qualitatively and quantitatively similar to table 4.

number and fraction of female directors, and *Relationship dummy* are negative and highly significant. Increasing the fraction of females on a board by 1% reduces spreads by 46 basis points, as seen in column II. In addition, *Relationship dummy* has a negative and significant coefficient. Holding everything else equal, the cost of borrowing from a relationship lender is 14.2 basis points lower than borrowing from a non-relationship lender. Hence, we find evidence that establishing bank relationships reduces spreads. However, when we observe the interaction between relationship lending and female diversity, this effect is muted by 34 basis points for borrowers with bank relationships. In other words, although gender board diversity reduces the cost of lending, this effect diminishes once firms establish bank relationships and are "locked-in" with their lenders. As firms become more gender-diverse, which implies more transparency and smaller information opacity, the effect of relationship lending declines. The mechanism that underlies this findings is as follows. Female representation is crucial in screening the accuracy of financial reporting and thus reducing adverse selection issues based on hard information (accounting statements). However, in repeated interactions between banks and firms (relationship lending), the verification cost for the true quality of financial reporting is already discounted in the first loan. This finding concurs with Bharath, Dahiya, Saunders and Srinivasan (2009), who shows that more informationally opaque firms benefit less from relationship lending in terms of loan spreads. We find that this is the case for gender diversity as a device to signal more information transparency.

Next, we examine the effect of relationship lending by accounting for the characteristics of female directors. Columns III to VIII show, once again, that the effect of female directors on the cost of lending is driven primarily by female independent directors, as opposed to other categories. However, this effect is less potent for high-relationship borrowers. We document that firms' loan spreads have a significantly different response to gender diversity, when considering relationship lending, with respect to independent board characteristics. These results support H1b because the creation of more diverse boards leads to lower loan spreads. However, this is less the case for relationship borrowers. This finding is robust

when we analyze the composition of the board.

To further corroborate our findings, we directly examine bank-dependent companies. In table 7, we focus on how the pricing of bank loans varies with female board representation when firms rely heavily on bank financing. Specifically, following Santos and Winton (2008) we create a dummy variable, *Bank dependent*, which equals 1 for firm i in year t if firm i does not have access to public debt markets (bond or equity issuance) within a five-year window prior to the current loan issuance; it equals zero otherwise. In turn, we subdivide our sample to bank-dependent and non-dependent firm and estimate equation (3.2) for the two sub-samples. The bank-dependent sample consists of 10,373 loans to 841 firms.

In the spirit of Kashyap, Stein and Wilcox (1993), bank dependency is associated with higher degrees of information asymmetry. In other words, bank-dependent firms lack transparency and availability of public information that can influence the cost of borrowing. During the most recent global financial crisis, banks incurred severe losses, which led them to change their risk appetites and resulted in increased lending costs to bank-dependent firms (Santos (2011)). In other words, the variable on bank dependency measures whether the firm has a financing source over and above bank financing. In line with our expectations, observing the marginal effects, we find that all else equal, bank-dependent firms (columns I-IV) pay higher spreads on their loans compared to firms with access to public markets (column V-VIII). Our results suggest that banks increase lending rates more for bank-dependent firms than for firms with access to public markets because they can utilize the soft informational power that they collect from repeated interactions.[14]

[14]To further check the robusness of our findings, we follow the relevant empirical literature (e.g., see Fazzari, Hubbard and Petersen (1988), Gilchrist, Yankov and Zakrajsek (2009)), and we classify firms as more or less likely to be financially constrained. To this end, we utilize the size, cash flow, and credit ratings as sorting devices. Tables A3 - A4 present these tests. The results are qualitatively similar to the ones in table 7.

5.3 Gender diversity and loan purposes

In table 8, we dig deeper into the role of gender diversity in determining the cost of lending. Specifically, we introduce interaction terms between female representation (i.e., the number and fraction of female directors) and loans' purpose that characterize the ex-ante level of information asymmetries. The relationship between gender diversity and cost of lending is likely influenced by differences in lenders' ability to extract higher rates of return for different uses of proceeds. The purpose of the loan has useful information content beyond the signals about creditworthiness that are conveyed in loan origination. In table 8, following Angbazo, Mei and Saunders (1998), we create three dummy variables to reflect the designated purposes: general corporate, commercial paper backup and debt repayment.[15] Loans for backup or refinancing prior debt obligations are likely associated with higher spreads compared to general corporate loans because lenders are able to charge higher rates for providing immediacy (Denis (1990)). General corporate, commercial paper backup and debt repayment loans represent on average 48%, 10%, and 21% of the sample, respectively.

According to the results in table 8, both female indicators are negative and highly significant, and the economic significance is quantitatively similar to those in table 6. All loan-purpose dummy variables are negative, apart from *Debt repayment*, and statistically significant at 1%. The negative signs for *Corporate purpose* and *Commercial paper backup* are consistent with Denis (1990) because these loans can be viewed as a letter of credit, which provide positive signals about the borrower's prospects. On the contrary, the coefficient of *Debt repayment* supports the view that these loans are negative NPV investments that banks can use to extract higher yields to compensate for higher risk exposure. Most important, the coefficient of the interaction term in columns I-VI is positive and highly significant,

[15]Corporate Purposes: General corporate loans are a catch-all purpose loan category that can be used for various activities related to general operations, purchases, or working capital (inventory purchases). A unique characteristic of these loans is the lack of security. Commercial paper backup: A commitment to back a company's commercial paper program. It is typically a revolving credit, a 364-day facility, or a letter of credit. The commitment may be drawn down if the borrower is unable to roll-over or refinance maturing commercial paper. Debt repayment: A loan to refinance or consolidate existing debt prior to maturity.

indicating that these specific loan purposes diminish the negative impact of the female variables on the cost of lending. In addition, in columns V-VI, we observe qualitatively similar results but quantitatively stronger results because loans for debt refinancing are viewed as negative NPV investments because they are usually utilized for defensive purposes in corporate control contests (Angbazo, Mei and Saunders (1998)). In summary, we find that the higher a loan's systemic risk exposure, the higher the ex-ante cost of the loan, given the same transparency in accounting practices arising from gender diversity. The coefficients of the marginal effect on the female variables provide useful insights for heterogeneous effects on gender diversity with respect to differences in the purpose of the granted loans.

6 Robustness checks

6.1 Instrumental variable estimation

Our evidence thus far suggests that gender diversity reduces the cost of lending due to better transparency, but this effect attenuates once firms establish relationships with banks. One may raise doubts about the extent to which gender diversity drives our results, as unobserved firm factors such as bank-firm board connectedness, may drive gender diversity and the loan spread simultaneously. Thus, lower spreads on loans might not be due to the incremental benefits of female representation as we argue thus far but may simply be the result of female variable proxying for the borrower's unobservable quality. To address this potential concern, we introduce an instrumental-variables (IV) methodology.

The identification of gender diversity requires an exogenous variable, which is correlated with female participation but does not directly affect loan spreads except through diversity. To this end, we use female retirements as an exogenous instrument for gender diversity that addresses endogeneity of board composition. Relying on BoardEx, we define a director departure as retirement if the director is at or beyond the company's mandatory retirement age. In our sample, there are 172 firms with director retirements. Our identification strategy

is to compute changes in board composition that are not due to the firm's conditions. One way that retirements could correlate with the cost of lending is through common industry developments that tend to move together. We thus control for industry fixed effects in our empirical specification. The identifying assumption in our IV analysis is that after controlling for time-varying industry (demand-side) effects, time-varying bank (supply-side) effects, and loan characteristics, director retirements enter exogenously in gender diversity (Fracassi and Tate, 2012). This allows us to interpret our findings as arising from a change in gender diversity.

We conduct the IV analysis using a two-stage least squares model with Bank*Year, Industry*Year, and Bank*Industry FE, separately. In table 9, columns I-VI, we replicate the baseline specification of table 3 using our instruments. The first stage-point estimates in panel A confirm that director retirements lead to a significant increase in female participation on boards. This suggests that firms replace retired directors with female directors. In addition, the over-and-weak identification tests show no concerns regarding instrument validity. Panel B presents the second-stage estimates using the estimated value of the total number of females on the board of directors. The estimates are qualitatively and quantitatively similar to those in our baseline specification. Moreover, the statistical significance and inference on the coefficients of interest are very similar. In sum, our findings are robust to endogenous regressors.

6.2 Effects of non pricing characteristics

Overall, the results in the previous subsection indicate that, ceteris paribus, firms with gender-diverse boards borrow at a lower cost. In this subsection, we explore how changes in board composition affect non price terms. *Facility amount*, *Fixed charge coverage*, *Financial covenants*, and *Performance pricing* are key loan contract features. The motivation for this test is that the above indicators are better at lowering loan risk in the case of adverse developments for the borrower. We use, gender diversity as a proxy that is adverse

to firm risk. So, we expect a positive effect on *Facility amount* and *Performance pricing* and a negative effect on higher needs for *Fixed charge* (source of general covenants) and *Financial covenants*.[16] General covenants restrict a borrower's actions, such as acquisitions or debt issuance; financial covenants require maintaining minimum financial ratios or values, such as a maximum debt ratio.

In table 10, column I, the coefficient of interest is positive and statistically significant at the 1% level. Clearly, firms with more females directors borrow $2.8M than firms that are less diversified. Equally, this decreases the probability of having higher contract strictness such as fixed charge coverage and financial covenants (Murfin (2012)). Performance pricing is a relatively new provision in loan contracts. There are two types of performance pricing: interest decreasing and interest increasing. In our analysis, we consider interest decreasing, which is a relatively new payment modification option.[17] In column IV, we observe that firms with higher female representation are 1.5% more likely to have an interest-decreasing performance-pricing provision.

6.3 Other robustness tests

In table 11 we conduct a number of additional robustness tests. To start with, we report the results only for the total number of female directors, but we also obtain similar results for the proportion of females. In columns I and II we conduct an equivalent analysis with the baseline (table 3), but we replace *Relationshipdummy* with continuous measures of relationship strength such as the total number (column I) and amount of loans (column II). This is a powerful test because we take into account the dynamic nature of relationship lending and compare relationship lending borrowers with the full spectrum of borrowers that a bank serves. We follow Bharath, Dahiya, Saunders and Srinivasan

[16] We choose borrower covenants such as fixed-charge coverage as controls as opposed to alternative accounting measures to most closely match the variables on which banks contract.

[17] Interest-decreasing performance pricing provisions automatically decrease the interest rate on the loan when the borrower's creditworthiness improves. It thereby reduces adverse-selection problems when asymmetric information between the borrower and lender results in a misclassification of credit risk.

(2009), who use a similar approach, to measure the intensity of relationship lending. Let $Number\ of\ Loan^{b\to f}$ in the last five years be the number of loans from bank b to firm f at time t, and let $Total\ number\ of\ loan^{b}$in the last five years be the total number of loans from bank b during the same year to the total number of borrowers. For each possible bank-firm pair, we compute the normalized continuous relationship lending as follows:

$$REL(number)_{b,f,t} = \frac{Number\ of\ loan^{b\to f} \text{ in the last five years}}{Total\ number\ of\ loan^{b} \text{ in the last five years}} \tag{6.1}$$

The second continuous measure of relationship strength is *REL($M)*. For bank b lending to borrower f at time t, we calculate it as follows:

$$REL(\$M)_{b,f,t} = \frac{\$M\ of\ loan^{b\to f} \text{ in the last five years}}{Total\ \$M\ of\ loan^{b} \text{ in the last five years}} \tag{6.2}$$

For both variables, higher values reflect higher relationship-lending intensity.

We find that the effect of continuous relationship lending is qualitatively similar to the baseline, but the economic significance is higher (8 and 12 basis points in columns I and II, respectively). This is expected for the continuous measures of relationship strength because they capture the relative importance of the relationship borrower vis-a-vis other borrowers for each bank. In columns III and IV, we replicate the baseline regression by using data at the loan deal level and lead-arrangers only, respectively. The results remain qualitatively similar to those in our benchmark specification. In column V, we drop loans in which the lead arranger is one of the largest three U.S. banks (J.P. Morgan Chase, Bank of America, and Citigroup) based on the number of deals in which they participate. This analysis allows us to examine whether the efficiency of very large banks in originating large loan deals solely drives the results. In column VI we estimate the equation controlling for term loans (up until now we control for loan purpose by using purpose fixed effects).

In column VII, we exclude loans for leveraged buyouts (LBOs) and mergers and acquisitions (M&As) because they reduce the asymmetric information between banks and borrowers (Ivashina and Kovner (2011)). However, the results are almost identical to those in the baseline specifications. In column VIII, we control for firm credit ratings as a measure of opaqueness and examine how gender diversity affects loan spread. Finally, in column IX we exclude NBER recessions, which equal 1 if the U.S. economy is in a downturn as defined by the NBERs Business Cycle Dating Committee. Results are similar to the baseline specifications.

Finally, table 12 provides further sensitivity tests using corporate governance controls. A a firm might obtain loans with lower spreads not because of female board participation, but due to better corporate governance quality. For example, Anderson, Mansi and Reeb (2004) find that factors such as board independence, board size, and audit committee size reduce the cost of debt for a company. To reduce endogeneity concerns for omitted variable bias, we thus test the robustness of our baseline results in table 4, utilizing various boardroom characteristics. To this end, we follow previous studies (e.g., Anderson, Mansi and Reeb (2004), Liu, Wei and Xie (2014)) and control for *Board size*, *Board independence*, *Audit committee size*, *# Ind. NED with audit experience*, *# of board directorships*, and *Board age*. Consistent with our previous results, we find that female directors' impact is still present and strong. More precisely, throughout all the specifications of table 12 (see columns I-VIII), our estimations show a negative and statistically significant relationship at 1% and 5% between female participation on boards and the cost of loans.

7 Conclusion

Empirical investigations of firm performance considers the effects of gender diversity but produce seemingly mixed results. In this paper, we examine how gender diversity affects the cost of lending, paying special attention to relationship lending and the degree to which

some firms face credit constraints from financial markets and financial intermediaries, which are relaxed less quickly than for other types of firms.

Our results, based on matched firm-bank data in the U.S. over the period 1999-2013 suggest that the sensitivity of loan spreads to gender diversity is significantly higher for independent female directors. Therefore, gender diversity has an impact through the reduction of information asymmetry and improvement of transparency, and it could operate alongside the relationship lending channel to exert an influence over the cost of lending. However, we show that the beneficial effect of gender diversity diminishes with relationship lending. Finally, we uncover significant firm-level heterogeneity because the loan spreads of small firms and those that face high volatility in their cash flows are most affected by changes in gender diversity. Our findings are of interest to policy makers who should consider how firms take into account the response of firms to gender diversity when they contemplate policies that make external financing for companies more readily available.

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8 Tables

Table 1: Variable definitions and sources

A. Dependent variables		
AISD	All-in-spread-drawn (bps), defined as the sum of the spread over LIBOR plus the facility fee.	DealScan
AISU	All-in-spread-undrawn (bps), defined as the sum of the facility fee and the commitment fee.	DealScan
Commitment fee	Commitment fee (bps) paid on the unused amount of loan commitments.	DealScan
Letter-of-credit fee	Fee (bps) paid on drawn amounts on the letter-of-credit sublimit.	DealScan
Facility amount	The loan (facility) amount in M$ weighted by the bank's share.	DealScan
Fixed charge coverage	Firm's ability to pay fixed charge obligations (expenses) from its income before interest and taxes.	DealScan
Financial covenants	The total number of financial covenants in the loan contract.	DealScan
Performance pricing	Dummy variable equal to 1 if the loan has performance pricing provisions, 0 otherwise.	Dealscan
B. Main Explanatory variables		
# female on BD	The number of total female directors on the board.	Boardex
% female on BD	The fraction of the female directors on the board.	Boardex
# ED female on BD	The number of executive (internal) female directors on the board.	
% ED female on BD	The fraction of executive (internal) female directors on the board.	Boardex
# SD female on BD	The number of non-executive (external) female directors on the board.	Boardex
% SD female on BD	The fraction of non-executive (external) female directors on the board.	Boardex
# indep. NED female on BD	The number of independent non-executive (external) female directors on the board.	Boardex
% indep. NED female on BD	The fraction of independent non-executive (external) female directors on the board.	Boardex
C. Control variables		
Relationship dummy	Dummy equal to 1 if the bank lends to the same borrower in the five years before the current loan, 0 otherwise.	Own calculation

Relationship number	The number of loans from the bank to the same borrower in the past five years, over the total number of loans from the bank to the total number of borrowers.	Own calculation
Relationship amount	The amount ($M) of loans from the bank to the same borrower in the past five years, over the total amount ($M) of loans from the bank to the total number of borrowers.	Own calculation
Covenant dummy	Dummy equal to 1 if the loan has covenants, 0 otherwise.	DealScan
Maturity	Loan duration in months.	DealScan
LBO and M&A's	Dummy equal to 1 if the loan's primary purpose is for leveraged buyouts or M&A.	DealScan
Term loan	Dummy equal to 1 if the loan is a term loan, 0 otherwise. A loan is a term loan if a firm borrows a certain amount for a certain length of time.	DealScan
Collateral	Dummy equal to 1 if the loan is linked with collateral, 0 otherwise.	DealScan
Refinancing	Dummy equal to 1 if the loan tracks the amended restated agreements that replaces the previous contract, 0 otherwise.	
Firm size	The natural logarithm of total assets.	Compustat
NYSE	Dummy equal to 1 if the firm is listed on the New York Stock Exchange, 0 otherwise.	Compustat
Profitability	The ratio of pre-tax profits to total assets.	Compustat
Tobin's Q	The natural logarithm of market-to-book value.	Compustat
Company rating	Company S&P credit rating.	DealScan
Bank-dependent firm	Dummy equal to 1 if the the firm does not have access to public debt markets (bond or equity issuance) within a five-year window prior to the current loan issuance, 0 otherwise.	Own calculations
Board size	The total number of directors on a board.	Boardex
Audit committee size	The number of directors on the audit committee.	Boardex
# Ind. NED with audit experience	The number of independent non-executive (external) directors with functional audit experience on the board.	Boardex
# of board directorships	The mean number of directorships that board directors hold.	Boardex
Board age	The mean age of the directors on a board.	Boardex
Bank size	The natural logarithm of total assets.	Call Reports
Lead bank	Dummy equal to 1 if the bank is a mandated arranger, arranger, lead manager or agent, 0 otherwise.	DealScan
Top 3 banks	Dummy equal to 1 if lead arranger is one of the top 3 arrangers, namely Bank of America, Citigroup, or JPMorgan Chase, 0 otherwise.	DealScan

D. Instrumental variables		
Retired director	We define a female director departure as retirement if a female director is at or beyond the company's mandatory retirement age.	BoardEx

Table 2: Summary statistics

Panel A: Descriptive statistics

Variables	Obs.	Mean	Std.	Min	Max
AISD	53,302	145.587	117.326	0.000	1405
AISU	53,302	17.280	19.555	0.000	305
Commitment fee	53,302	13.009	20.035	0.000	250
Letter-of-credit fee	53,302	54.765	92.795	0.000	713
Facility amount	53,302	57.369	148.188	0.000	12,250
Fixed charge coverage	53,302	0.198	0.399	0.000	1.000
Financial covenants	53,302	1.538	1.318	0.000	7.000
Performance pricing provision	53,302	0.577	0.494	0.000	1.000
# female on BD	53,302	1.202	1.037	0.000	7.000
% female on BD	53,302	0.113	0.093	0.000	0.625
# ED female on BD	53,302	0.053	0.228	0.000	2.000
% ED female on BD	53,302	0.005	0.024	0.000	0.400
# SD female on BD	53,302	1.149	1.014	0.000	6.000
% SD female on BD	53,302	0.108	0.090	0.000	0.545
# indep. NED female on BD	53,302	1.019	0.969	0.000	6.000
% indep. NED female on BD	53,302	0.096	0.087	0.000	0.545
Relationship dummy	53,302	0.517	0.500	0.000	1.000
Relationship number	53,302	0.080	0.237	0.000	1.000
Relationship amount	53,302	0.059	0.212	0.000	1.000
Covenant dummy	53,302	0.491	0.500	0.000	1.000
Maturity	53,302	46.832	21.300	-0.033	240
LBO and M&A's	53,302	0.150	0.357	0.000	1.000
Term loan	53,302	0.193	0.395	0.000	1.000
Collateral	53,302	0.319	0.466	0.000	1.000
Refinancing	53,302	0.817	0.387	0.000	1.000
Firm size	53,302	8.232	1.741	0.855	14.608
NYSE	53,302	0.766	0.423	0.000	1.000
Profitability	53,302	0.135	0.088	-1.691	0.897
Tobin's Q	53,302	1.696	0.958	0.478	16.970
Company rating	53,302	13.178	6.524	1.000	23.000
Bank-dependent firm	53,302	0.195	0.396	0.000	1.000
Board size	53,302	10.008	2.794	2.000	33.000
Audit committee size	53,267	3.993	1.092	0.000	11.000
# Ind. NED with audit experience	53,267	0.539	0.706	0.000	4.000
# of board directorships	53,289	3.240	1.271	1.000	10.571
Board age	53,274	60.064	3.957	41.750	76.750
Bank size	53,302	18.743	2.068	4.927	21.605
Lead bank	53,302	0.278	0.448	0.000	1.000
Top 3 banks	53,302	0.281	0.450	0.000	1.000
NBER recessions	53,302	0.113	0.316	0.000	1.000
Retired directors	53,302	0.027	0.164	0.000	2.000

Panel B: Univariate analysis

	Boards without female directors	Boards with female directors	Differences	
Variable	Mean	Mean	Mean	Significance
AISD	183.458	130.630	52.827	***
AISU	20.840	15.874	4.966	***
Commitment fee	18.603	10.800	7.802	***
Letter of credit fee	76.935	46.010	30.924	***
Firm size	7.174	8.650	-1.476	***
NYSE	0.591	0.835	-0.244	***
Profitability	0.137	0.134	0.003	***
Company rating	16.604	11.826	4.778	***

The table reports summary statistics. Panel A reports summary statistics for the variables in the empirical analysis. All variables are defined in table 1. Panel B reports differences of the various dependent variables in this study between boards without female directors and boards with female directors. The ***, **, and *, indicate significance levels at the 1%, 5%, and 10%, respectively.

Table 3: Cost of lending and gender diversity

	I	II	III	IV	V	VI	VII	VIII
	# female on BD	% female on BD	# ED female on BD	% ED female on BD	# SD female on BD	% SD female on BD	# indep. NED female on BD	% indep. NED female on BD
Female variable	-2.847***	-20.790***	1.580	18.917	-3.076***	-23.792***	-4.704***	-40.493***
	(-4.414)	(-3.240)	(0.720)	(0.888)	(-4.665)	(-3.578)	(-7.276)	(-5.906)
Relationship dummy	-4.271***	-4.225***	-4.222***	-4.222***	-4.259***	-4.215***	-4.248***	-4.199***
	(-4.008)	(-3.980)	(-3.984)	(-3.983)	(-3.998)	(-3.970)	(-3.983)	(-3.947)
Covenant dummy	25.129***	25.248***	25.332***	25.333***	25.096***	25.226***	24.911***	25.077***
	(15.866)	(15.924)	(15.989)	(15.991)	(15.853)	(15.914)	(15.791)	(15.864)
Maturity	0.364***	0.367***	0.368***	0.368***	0.363***	0.366***	0.361***	0.365***
	(10.160)	(10.234)	(10.258)	(10.249)	(10.142)	(10.215)	(10.104)	(10.201)
Firm size	-19.338***	-19.749***	-20.057***	-20.046***	-19.280***	-19.691***	-18.935***	-19.451***
	(-29.149)	(-30.812)	(-31.577)	(-31.527)	(-29.002)	(-30.639)	(-28.737)	(-30.431)
NYSE	-7.899***	-7.985***	-8.380***	-8.379***	-7.903***	-7.955***	-7.715***	-7.711***
	(-4.656)	(-4.709)	(-4.908)	(-4.904)	(-4.656)	(-4.693)	(-4.535)	(-4.529)
Profitability	-190.440***	-190.905***	-191.113***	-191.011***	-190.100***	-190.549***	-189.291***	-189.899***
	(-13.599)	(-13.614)	(-13.590)	(-13.584)	(-13.560)	(-13.573)	(-13.527)	(-13.546)
Tobin's Q	-11.411***	-11.448***	-11.515***	-11.520***	-11.423***	-11.460***	-11.337***	-11.372***
	(-10.482)	(-10.502)	(-10.525)	(-10.529)	(-10.487)	(-10.503)	(-10.438)	(-10.454)
Bank size	1.440	1.453	1.489	1.494	1.453	1.465	1.410	1.423
	(0.820)	(0.826)	(0.850)	(0.853)	(0.827)	(0.833)	(0.802)	(0.807)
Observations	53,062	53,062	53,062	53,062	53,062	53,062	53,062	53,062
Adjusted R-squared	0.471	0.471	0.470	0.470	0.471	0.471	0.471	0.471
F-stat	283	283.3	282.9	283.5	283.2	282.8	283.8	283.5
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Purpose FE	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 4: Cost of lending and gender diversity with time varying fixed effects

	I	II	III	IV	V	VI	VII	VIII
	# female on BD	% female on BD	# ED female on BD	% ED female on BD	# SD female on BD	% SD female on BD	# indep. NED female on BD	% indep. NED female on BD
Female variable	-4.643***	-34.743***	-2.938	-19.716	-4.608***	-34.988***	-6.137***	-52.365***
	(-6.477)	(-4.831)	(-1.253)	(-0.858)	(-6.306)	(-4.680)	(-8.502)	(-6.865)
Relationship dummy	-11.712***	-11.670***	-11.710***	-11.705***	-11.696***	-11.661***	-11.657***	-11.627***
	(-10.096)	(-10.089)	(-10.145)	(-10.137)	(-10.076)	(-10.077)	(-10.020)	(-10.021)
Observations	52,749	52,749	52,749	52,749	52,749	52,749	52,749	52,749
Adjusted R-squared	0.431	0.430	0.430	0.430	0.431	0.430	0.431	0.431
F-stat	355.9	355.4	353.8	355.2	355.7	354.5	357.4	357.9
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5: Fees and lender diversity

	I	II	III	IV	V	VI
Dependent variable	AISU	Commitment fee	Letter of credit fee	AISU	Commitment fee	Letter of credit fee
# female on BD	-0.559***	-1.108***	-1.073**			
	(-6.107)	(-11.864)	(-2.214)			
% female on BD				-4.377***	-9.795***	-9.572*
				(-4.271)	(-9.604)	(-1.776)
Relationship dummy	-0.320*	-0.868***	-8.254***	-0.312*	-0.854***	-8.241***
	(-1.737)	(-5.100)	(-9.113)	(-1.697)	(-4.999)	(-9.086)
Observations	52,914	52,914	52,914	52,914	52,914	52,914
Adjusted R-squared	0.139	0.174	0.208	0.139	0.174	0.208
F-stat	258.7	250.8	312.4	259.7	253.1	313
Loan controls	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in Table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 6: Gender diversity and relationship lending

	I	II	III	IV	V	VI	VII	VIII
	# female on BD	% female on BD	# ED female on BD	% ED female on BD	# SD female on BD	% SD female on BD	# indep. NED female on BD	% indep. NED female on BD
Female variable	-5.681***	-46.333***	-25.954	38.644	-6.046***	-52.140***	-8.165***	-75.830***
	(-5.603)	(-4.398)	(-1.292)	(1.237)	(-5.827)	(-4.747)	(-7.797)	(-6.796)
Relationship dummy	-14.182***	-14.281***	-4.261***	-11.078***	-14.946***	-15.291***	-15.693***	-15.997***
	(-7.219)	(-7.030)	(-4.038)	(-9.530)	(-7.608)	(-7.442)	(-8.253)	(-8.136)
Relationship * Female variable	2.027**	22.791*	-1.310	-119.593***	2.784***	33.216***	3.909***	45.154***
	(2.032)	(1.948)	(-0.059)	(-2.833)	(2.706)	(2.690)	(3.637)	(3.573)
Marginal effect (Female)	-4.632***	-34.543***	-26.632	-23.224	-4.606***	-34.957***	-6.143***	-52.471***
	(-6.472)	(-4.822)	(-1.051)	(-1.025)	(-6.300)	(-4.681)	(-8.507)	(-6.896)
Observations	52,749	52,749	52,745	52,749	52,749	52,749	52,749	52,749
Adjusted R-squared	0.431	0.430	0.480	0.430	0.431	0.431	0.432	0.431
F-stat	320.9	320.7	241	323.3	321.1	320.8	322.9	323.9
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 7: Cost of lending and gender diversity for bank dependent borrowers

	Bank-dependent firms				Non-dependent firms			
	I	II	III	IV	V	VI	VII	VIII
	# female on BD	% female on BD	# SD female on BD	% SD female on BD	# female on BD	% female on BD	# SD female on BD	% SD female on BD
Female variable	-7.733***	-70.638**	-9.034***	-84.039***	-4.437***	-33.843***	-4.899***	-40.826***
	[-2.762]	[-2.527]	[-3.182]	[-2.902]	[-4.453]	[-3.124]	[-4.843]	[-3.730]
Relationship dummy	-16.570***	-17.324***	-17.825***	-18.836***	-9.447***	-9.095***	-10.111***	-10.003***
	[-4.469]	[-4.437]	[-4.929]	[-4.932]	[-5.059]	[-4.684]	[-5.425]	[-5.136]
Relationship *Female variable	6.204**	68.863**	7.954***	89.463***	0.523	3.001	1.091	11.142
	[2.113]	[2.186]	[2.704]	[2.789]	[0.520]	[0.252]	[1.052]	[0.900]
Marginal effect (Female)	-5.076**	-41.146*	-5.628**	-45.724**	-4.155***	-32.227***	-4.312***	-34.825***
	(-2.286)	(-1.945)	(-2.427)	(-2.018)	(-5.793)	(-4.420)	(-6.094)	(-4.878)
Observations	10,171	10,171	10,171	10,171	42,357	42,357	42,357	42,357
Adjusted R-squared	0.406	0.406	0.407	0.407	0.429	0.429	0.430	0.429
F-stat	37.52	37.34	39.69	39.57	197.8	195.6	197.8	195.6
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 8: Gender diversity and loan purpose

	I	II	III	IV	V	VI
	Corporate purpose		Back up		Debt repayment	
	#female	%female	#female	%female	#female	%female
Female variable	-6.382***	-49.308***	-5.393***	-40.088***	-4.974***	-35.989***
	(-6.990)	(-5.052)	(-7.240)	(-5.471)	(-7.104)	(-5.028)
Relationship dummy	-10.788***	-11.073***	-11.566***	-10.787***	-11.036***	-11.540***
	(-9.369)	(-9.649)	(-10.030)	(-9.403)	(-9.646)	(-10.034)
Corporate purpose	-16.098***	-15.363***				
	(-6.882)	(-6.499)				
Corporate purpose * Female variable	3.782***	33.616***				
	(3.598)	(2.793)				
Commercial paper backup			-45.657***	-42.417***		
			(-20.038)	(-17.896)		
Commercial paper backup * Female variable			6.653***	56.280***		
			(6.518)	(4.133)		
Debt repayment					19.385***	23.585***
					(5.710)	(6.857)
Debt repayment * Female variable					10.591***	62.506**
					(3.253)	(1.968)
Marginal Effect (Female)	-4.549***	-33.017***	-4.716***	-34.363***	-4.571***	-33.609***
	(-6.275)	(-4.561)	(-6.694)	(-4.905)	(-6.555)	(-4.758)
Observations	52,749	52,749	52,749	52,749	52,749	52,749
Adjusted R-squared	0.433	0.432	0.436	0.436	0.433	0.432
F-stat	314.9	311.9	356.8	356.5	319.9	320.7
Loan controls	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Bank*Year FE	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 9: Cost of lending and gender diversity: 2SLS model

	I	II	III	IV	V	VI
	Panel A: First-stage results					
Retired director	0.540***	0.427***	0.299***	0.046***	0.033***	0.024***
	(14.724)	(12.180)	(8.462)	(12.802)	(11.296)	(7.541)
F-stat	633.4	627.5	449.2	307.7	358.2	276.5
	Panel B: Second-stage results					
# female on BD	-19.272***	-29.329***	-28.601**			
	(-3.657)	(-3.339)	(-2.556)			
% female on BD				-225.695***	-375.035***	-357.610**
				(-3.564)	(-3.184)	(-2.453)
Relationship dummy	-13.302***	-11.182***	-15.467***	-13.110***	-10.770***	-14.976***
	(-10.902)	(-8.089)	(-10.396)	(-10.564)	(-7.640)	(-9.751)
Covenant dummy	28.723***	23.967***	16.624***	29.308***	24.386***	16.946***
	(16.720)	(11.582)	(8.280)	(17.066)	(11.877)	(8.534)
Maturity	0.643***	0.489***	-0.062	0.658***	0.501***	-0.037
	(16.182)	(10.995)	(-1.030)	(16.396)	(11.402)	(-0.644)
Firm size	-15.242***	-14.276***	-14.357***	-16.810***	-16.090***	-16.322***
	(-10.891)	(-6.133)	(-5.176)	(-15.956)	(-8.452)	(-7.598)
NYSE	-10.154***	-9.113***	-8.564***	-9.177***	-6.767**	-6.777*
	(-4.490)	(-3.600)	(-2.830)	(-3.707)	(-2.135)	(-1.837)
Profitability	-134.707***	-199.338***	-176.640***	-135.671***	-202.133***	-178.832***
	(-10.252)	(-10.546)	(-10.785)	(-10.391)	(-10.702)	(-10.968)
Tobin's Q	-13.316***	-9.588***	-16.404***	-13.083***	-9.405***	-16.501***
	(-13.641)	(-6.754)	(-10.333)	(-13.145)	(-6.459)	(-10.255)
Bank size		0.028	52.155***		0.139	54.730***
		(0.097)	(10.147)		(0.465)	(9.641)
Observations	52,914	53,008	51,091	52,914	53,008	51,091
Adjusted R-squared	0.359	0.514	0.385	0.351	0.496	0.370
F-stat	432.8	454.5	211.7	418.9	446.9	207.2
P-value for under identification	0.000	0.000	0.000	0.000	0.000	0.000
F-stat for weak identification	216.8	148.3	71.60	163.9	127.6	56.86
Bank*Year FE	Y	N	N	Y	N	N
Industry*Year FE	N	Y	N	N	Y	N
Bank*Industry FE	N	N	Y	N	N	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. The first stage regressions are given in panel A and the dependent variable is *# female on BD* and *% female on BD* in columns I-III and IV-VI, respectively. Under identification: H_0: Under-identified; Weak identification: H_0: Weakly-identified. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 10: Non pricing characteristics and gender diversity

	I	II	III	IV
Dependent variable	Facility amount	Fixed charge coverage	Financial covenants	Performance pricing
# female on BD	2.806***	-0.006**	-0.038***	0.015***
	(2.733)	(-2.577)	(-5.385)	(5.113)
Relationship dummy	-9.125***	0.016***	-0.006	-0.039***
	(-3.928)	(4.036)	(-0.522)	(-5.504)
Observations	52,749	52,749	52,749	52,914
Adjusted R-squared	0.132	0.345	0.529	0.232
F-stat	32.02	277	574.1	299
Loan controls	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The dependent variable is noted in the first row. The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 11: Sensitivity analysis

	I	II	III	IV	V	VI	VII	VIII	IX
	Relationship number	Relationship amount	Deal level	Lead -only	Exclude TOP3	Term loan	Exclude LBO and M&A's loan	Credit Rating	Exclude NBER recessions
# female on BD	-4.316***	-4.311***	-4.929***	-5.600***	-3.356***	-3.703***	-4.498***	-3.872***	-3.156***
	(-6.954)	(-6.945)	(-7.638)	(-4.653)	(-3.802)	(-5.708)	(-6.107)	(-5.488)	(-4.674)
Relationship dummy			-8.475***	-11.284***	-11.309***	-9.645***	-8.655***	-10.923***	-3.655***
			(-7.863)	(-4.165)	(-8.227)	(-8.931)	(-6.968)	(-9.673)	(-3.354)
Relationship number	-8.048**								
	(-2.478)								
Relationship amount		-11.859***							
		(-3.649)							
Term loan						64.243***			
						(33.333)			
Credit rating								2.461***	
								(12.778)	
Observations	52,914	52,914	39,495	14,667	34,849	52,749	44,766	52,749	47,091
Adjusted R-squared	0.369	0.369	0.428	0.341	0.454	0.470	0.413	0.438	0.474
F-stat	417.2	406.9	392.2	129.2	210.9	397.6	270.4	328.5	271.7
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table 12: Cost of lending and gender diversity controlling for boardroom characteristics

	I	II	III	IV	V	VI	VII	VIII
	# female on BD	% female on BD	# ED female on BD	% ED female on BD	# SD female on BD	% SD female on BD	# indep. NED female on BD	% indep. NED female on BD
Female variable	-1.618**	-19.212***	1.787	15.803	-1.835***	-21.838***	-3.750***	-39.127***
	(-2.358)	(-2.878)	(0.817)	(0.744)	(-2.628)	(-3.198)	(-5.475)	(-5.543)
Relationship dummy	-4.335***	-4.328***	-4.335***	-4.337***	-4.324***	-4.315***	-4.285***	-4.285***
	(-4.083)	(-4.076)	(-4.085)	(-4.086)	(-4.075)	(-4.066)	(-4.031)	(-4.029)
Board size	-0.921***	-1.087***	-1.118***	-1.112***	-0.898***	-1.080***	-0.734***	-1.063***
	(-3.324)	(-4.014)	(-4.126)	(-4.098)	(-3.225)	(-3.985)	(-2.641)	(-3.917)
Audit committee size	-3.259***	-3.255***	-3.389***	-3.388***	-3.243***	-3.237***	-3.091***	3.122***-
	(-6.235)	(-6.234)	(-6.441)	(-6.439)	(-6.216)	(-6.209)	(-5.896)	(-5.962)
# Ind. NED with audit experience	-1.521**	-1.498**	-1.618**	-1.617**	-1.519**	-1.494**	-1.393*	-1.377*
	(-2.098)	(-2.064)	(-2.244)	(-2.242)	(-2.099)	(-2.063)	(-1.926)	(-1902)
# of board directorships	2.878***	2.873***	2.846***	2.845***	2.898***	2.896***	2.966***	2.956***
	(5.720)	(5.722)	(5.663)	(5.669)	(5.747)	(5.763)	(5.879)	(5.874)
Board age	-1.051***	-1.057***	-1.003***	-1.003***	-1.051***	-1.057***	-1.089***	-1.089***
	(-6.075)	(-6.143)	(-5.989)	(-5.985)	(-6.105)	(-6.173)	(-6.367)	(-6.387)
Observations	52,987	52,987	52,987	52,987	52,987	52,987	52,987	52,987
Adjusted R-squared	0.473	0.473	0.473	0.473	0.473	0.473	0.473	0.473
F-stat	200.6	200.3	197.6	197.7	200	199.6	198.9	199.5
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y
Bank controls	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Purpose FE	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Appendix

Table A1: Correlogram

	AISD	AISU	ComFee	LOCF	#Fem	%Fem	#EDF	%EDF	#SDF	%SDF	#INEDF	%INEDF	Rel/ship	Covenant	Mat/ty	FirmSize	NYSE	Prof/ty	Q	BankSize
AISD	1.000																			
AISU	0.333*	1.000																		
ComFee	0.362*	0.836*	1.000																	
LOCF	0.283*	0.591*	0.580*	1.000																
#Fem	-0.214*	-0.120*	-0.171*	-0.150*	1.000															
%Fem	-0.143*	-0.085*	-0.124*	-0.105*	0.931*	1.000														
#EDF	-0.006	-0.004	-0.003	0.008	0.210*	0.237*	1.000													
%EDF	0.014*	0.009	0.015*	0.022*	0.181*	0.238*	0.965*	1.000												
#SDF	-0.218*	-0.122	-0.174*	-0.155*	0.976*	0.898*	-0.010	-0.032*	1.000											
%SDF	-0.151*	-0.090*	-0.131*	-0.114*	0.909*	0.966*	-0.013*	-0.022*	0.933*	1.000										
#INEDF	-0.213*	-0.118*	-0.168*	-0.145*	0.904*	0.832*	-0.024*	-0.041*	0.930*	0.867*	1.000									
%INEDF	-0.153*	-0.087*	-0.127	-0.105*	0.836*	0.885*	-0.026*	-0.032*	0.860*	0.920*	0.939*	1.000								
Rel/ship	-0.116*	-0.043*	-0.053*	-0.081*	0.053*	0.045*	-0.010	-0.012*	0.057*	0.050*	0.064*	0.057*	1.000							
Covenant	0.213*	0.221*	0.0236*	0.375*	-0.220*	-0.151*	0.020*	0.034*	-0.230*	-0.165*	-0.228*	-0.170*	-0.029*	1.000						
Mat/ty	0.200*	0.031*	0.103*	0.110*	-0.138*	-0.070*	-0.015*	0.003	-0.138*	-0.072*	-0.105*	-0.044*	-0.038*	0.219*	1.000					
FirmSize	-0.347*	-0.172*	-0.233*	-0.246*	0.475*	0.322*	0.014*	-0.031*	0.483*	0.339*	0.460*	0.326*	0.114*	-0.351*	-0.237*	1.000				
NYSE	-0.229*	-0.057*	-0.132*	-0.116*	0.269*	0.211*	0.004	-0.021*	0.274*	0.223*	0.259*	0.213*	0.083*	-0.112*	-0.121*	0.4407*	1.000			
Prof/ty	-0.126*	-0.063*	-0.062*	-0.029*	-0.038*	-0.007	0.020*	0.019*	-0.043*	-0.012*	-0.038*	-0.007	0.013*	0.035*	0.052*	-0.210*	-0.036*	1.000		
Q	-0.158*	-0.103*	-0.089*	-0.070*	-0.029*	-0.008	0.050*	0.053*	-0.041*	-0.015*	-0.034*	-0.007	0.004	0.005	-0.004	-0.192*	-0.103*	0.563*	1.000	
BankSize	-0.023*	-0.051*	-0.045*	-0.056*	0.077*	0.077*	0.005	0.001	0.077*	0.079*	0.083*	0.083*	0.037*	-0.081*	0.012*	0.102*	0.036*	-0.004	0.009	1.000

The table reports Pearson correlations for exposition brevity *ComFee* is commitment fee, *LOCF* is the Letter-of-credit fee,*#EDF* is the # ED female on BD, *%EDF* is the % ED female on BD, *#SDF* is the # SD female on BD, *%SDF* is the % SD female on BD, *#INEDF* is the # indep. NED female on BD, *%INEDF* is the % indep. NED female on BD, *Rel/ship* is the Relationship dummy, *Covenant* is the Covenant dummy, *Mat/ty* is the Maturity, *NYSE* is the NYSE Dummy, *Prof/ty* is the Profitability, *FMTB* is the Tobin's Q,. The * mark denotes the statistical significance at the 1% level.

Table A2: Baseline with time-invariant fixed effects

	I	II	III	IV	V	VI
# female on BD	-4.521***	-3.321***	-2.847***			
	(-7.496)	(-6.042)	(-4.414)			
% female on BD				-32.307***	-24.259***	-20.790***
				(-5.332)	(-4.394)	(-3.240)
Relationship dummy	-13.856***	-5.853***	-4.271***	-13.787***	-5.784***	-4.225***
	(-11.306)	(-5.282)	(-4.008)	(-11.269)	(-5.227)	(-3.980)
Covenant dummy	30.210***	28.120***	25.129***	30.482***	28.300***	25.248***
	(17.587)	(17.999)	(15.866)	(17.758)	(18.150)	(15.924)
Maturity (months)	0.727***	0.488***	0.364***	0.733***	0.491***	0.367***
	(17.497)	(12.689)	(10.160)	(17.649)	(12.773)	(10.234)
Firm size	-18.926***	-17.681***	-19.338***	-19.598***	-18.158***	-19.749***
	(-31.561)	(-29.136)	(-29.149)	(-34.070)	(-30.856)	(-30.812)
NYSE dummy	-15.718***	-12.654***	-7.899***	-15.924***	-12.792***	-7.985***
	(-8.433)	(-7.597)	(-4.656)	(-8.515)	(-7.679)	(-4.709)
Profitability	-149.739***	-150.139***	-190.440***	-150.551***	-150.673***	-190.905***
	(-10.518)	(-11.304)	(-13.599)	(-10.572)	(-11.346)	(-13.614)
Tobin's Q	-13.953***	-13.466***	-11.411***	-14.011***	-13.505***	-11.448***
	(-13.673)	(-13.588)	(-10.482)	(-13.716)	(-13.622)	(-10.502)
Bank size	-0.282	-0.054	1.440	-0.283	-0.052	1.453
	(-0.735)	(-0.167)	(0.820)	(-0.734)	(-0.163)	(0.826)
Observations	53,302	53,299	53,062	53,302	53,299	53,062
Adjusted R-squared	0.335	0.397	0.471	0.334	0.397	0.471
F-stat	615.7	420	283	599.2	410.3	283.3
Time FE	Y	Y	Y	Y	Y	Y
Purpose FE	N	Y	Y	N	Y	Y
Industry FE	N	N	Y	N	N	Y
Bank FE	N	N	Y	N	N	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table A3: Sub-samples for the cost of lending and females on boards

Categories	Size				Cash flow volatility/Total assets				Credit rating			
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
# female on BD	-3.746**	-5.726***			-6.128***	-3.518***			-3.674*	-1.162		
	(-2.489)	(-4.255)			(-4.070)	(-3.038)			(-1.934)	(-1.170)		
Relationship *	3.518*	-1.314			3.226**	2.674**			5.646**	-2.353***		
# female on BD	(1.949)	(-1.022)			(2.119)	(2.185)			(2.492)	(-2.482)		
% female on BD			-29.284**	-53.294***			-56.772***	-24.020*			-25.728	-11.090
			(-2.086)	(-3.273)			(-3.478)	(-1.821)			(-1.490)	(-1.032)
Relationship *			34.712**	-15.096			41.152**	22.251			54.189***	-31.345***
% female on BD			(2.053)	(-0.905)			(2.248)	(1.541)			(2.703)	(-2.829)
Relationship dummy	-13.893***	-8.227***	-14.086***	-8.233***	-13.124***	-14.912***	-13.746***	-14.248***	-17.981***	-6.155***	-18.220***	-5.502***
	(-5.878)	(-2.953)	(-5.785)	(-2.813)	(-4.438)	(-6.700)	(-4.592)	(-5.935)	(-6.296)	(-3.522)	(-6.379)	(-3.183)
Marginal effect	-2.096**	-6.468***	-13.003*	-61.820***	-4.440***	-2.157**	-35.241***	-12.695	-1.047	-2.469***	-0.518	-28.500***
	(-1.979)	(-6.839)	(-1.950)	(-5.768)	(-4.099)	(-2.483)	(-3.005)	(-1.414)	(-0.782)	(-3.486)	(-0.042)	(-3.808)
Observations	26,042	26,473	26,042	26,473	24,241	28,998	24,241	28,998	22,228	30,314	22,228	30,314
Adjusted R-squared	0.381	0.473	0.381	0.473	0.451	0.477	0.451	0.477	0.329	0.487	0.329	0.487
F-stat	136.9	138.9	136.2	137.5	116.3	257.9	116.3	257.5	79.66	184.1	80.59	184
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

To further strengthen the robustness of the "locked-in" finding we classify firms as more or less likely to be financially constrained. In this table, we present the estimates of Equation (3.1) and split between two sub-samples for the firm size, cash flow volatility and credit ratings. The point estimates in columns I to IV tell a consistent story with table 7. For smaller firms (below the median) there is a significant difference in response compared to larger firms. Gender diversity is a highly significant determinant of loan spreads, while this is not the case for larger firms. In addition, the response of small firms match that of the more volatile firms in terms of cash flow reported in columns V to VIII. Similarly, in columns IX-XII we split firms below and above the investment-grade threshold and rerun the main models. The results, once again suggest that the benefits of relationship lending decrease when borrowers are more opaque. We conclude that constrained and unconstrained firms may face different credit supply conditions based on their specific characteristics and respond differently to changes in board composition. The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

Table A4: Sub-samples for the cost of lending and independent NED females on boards

Categories	Size				Cash flow volatility/Total assets				Credit rating			
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
# indep. ED female on BD	-7.520***	-6.505***			-6.911***	-7.158***			-5.807***	-3.142***		
	(-4.889)	(-4.683)			(-4.848)	(-5.810)			(-2.852)	(-3.063)		
Relationship *	4.928***	1.100			4.186***	4.377***			7.395***	-0.181		
# indep. ED female on BD	(2.773)	(0.810)			(2.739)	(3.212)			(2.987)	(-0.175)		
% indep. ED female on BD			-61.485***	-64.967***			-69.109***	-63.407***			-46.702**	-37.750***
			(-4.246)	(-3.763)			(-4.351)	(-4.557)			(-2.500)	(-3.342)
Relationship *			40.191**	20.065			52.963***	43.277***			69.925***	-0.965
% indep. ED female on BD			(2.352)	(1.140)			(2.834)	(2.683)			(3.132)	(-0.078)
Relationship dummy	-14.269***	-11.887***	-13.880***	-12.804***	-13.487***	-16.142***	-14.121***	-15.899***	-18.344***	-9.432***	-18.493***	-9.540***
	(-6.171)	(-4.472)	(-5.858)	(-4.574)	(-4.846)	(-7.533)	(-4.958)	(-6.933)	(-6.469)	(-5.418)	(-6.483)	(-5.411)
Marginal effect	-5.209***	-5.883***	-42.635***	-53.634***	-4.721***	-4.931***	-41.399***	-41.381***	-2.367	-3.242***	-14.171	-38.286***
	(-4.474)	(-6.423)	(-3.862)	(-4.879)	(-4.844)	(-5.555)	(-3.800)	(-4.395)	(-1.595)	(-4.520)	(-1.027)	(-4.796)
Observations	26,042	26,473	26,042	26,473	24,241	28,998	24,241	28,998	22,228	30,314	22,228	30,314
Adjusted R-squared	0.382	0.473	0.382	0.472	0.452	0.478	0.451	0.478	0.329	0.487	0.329	0.488
F-stat	138.9	139	137.9	137.7	114.5	261.1	114.4	260.9	80.88	187.3	81.63	186.1
Loan controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bank*Time FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

In this table, we focus on the different characteristics of the board diversity, paying attention to independent female directors that were found to drive the impact on loan spreads. We find that at higher levels of a borrower's information opacity, the observed reduction in the cost of borrowing due to a relationship becomes less important. In other words, we show that the reduced benefits of the relationship are upheld for small, more volatile in terms of cash flow and opaque firms, especially for the independent group of directors. The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.

In table A5, we explore whether the existence of collateral, refinancing indicators, and financial covenant intensity can change the effect of board composition. Admittedly, one drawback of DealScan is the limited information on pledged asset. Therefore, we create a dummy variable to indicate whether the loan is linked with collateral. If a loan is secured, then the expected monetary loss for lenders should be lower and the resulting agency problems should, therefore, be less severe. In addition, DealScan has a refinancing indicator variable that tracks the amended and restated agreements that replaces the previous contract and incorporates all amendments up to the point. When firms refinance a loan, they face the risk that changes in market conditions result in refinancing at a higher interest rate. However, these loans can be viewed as renewals, which provide positive signals about a borrower's prospects. Finally, financial covenants intensity serves as a discipline device that can enhance the flexibility and efficiency of loan contraction. Higher covenants intensity assumes a higher monitoring effort to observe violations and to gather soft information. In table A5, we use the same specification with the benchmark analysis, but we add the collateral variable (columns I-II), the refinancing dummy (columns III-IV), and the financial covenant intensity (columns V-VI). The coefficient estimates of the female variable are similar in magnitude as in the baseline results and highly significant at 1%. Also, the coefficients on the collateral variable and the refinancing dummy are both negative and statistically significant at the 1% level, while the coefficient on the financial covenant intensity is positive and highly significant at 1%.

Table A5: Cost of lending and gender diversity: Secured vs. unsecured loans

Categories	I	II	III	IV	V	VI
	Collateral		Refinancing		Financial covenants intensity	
	#female	%female	#female	%female	#female	%female
Female variable	-4.717***	-35.844***	-4.725***	-35.382***	-4.427***	-32.906***
	(-6.609)	(-4.997)	(-6.587)	(-4.903)	(-6.152)	(-4.570)
Collateral	-13.288***	-13.294***				
	(-8.593)	(-8.589)				
Refinancing dummy			-9.508***	-9.418***		
			(-5.502)	(-5.444)		
Financial covenants intensity					5.726***	5.776***
					(7.365)	(7.442)
Observations	52,749	52,749	52,749	52,749	52,749	52,749
Adjusted R-squared	0.433	0.432	0.432	0.431	0.433	0.432
F-stat	314.9	311.9	356.8	356.5	319.9	320.7
Loan controls	Y	Y	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Bank*Year FE	Y	Y	Y	Y	Y	Y
Clustered standard errors	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year	Bank*Year

The table reports coefficients and t-statistics (in parentheses). The sample consists of loan-bank-firm observations from 1999 to 2013. All variables are defined in table 1. All specifications include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Standard errors are robust and clustered at the bank-year level. The *,**, and *** marks denote the statistical significance at the 10%, 5%, and 1% level, respectively.