Bank Specialization, Control Rights, and Real Effects

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Abstract. We document the presence of bank specialization in the U.S. syndicated loan market, its implications for financial contracting, and its real effects through the covenant violation channel. Firms borrowing from a bank specialized in their industry (core borrowers) obtain credit with less restrictive financial covenants. When control rights shift to lenders after a covenant violation, specialized banks help their core borrowers by asking for smaller investment cuts, with positive effects on performance. Our evidence suggests that credit market structure shapes the real effects of agency problems.

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Information frictions pervade credit markets. Loan contracts mitigate these frictions by specifying complex and state-contingent terms, known as covenants. Breaching a covenant shifts control rights from the firm to its lenders, which can then influence corporate behavior. Unsurprisingly, a large literature has examined covenant violations and their implications for corporate policies (Chava & Roberts, 2008; Falato & Liang, 2016; Nini, Smith, & Sufi, 2012; Roberts & Sufi, 2009) as well as the macroeconomy (Chodorow-Reich & Falato, 2022; Lian & Ma, 2020). Despite this attention, few studies focus on the role of credit market structure in shaping these outcomes. Filling this gap is important for understanding how banking structure can mitigate or amplify the real consequences of agency problems.

This paper brings empirical evidence that lenders' specialization alleviates agency problems and assuages the consequences of covenant violations. A growing number of studies document specialization as a salient feature of credit markets (Beck, De Jonghe, & Mulier, 2022; Blickle, Parlatore, & Saunders, 2023; Paravisini, Rappoport, & Schnabl, 2023). As noted by Paravisini et al. (2023, pp. 2049-2050): "If banks develop skills, expertise, or technology in evaluating projects in a specific sector [...] they may obtain a market-specific advantage relative to other lenders." While the existing studies present empirical evidence of lenders' specialization consistent with market-specific information advantages, our paper shows that these advantages translate into real effects through the influence of creditors on firms' governance.

Our main results can be summarized as follows. First, we document the presence of banks' industry specialization in the $2 trillion US syndicated loan market over a 24-year sample. Second, we present new evidence supporting the presence of industry-specific lending advantages in this market. Lenders' specialization reduces the need for restrictive financial covenants in loan contracts, revealing a smaller information distance between lenders and borrowers (Gârleanu & Zwiebel, 2009). These loans also exhibit more generous terms and greater dispersion in covenant strictness and pricing, further supporting an information-based explanation. Third, such information advantages change how creditors wield control rights over debtors, with real implications. Specialized lending allows for smaller drops in corporate investment after covenant violations, with improvements in firms' performance. High-quality firms drive this effect, alleviating the concern that our results could represent zombie-lending (Faria-e Castro, Paul, & Sánchez, 2024). Overall, our evidence suggests that lenders' specialization plays a

positive role in mitigating possible ex-post inefficiencies arising from ex-ante contracting efforts to address agency problems (Smith & Warner, 1979).

We begin by presenting evidence of lenders' industry specialization in the syndicated loan market. For our analysis, we obtain data on syndicated loan contracts from Refinitiv Dealscan and on firms' balance sheets from Compustat, for the period of 1996-2019. We use this data to estimate the evolution of lead banks' C&I lending portfolios over time. We measure specialization as relative lending concentration as in Paravisini et al. (2023). We define specialized banks as those whose loan portfolio concentration deviates significantly from the credit distribution of the entire syndicated loan market. We apply this definition at the bank-industry-time level, looking at the ratio between the share of an industry in the bank's syndicated lending portfolio and the share of that industry in the entire syndicated loan market (Blickle et al., 2023). This measure avoids confusing specialization with how few capital-intensive industries may mechanically absorb large fractions of all banks' credit supply.

We find clear patterns of specialization. On average, banks show higher lending concentration compared to the overall credit distribution in the syndicated loan market. The distributions of banks' portfolio shares in each industry display rightward skewness, i.e. it is common for banks to have an above-median lending concentration in at least some industries. Moreover, each industry consistently displays at least one outlier bank, with a portfolio share abnormally large with respect to its peers. Specialization is persistent: Banks' relative loan portfolio shares in each industry exhibit a 55% correlation at a 10-year horizon, suggesting that relative loan portfolio shares capture long-lasting differences across banks.

Next, we examine whether these specialization patterns align with the existence of industry-specific information advantages in the syndicated loan market. We develop a new test based on the stringency of loan covenants, motivated by the theoretical contribution of Gârleanu and Zwiebel (2009). Intuitively, the equilibrium covenant strictness optimally reflects a trade-off between the informativeness of covenant violations and costly renegotiations. In this framework, covenant strictness is an increasing function of the information distance between borrowers and lenders. We empirically proxy this information distance with the measure developed by Demerjian and Owens (2016), which condenses the loan's covenant package into a stringency index that captures the ex-ante probability of violating at least one financial covenant.

Employing a within-bank approach, we find that loan contracts between banks and firms operating in the bank's industry of specialization (hereafter, core borrowers) have less stringent covenants than loan contracts between banks and their other borrowers (hereafter, non-core borrowers), after accounting for industry heterogeneity and borrower risk. When a bank's industry lending share is twice as large as the market's, the average loan contract with a firm in that industry displays a covenant strictness 3.8 percentage points lower compared to loans issued by the same bank at the same time to firms in industries in which the bank's lending share matches that of the overall credit market. This effect is economically and statistically significant, amounting to 13% of the unconditional mean of covenant strictness. The lower covenant strictness we document is not merely the by-product of a trade-off between loan terms (Bradley & Roberts, 2015): Loans between specialized banks and their core borrowers exhibit lower spreads, higher amounts, and similar maturities. Furthermore, we show that contracts in lenders' industry of specialization exhibit greater dispersion in covenant strictness and loan spreads, consistent with models in which more precise information leads to better screening (Stiglitz & Weiss, 1981). Overall, our findings align with the presence of industry-specific information advantages in the syndicated loan market.

Finally, we investigate if, and how, the lending advantages associated with lenders' specialization have real effects at the firm level through covenant enforcement decisions. Covenant violations represent an ideal setting as lenders effectively obtain control rights over the firm upon a covenant breach. Specifically, when firms violate a covenant, lenders have the right to accelerate the loan principal repayment. Still, in practice, they often pursue a waiver in exchange for concessions from the firm's managers. Potential differences in firms' outcomes that are close to the covenant threshold can thus be credibly traced to creditor-led interventions, following the "quasi-discontinuity" approach in Roberts and Sufi (2009) and Nini et al. (2012).

Our main finding shows that, four quarters after a covenant violation, specialized banks' core borrowers experience a lower drop in investment than non-core borrowers. Upon a violation, borrowers undergo a decline in capital expenditures by 0.4% of tangible assets compared to non-violating borrowers of the same bank, in the same industry, at the same time. This result masks significant heterogeneity. Non-core borrowers experience a reduction of up to 0.8% in investment, but this drop is 0.3 percentage points lower for core borrowers in industries

where the bank's portfolio share is double that of the market. This effect amounts to at least a 40% lower reduction in capital expenditure to tangible assets, and it increases as banks further specialize in an industry. Furthermore, we show that the lower drop in investment is associated with an improvement in firms' performance. Core borrowers perform relatively better in terms of operating cash flow over assets and sales growth, as well as showing a smaller increase in default probability compared to non-core borrowers.

We validate our empirical approach in several ways. Our results are robust to controlling for numerous firm characteristics on which covenants are written, both contemporaneous and lagged, in a linear and non-linear way, as well as their pre-violation dynamics (Nini et al., 2012). A placebo experiment in which violations are falsely assumed to take place one year before their actual realization yields insignificant results, as expected. Nonetheless, a comparison of the violation outcomes based on lenders' specialization raises two additional concerns. First, violations could correlate with firm characteristics and post-violation outcomes could depend on the interplay of these characteristics with banks' specialization (Chodorow-Reich & Falato, 2022). We alleviate this concern by including interaction terms between several firm characteristics and bank specialization in our specifications, and showing that our results do not change. Second, loans between specialized banks and their core borrowers exhibit looser covenants than loans with non-core borrowers, hence core borrowers' violations could be more serious than non-core borrowers' violations and potentially subject to harsher lenders' interventions. However, this would bias our estimates against finding a positive effect of lenders' specialization on investment and the other measures of performance following a covenant violation, which is actually what we document.

We rule out three possible alternative explanations for our findings. First, the industry-specific information advantages we document could be related to other ways of acquiring information: i) long-term credit relationships with borrowers in a given industry (Boot, 2000), and ii) local knowledge spillovers (Agarwal & Hauswald, 2010) due to industrial clusters of firms located in specific geographic areas. We show that neither relationship lending nor geographical proximity affect our results on covenant strictness and post-violation outcomes. Second, industry-specialized banks could in principle have a large industry market share. As such, they could internalize the industry-level spillovers of their credit decisions simply due

to size (Giannetti & Saidi, 2019), which would represent an alternative mechanism to the information-based explanation we put forward. We show that controlling for industry market shares does not affect our results. Large industry market shares are associated with stricter covenants (Gorostiaga, 2022) and no different post-violation outcomes, whereas the effect of specialization persists, and even increases in magnitude. Third, to the extent that covenant violations might be related to firms' financial distress, our results on post-violation outcomes could represent evidence of "zombie lending" by overly-concentrated lenders (Faria-e Castro et al., 2024). We mitigate this concern by showing that high-quality firms—i.e. firms with either low default probability, low leverage, or high coverage ratios—drive the positive effects on investment induced by industry-specialized lenders.

Our findings contribute to the empirical research on the creditors' role in the corporate governance of the firm. It is well established that the shift in control rights induced by covenant violations has important implications for corporate policies (Nini et al., 2012), e.g., investment (Chava & Roberts, 2008; Nini et al., 2009), capital structure (Roberts & Sufi, 2009), employment (Falato & Liang, 2016), CEO turnover (Ferreira, Ferreira, & Mariano, 2018), corporate acquisitions (Becher, Griffin, & Nini, 2022), research and development (Chava, Nanda, & Xiao, 2017; Gu, Mao, & Tian, 2017), and within-firm resource allocation (Ersahin, Irani, & Le, 2021). More recent evidence points to heterogeneity in these effects depending on lenders' characteristics, such as capital (Chodorow-Reich & Falato, 2022) and short-termist incentives (Bird, Ertan, Karolyi, & Ruchti, 2022). Our main contribution is to show the role of credit market structure in shaping the outcomes of covenant violations, highlighting the presence of significant heterogeneity even after accounting for bank- or firm-specific characteristics. This, in turn, points to a potential interplay between bank business models and agency problems in the transmission of financial shocks, e.g. through the "loan covenant channel" (Chodorow-Reich & Falato, 2022).

More broadly, our paper is related to the financial contracting literature. While several papers document the relevance of borrowers' and lenders' characteristics for the determination of loan covenants (e.g., Berlin & Mester, 1992; Billett, King, & Mauer, 2007; Demiroglu & James, 2010; Murfin, 2012) and interest rates (e.g., Ivashina, 2009), only a few studies suggest that contract terms might depend on the interplay of borrowers' and lenders' specific factors. Prilmeier (2017) shows that the intensity of credit relationships affects covenant strictness

in a non-linear way. Hubbard, Kuttner, and Palia (2002) and Santos and Winton (2019) find that the interplay of bank capital and borrowers' profitability matters for loan spreads. Our evidence hints at another important joint borrower-lender dimension for the determination of loan covenants, namely lenders' industry specialization.

Finally, our paper contributes to the growing empirical literature on specialization in credit markets. Acharya, Hasan, and Saunders (2006), Tabak, Fazio, and Cajueiro (2011), and Beck et al. (2022) study the relationship between bank diversification and risk. Saidi and Streitz (2021) find that higher bank industry concentration leads to lower loan spreads in that industry. Other studies provide evidence of lenders' specialization in lending along several dimensions, such as export markets (Paravisini et al., 2023), geographical regions (Duquerroy, Mazet-Sonilhac, Mésonnier, & Paravisini, 2022), industries (Blickle et al., 2023; Di & Pattison, 2023), and collateral (Gopal, 2021). This body of work shows that banks' credit-supply responses to funding shocks are heterogeneous across markets, industries, and regions depending on the banks' area of specialization (Casado & Martinez-Miera, 2022; De Jonghe, Dewachter, Mulier, Ongena, & Schepens, 2020; Jiang & Li, 2022; Paravisini et al., 2023). Berger, Minnis, and Sutherland (2017) find that specialized banks are less likely to demand financial information from their borrowers. Blickle et al. (2023) document that banks' industry specialization implies more generous loan terms and better loan performance. Overall, these studies present evidence coherent with the presence of market-specific information advantages. Our contribution is two-fold. First, we develop new tests to ascertain specialized banks' industry-specific lending advantages based on covenant strictness and the dispersion of contract terms. Second, we identify specialized lenders' influence on firms' corporate governance as a new channel through which specialization can translate into real effects.

The paper proceeds as follows. In Section 1, we describe our sample. In Section 2 we illustrate how we measure banks' industry specialization and provide evidence of its salience in the US syndicated loan market. In Section 3, we investigate the presence of industry-specific information advantages associated with lenders' specialization. In Section 4, we analyze if specialized lenders' information advantages have implications for corporate investment and performance through covenant enforcement decisions. In Section 5, we assess several alternative explanations. In Section 6, we provide robustness checks. Section 7 concludes.

1 Data and Sample Construction

To characterize specialization and to study its implications for loan contracts and firm outcomes, we construct a sample of syndicated loans matched with bank and firm characteristics. Below we describe the sample construction and summarize the sample characteristics.

1.1 Sample Construction

Our two main data sources are Refinitiv DealScan and Compustat. DealScan contains detailed information on syndicated loans, including credit amounts, covenants, price terms, and maturity. Despite its focus on relatively large loans and firms, Dealscan still represents one of the main detailed loan-level sources of information on US firms' credit relationships, spanning almost 40 years (from 1987 to today). It is indeed commonly used to study bank lending (e.g., Bharath, Dahiya, Saunders, & Srinivasan, 2011; Giannetti & Saidi, 2019) and its implications for the real economy (e.g., Chakraborty, Goldstein, & MacKinlay, 2018; Chodorow-Reich, 2014).

Compustat provides balance-sheet information for both banks and firms. We merge the loan data in Dealscan with borrowers' quarterly financial information in Compustat through the linking table provided by Chava and Roberts (2008), which spans the period from 1987 to 2021.[1] We also employ other data sources. We assign firms to a given industry based on the Text-based Fixed Industry Classification (TFIC) developed by Hoberg and Phillips (2010, 2016). We obtain information on stock prices from CRSP and on firms' credit ratings from Capital IQ.[2]

We match banks in Dealscan with their quarterly financial information in Compustat using the link table provided by Schwert (2018), which identifies the Bank Holding Company (BHC) of all the DealScan lenders with at least 50 loans, or $10 billion loan volume in the matched DealScan-Compustat sample. As a lending syndicate involves multiple banks with different roles—lead arrangers and participant banks—we focus on the former (Bharath et al., 2011; Prilmeier, 2017; Schwert, 2018). Lead arrangers supply credit, negotiate the loan terms with the borrower, carry out due diligence, and market the loan to participant banks. Importantly,

1. The linking table is constantly being updated. As of January 2024, this is the most recent and comprehensive version.
2. We also supplement Compustat information on firms' states of incorporation with the historical data collected by Bai, Fairhurst, and Serfling (2020) and Gao, Leung, and Qiu (2021) from SEC filings.

they are required to manage the credit relationship and enforce covenants even if they do not retain the entirety of the loan amount on their balance sheets (Ivashina, 2009). We identify lead arrangers using the categorical variables and the textual description of banks' roles provided by Dealscan, following the procedure outlined by Chakraborty et al. (2018).

To characterize bank specialization, we need banks' time-varying industry exposures. For that, we need to track credit relationships over time. Dealscan, however, provides data only on loan originations and information on loan shares is sparse. To get around this issue, we create a bank-firm level panel similar to a credit register (Chakraborty et al., 2018; Doerr & Schaz, 2021). We make the following assumptions: 1) each loan facility is outstanding until the original end date, or if an amendment is reported in Dealscan, until the amended end date;[3] 2) the facility amount is entirely attributed to the lead arranger(s).[4] We use this dataset to establish whether a credit relationship is still active at a given point in time and to compute our baseline measure of bank industry specialization.

Throughout our analysis we restrict the sample to loans originated between 1996 and 2019; the coverage of syndicated lending and contract terms in Dealscan is sparse before 1996 (Chava & Roberts, 2008), and the post-2019 years are affected by the major shock of the COVID-19 pandemic. We further restrict the sample to loans granted to non-financial corporations (i.e., SIC codes from 6000 to 6999 are excluded) headquartered in the US for which the TFIC is available. We winsorize all firm- and loan-level variables at the top and bottom 2.5%.[5] Finally, we drop all observations with missing firm-level variables that are important determinants of

3. To track loan amendments, we exploit the information present in the "facilityamendment" table in the WRDS legacy version of Dealscan. One potential caveat is that renegotiated/amended loans could appear as new loans in DealScan; if loan renegotiations are not identically and independently distributed across bank-firm pairs, this could imply an imperfect measurement of a bank's lending activity. To partially address this issue, we perform our analysis by dropping from our sample all the loans that have a description such as "This loan amends and restates..." in the various "comment" fields available in Dealscan. The main results of the paper do not quantitatively change if we do not drop these loans.

4. This follows directly from the fact that lead arrangers are still mandated to manage the entire loan and the relationship with the borrower even if they may retain a low share of the loan on their balance sheet. If there are multiple lead arrangers, we split the loan amount equally among them. However, as robustness, we also create alternative versions of this bank-firm panel by employing the various methods proposed in the literature for attributing loan shares to lead arrangers (Chodorow-Reich, 2014; De Haas & Van Horen, 2013; Doerr & Schaz, 2021), as well as excluding term loans B that are more likely to be sold in their entirety right after origination (Blickle, Fleckenstein, Hillenbrand, & Saunders, 2020).

5. We do not winsorize the measures of covenant strictness and of expected default probability, which are naturally bounded between 0 and 100.

covenants and loan spreads[6]

The first step in our analysis focuses on contract terms at loan origination. There are two possible units of analysis in Dealscan: facility and package (or deal, which is a set of facilities). We conduct the analysis at the package level—hereafter referred to simply as "loan"—as the information available on covenants is at the package level.[7] We supplement the loan-level data provided by Dealscan with the comprehensive measure of covenant strictness developed and made available by Demerjian and Owens (2016), and with the measure of "total cost of borrowing" (TCB) developed and made available by Berg, Saunders, and Steffen (2016). The former takes into account 15 accounting-based covenants and can be interpreted as the ex-ante probability of violating at least one, whereas the latter is an estimate of the total cost of credit based on all the fees and the loan spreads included in loan contracts. The resulting dataset is a bank-loan level panel at a quarterly frequency, with information at loan origination on firm, loan, and bank characteristics.[8] As Murfin (2012), we assume the determination of contract terms takes place during the quarter before the actual reported loan starting date.

The second step focuses on firm investment around covenant violations and how bank specialization affects this outcome. We merge the quasi-credit register we constructed by tracking credit relationships over time with the data on covenant violations extracted from companies' SEC filings by Nini et al. (2012) and Griffin, Nini, and Smith (2024).[9]

In line with these studies, we focus on new covenant violations, i.e. violations by a firm that has not violated any covenant in the previous four quarters.[10] These "represent the first opportunity for credit intervention and thus provide the cleanest identification of the effect of violations on corporate behavior" (Nini et al., 2012, p. 1725).

If a violation is reported for a given quarter, we assume that the firm is in breach of a covenant for one of the credit relationships currently active in that quarter according to our quasi-credit

6. The exact set of variables we require to be non-missing is the set of firm controls we use in our specifications, described in Section 3.1.
7. We aggregate the facility-level information at the package level by taking a weighted average of the facility characteristics – loan spread, fees, maturity – using as weights the respective facility amounts.
8. For this part of the analysis, we retain only loans that have either covenant strictness or all-in drawn spread non-missing.
9. In the quasi-credit register, we drop all the observations corresponding to bank-quarters in which a given bank is not lending in the syndicated loan market.
10. Firm-quarter observations corresponding to a violation that does not meet this criterion are set to missing.

register. We then need to determine which bank manages the violation.[11] If the firm has an active credit relationship with only one lead arranger, then it is straightforward. In case a firm has multiple credit relationships currently outstanding in a given quarter, we proceed sequentially. First, we pick the bank with the largest credit amount outstanding with the firm. In case multiple bank satisfies this criterion, we pick the bank with the longest relationship with the firm. In case multiple banks satisfy this criterion, we pick the bank with the largest total credit amount outstanding.[12] The resulting dataset is a firm-quarter level panel matched with the firms' main bank information and a dummy variable that indicates the quarters in which a firm experiences a covenant violation.

1.2 Sample Characteristics

We provide summary statistics for the samples we use in our empirical analysis in Table 1. All variables are defined in Table A1. The "origination" sample includes all the loans that satisfy the criteria described in the previous subsection, for a total of 12,046 unique loan observations, as can be seen in the top part of Panel A. Note that information on covenant strictness is more limited relative to other loan terms, such as loan spreads. On average, covenants are set so that a firm has a 28% ex-ante probability of violating at least one covenant as well as an All-In-Drawn Spread of 192 basis points. The average loan package has a maturity of 4 years, amounts to $1 billion, and the average syndicate size (number of lenders) is 9.

The bottom part of Panel A reports information on the borrowers in our sample, which includes 9,596 firm-quarter observations for 1,834 unique firms. These are large, public firms, which average $2 billion in total assets. About 40% of them do not have a long-term issuer credit rating, and for those that have a rating, the average rating is BBB-/BB+.[13] Over our sample period (1996-2019) they enter on average into 8 syndicated loan agreements.

11. An alternative approach to measuring violations would be comparing the covenant thresholds with the underlying financial variables (as in e.g., Chava & Roberts, 2008). However, this approach presents numerous measurement challenges due to non-standardized covenant definitions and covenant thresholds that might change over time, which are unobservable to the econometrician (Badawi, Dyreng, de Fontenay, & Hills, 2021; Dyreng, Ferracuti, Hills, & Kubic, 2021).
12. We show that our analysis does not depend on these assumptions, and our results are robust to focusing only on firm-quarters with only one active credit relationship.
13. Rating is a categorical variable. We assign value 1 to AAA ratings, 2 to AA, and so on. The largest value is 9, assigned to "D" or "SD" indicating default in the Capital IQ Long-Term Issuer Credit Rating.

Panel B of Table 1 summarizes the information on the "violations" sample. This includes all firm-quarters observations that can be matched to an outstanding loan as implied by our pseudo-credit register and that satisfy the sample selection criteria described in the previous subsection, for a total of 58,246 observations. 1.4% of these observations represent new covenant violations, which is of the same order of magnitude as in Nini et al. (2012).[14] As there are more firm-quarter observations compared to the "origination" sample, there are some differences in the firm characteristics, such as in average size or leverage, but overall the two samples are comparable. Firms on average invest $62 million each quarter, which represents 5% of their tangible assets, and the average four-quarter change in investment is around -0.1%, with a standard deviation of 3%.

2 Bank Specialization in the US Syndicated Loan Market

We now describe how we measure banks' industry specialization and provide evidence that points to its salience in the US syndicated loan market.

2.1 Measurement

We measure bank industry specialization employing the approach proposed by Paravisini et al. (2023) and Blickle et al. (2023). A bank is specialized in lending to a specific industry if it displays an abnormally large loan portfolio share to that industry. Looking at the relative portfolio shares captures the intuitive and theory-grounded idea (Boyd & Prescott, 1986) that the portfolio of a specialized bank should not be representative of the portfolio of the population of banks in the economy. The reasoning, as argued by Paravisini et al. (2023), is the following: if a bank has a comparative lending advantage towards an industry, that will result in a large lending share to that industry by revealed preferences. However, as the industry share in a bank's loan portfolio depends also on industry size, looking at the absolute loan portfolio share is not informative; what matters is a bank's loan portfolio share relative to that of other banks.

Specifically, bank specialization is defined as the bank's portfolio share relative to the portfolio

14. In their sample from 1997 to 2008, they have 2% of their observations corresponding to a new covenant violation.

share of a bank that has a perfectly diversified loan portfolio, i.e., that is perfectly representative of the industry size distribution in the economy. Formally:

$$Specialization_{i,b,t} = \frac{S_{i,b,t}}{S_{i,t}} \tag{1}$$

$$\text{where } S_{i,b,t} = \frac{AmountLent_{i,b,t}}{\sum_{i=1}^{I} AmountLent_{i,b,t}} \text{ and } S_{i,t} = \frac{AmountLent_{i,t}}{\sum_{i=1}^{I} AmountLent_{i,t}}$$

where $S_{i,b,t}$ denotes the share of outstanding credit to industry i in bank b's total lending portfolio at time t, and $S_{i,t}$ is the share of total credit to sector i at time t, both averaged over a rolling window of 12 quarters.[15] This averaging reduces the influence of those industries whose portfolio shares are only sporadically larger (or smaller) in banks' lending portfolios or the entire loan market, and it ensures we adequately capture the presence of comparative lending advantages, in line with Paravisini et al. (2023).[16]

Our measure of specialization aims to capture comparative advantages in lending to different industries, which from an economic perspective represent sets of specific types of projects in the economy. To get as close as possible to this notion of industry, we rely on the Text-Based Fixed Industry Classification (TFIC) developed by Hoberg and Phillips (2010, 2016). The TFIC is based on textual data to track the products (types of projects) that characterize each firm's core business activity. Then, each year it classifies firms as belonging to a specific cluster (industry) based on the similarity of the firms' core activities. This dynamic allocation to different clusters of similar firms (industries) represents a major advantage compared to a static NAICS or SIC industry definition. In our analysis, we employ the 25-industry version of the TFIC, as this ensures a good balance between the number of firms per industry present in our final sample and sufficient precision in the characterization of the different sets of projects in the economy.

To further characterize specialization in the syndicated loan market we also rely on the Herfindahl-Hirschman Index (*HHI*) of a bank's loan portfolio, which gives us a bank-level

15. Using different time windows does not change our results, as shown in Section 6.
16. Despite this averaging, sporadic abnormally large loans could still lead to large right-tails in our measure of specialization, which can distort our estimations. We address this concern by showing that our main results are unchanged if instead of the ratio between $S_{i,b,t}$ and $S_{i,t}$, we use the difference $S_{i,b,t} - S_{i,t}$ as an alternative measure of specialization. See Section 6.

measure of portfolio concentration. In particular, we use it to compare the lending portfolio of the average bank in the syndicated loan market with the overall market portfolio in terms of industry concentration. For a bank b at time t, the *HHI* is defined as follows:

$$HHI_{b,t} = \sum_{i=1}^{I} S_{i,b,t}^2 \tag{2}$$

$HHI_{b,t}$ reaches its maximum, 1, in the presence of a perfectly concentrated portfolio—i.e. $S_{i,b,t} = 1$ for only one industry i, and 0 for all the others—and its minimum, $1/I$, in the presence of a perfectly diversified portfolio, i.e. $S_{i,b,t} = 1/I \ \forall i \in I$. We can then compute the average bank's *HHI* by simply taking a weighted average of every bank's *HHI*, in which the weights are represented by a bank's share of total credit, and the *HHI* for the market portfolio by summing all the credit exposures of every bank, as follows:

$$\begin{aligned} HHI_t^{AVGBANK} &= \sum_{b=1}^{B} \frac{AmountLent_{b,t}}{AmountLent_t} \left(\sum_{i=1}^{I} S_{i,b,t}^2 \right) \\ HHI_t^{MKT} &= \sum_{i=1}^{I} S_{i,t}^2 \end{aligned} \tag{3}$$

2.2 Evidence

To understand patterns of industry specialization in the syndicated loan market, we start looking at the measure of loan portfolio diversification. In Figure 1, we plot the *HHI* of the commercial lending portfolio for the average bank and for the market computed for each quarter as in Equation (3). A larger value of *HHI* implies a larger concentration of exposure. Comparing the average *HHI* of the market portfolio (~ 0.07) and that of the average bank (~ 0.105) over time, we see that the average bank is significantly more concentrated than the market. This implies that not every bank is lending to every industry in the same way, providing suggestive evidence of specialization in lending.

Second, we look at specialization by industry. Specifically, our goal is to understand if banks commonly display abnormally large loan portfolio shares in each industry. Figure 2 shows, at four different moments in time, the box-and-whisker plots of the distribution of bank portfolio shares towards each industry i (i.e., $S_{i,b,t}$). Across time the majority of industry portfolio share distributions are skewed to the right and almost every industry displays at least one bank that is

a right-tail outlier (a blue dot, in the plot). Moreover, specialization is persistent. In Figure 3, we plot the autocorrelation function of the relative lending portfolio shares, $Specialization_{i,b,t}$, as defined in Equation (1). We can see that the autocorrelation between the relative portfolio share for bank b to industry i at year t and at year $t+10$ is still 55%. That is, if a bank concentrates its lending to specific industries, the bank is very likely to keep doing the same in the future.

Finally, as Table 1 shows, the average bank's loan portfolio share in an industry is 1.4 times as large as the market's, further pointing to bank specialization in lending as a salient feature of the US syndicated loan market.

3 Industry Specialization and Information Advantages

After documenting clear patterns of specialization, we analyze its implications. First, we examine whether specialization is associated with industry-specific information advantages. For this step of our analysis, we build on the theoretical work by Gârleanu and Zwiebel (2009). Specifically, we consider the strictness of the covenant structure embedded in loan contracts as capturing the information "distance" between a bank and a firm. According to the theory, when banks are closer to borrowers in terms of information, write less strict covenants ex-ante to avoid costly renegotiation ex-post. At the same time, the more restrictive the contract – in terms of what the firm can or cannot do in order not to trigger a technical default by violating a covenant – the less information a bank has about a borrower, all else equal. Thus, by looking at covenant strictness at loan origination, we can directly assess the information distance between industry-specialized banks and firms in that industry.

3.1 Empirical Strategy

To assess systematic differences in covenant strictness at loan origination between specialized banks' core and non-core borrowers, we estimate the following specification:

$$\begin{aligned} Y_{l,f(i),b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot Specialization_{b,i,t-1} \\ + \gamma_F \cdot Firm\ Controls_{f,t} + \gamma_L \cdot Loan\ Controls_{l,f,b,t} + \varepsilon_{l,f,b,t} \end{aligned} \tag{4}$$

where $Y_{l,f(i),b,t}$ stands for covenant strictness of loan l, originated in quarter t, by bank b, to firm

f, operating in industry i. We rely on the measure of covenant strictness developed and made available by Demerjian and Owens (2016), a non-parametric version of the measure proposed in Murfin (2012).[17] Specifically, Demerjian and Owens (2016) define covenant strictness as the *ex-ante* probability of violating at least one *financial* covenant during the lifetime of the loan, ranging from 0 to 100. This measure is characterized by four properties, all valid on an "all else equal" basis. First, it increases in the number of covenants; second, for a fixed number of covenants, it decreases in the initial slack of a covenant, defined as the distance between the level of the covenant threshold and the starting level of the corresponding financial ratio; third, it increases in the volatility of the ratios targeted by covenants; fourth, it decreases in the correlation between covenants—intuitively, since even a single covenant's violation can trigger a technical default, contracting on independent financial ratios increases the probability of violation.

$Specialization_{b,i,t-1}$ is our main variable of interest as defined in Equation (1), the ratio of industry i's share in bank b's lending portfolio (averaged over 12 quarters), relative to industry i's share in the entire lending market (averaged over 12 quarters), at $t-1$. The coefficient of interest, β, captures how covenant strictness varies for contemporaneous loans arranged to sectors in which the bank's pre-set concentration is twice that of the market.

The granular set of fixed effects we include in the estimation of Equation (4) plays a key role in making our estimates as informative as possible. First, we use bank×year-quarter fixed effects ($\alpha_{b,t}$), comparing loans arranged by the *same bank* in the *same year and quarter*, to core and non-core borrowers. Bank-time fixed effects, however, do not fully account for borrower selection problems, as there might still be systematic differences between core and non-core borrowers even within each bank's borrower pool. To alleviate these concerns, we include industry×year-quarter fixed effects ($\alpha_{i,t}$), capturing all time-varying observed and unobserved industry heterogeneity, and firm fixed effects (α_f), controlling for all firm-specific, observable, and unobservable characteristics that are fixed over time. In our most stringent specification, we substitute the firm fixed effect with a bank×firm fixed effect ($\alpha_{b,f}$). In this case, we study the progressive evolution of contracts written within the same bank-firm relationship over time,

17. The measure developed by Demerjian and Owens (2016) can be downloaded on Edward L. Owens' personal website https://sites.google.com/site/edowensphd/researchdata. We thank the authors for making the measure available.

and check whether it differs across core and non-core borrowers while holding the match fixed, thus all match-specific unobservable confounders.[18]

To further limit sources of bias, we account for a wide variety of observable, time-varying borrower and loan characteristics. At the firm level, *Firm Controls*$_{f,t}$ include separate intercepts for each S&P long-term issuer credit rating (with the omitted dummy variable capturing unrated firms), the expected default probability (EDF) based on the Merton model of credit risk (Merton, 1974) and computed implementing the "naive" approach proposed by Bharath and Shumway (2008), as well as the log of total assets, debt to tangible net worth ratio, current ratio, the ratio of property, plant, and equipment to assets, interest coverage ratio, and market-to-book ratio. These controls account for repayment risk (especially for non-rated firms), size, leverage, liquidity, the ability to provide collateral, profitability, and investment opportunities.[19] At the loan level, *Loan Controls*$_{l,f,b,t}$ includes the log of maturity, the log of the loan amount, the fraction of revolving credit over the total package amount, separate intercepts for different loan purposes, and the log of the number of syndicate participants, ensuring that we compare similar contracts. Then, we double-cluster the standard errors ($\varepsilon_{l,f,b,t}$) at the bank and firm levels to account for within-firm and bank correlation.

Finally, we take two further steps to verify that the evidence is in line with an information-advantage explanation of bank specialization. First, we check that our result on covenant strictness does not merely stem from the well-known trade-off between covenants, pricing, maturity, and loan amount (e.g., Bradley & Roberts, 2015). We use these loan characteristics as alternative left-hand variables in Equation (4), documenting all other *ceteris-paribus* differences between core and non-core borrowers' contracts. Second, we test whether loan contracts to core borrowers exhibit greater dispersion in contract terms than non-core borrowers, within a given bank-year pair. Indeed, if more precise information leads to better screening (Stiglitz & Weiss, 1981), we expect specialized banks to better cater to the specific needs of core borrowers and perform greater price and non-price discrimination among them.

18. Ideally, we would also want to account for the firm-time dimension. Nonetheless, here we work with very large loans and even for large firms it is not common to obtain multiple loans at the same time, making a within-firm-time strategy not feasible.

19. The choice of these controls is based on similar studies about the determinants loan covenant strictness (Murfin, 2012; Prilmeier, 2017).

3.2 Results

We first look at how specialized banks write covenants at loan origination. Table 2 reports the results from the estimation of Equation (4) using covenant strictness as outcome. Column (1) includes bank×year-quarter, industry×year-quarter, and firm fixed effects. Column (2) adds firm controls. Column (3) further controls for syndicate and loan characteristics. Finally, column (4) substitutes firm fixed effects with bank-firm fixed effects.

We notice that, in each column, the point estimate on the specialization variable is negative and statistically significant at the 1% confidence level, with a magnitude that remains identical across columns (1) to (3). If a bank's portfolio concentration in an industry is twice that of the market, covenants to core borrowers are about 4 percentage points looser than covenants on similar loans to non-core borrowers. This estimate is economically significant, as it amounts to 10% of the standard deviation of strictness in our sample (see Table 1, first line). Based on these results, specialized banks are closer to their core borrowers in the information space compared to non-core ones.

The increase of the coefficient to 7 percentage points after accounting for confounders at the bank-firm level (column (4)) strengthens such conclusion, and deserves a separate discussion. When restricting our analysis to repeated loans between the same firm and bank, we absorb all bank-firm match specific, time-invariant, observable and unobservable confounders that may bias our estimate. For example, firms that can only start accessing the syndicated loan market through specialized lead arrangers may be smaller, more opaque, and ex-ante riskier. Thus, if we could observe the strictness of contracts they did not write with non-specialized lead lenders, the difference would be even starker. Nonetheless, by comparing the relaxation of covenants when there is repeated borrowing, we can rid the comparison of matches' specifics. Thus, column (4) suggests that not only covenants are overall laxer for core relationships, but they get laxer more quickly when there is repeated borrowing, hinting at the fact that our baseline estimate is a lower bound.

In Table 3, we display results from the first additional battery of tests on ex-ante contract characteristics, using contract terms other than strictness as dependent variables in Equation (4). In columns (1)-(4), we present estimates for the spread over LIBOR, the all-in drawn spread

(AISD), the all-in undrawn spread (AISU), and the measure of the total cost of borrowing (TCB) developed by Berg et al. (2016), all negative and significant except the AISU. In columns (5) and (6), we instead focus on two non-price terms: the log of maturity and the log of loan amount. The impact of specialization on these two outcomes is positive, with only the effect on the loan amount being marginally significant. Overall, our results indicate that specialized banks offer more generous loan terms to their core borrowers, consistent with Blickle et al. (2023).

In Table 4, we present the results for the second battery of tests, which focuses on the dispersion of loan contract characteristics. We estimate how multiple measures of dispersion for loans' strictness (in percentage points, columns (1) - (4)) and AISD (in basis points, columns (5)-(8)) differ within the same bank, in the same year, across core and non-core industries. As expected, all statistically significant results suggest greater dispersion for specialized banks, in line with our expectation of more tailored contracts for core borrowers.

To summarize, we see that banks on average write loan contracts with significantly looser covenants to their core borrowers. Such contracts present greater dispersion in loan terms, suggesting more tailoring, whereas it does not appear specialized banks ask for higher price, or more restrictive maturity or amount, in exchange for allowing their core-borrowers more leeway. In conclusion, the evidence on contract terms at loan origination strongly aligns with explanations of bank specialization based on the existence of information advantages.

4 The Real Effects of Lenders' Information Advantages

The last part of our analysis focuses on identifying the real effects of industry-specific information advantages. In particular, we investigate whether lenders' specialization changes their covenant enforcement decisions regarding corporate investment policies, and assess whether such decisions improve firm performance. Covenant violations represent an ideal setting to study if and how lender industry-specific advantages affect firms' investment, because upon a covenant breach lenders obtain control rights over the firm. Under certain conditions, which we describe below, potential differences in firms' outcomes can thus be attributed to lenders' differential interventions. The reasoning is the following. Covenant violations constitute

"technical defaults", which allow creditors the right to demand immediate repayment of the loan principal. However, creditors rarely execute such threat; rather, they use it to gain bargaining power in the renegotiations that often follow violations. Thus, covenant violations transfer control rights from borrowers to creditors.

4.1 Identification Strategy and Empirical Model

Our empirical exercise aims to compare how firms' outcomes following covenant violations are driven by lenders' industry specialization. To ascertain the impact of banks' specialization on covenant enforcement decisions, we estimate the following empirical model at the firm-quarter level:

$$\begin{aligned} Y_{f,t+4} - Y_{f,t} = {} & \theta_1 Specialization_{b,i,t} \times Violation_{f,t} \\ & + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} \\ & + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \alpha_{fiscal\ qtr} + \varepsilon_{f,t} \end{aligned} \tag{5}$$

where the dependent variable is the difference in firm f's outcomes from t to $t+4$. Our focus is corporate investment, measured as capital expenditures scaled by tangible fixed assets as in Chava and Roberts (2008). We also look at the effect on firms' operating performance and default risk. Turning to our variables of interest, $Specialization_{i,b,t}$ is the specialization of bank b in industry i at time t, defined in Equation (1). $Violation_{f,t}$ equals to 1 if firm f violated a financial covenant in year-quarter t, and to 0 otherwise. As in Nini et al. (2012), we focus exclusively on new violations, i.e. violations by firms that have not violated any covenant in the previous four quarters. The coefficient of interest is θ_1, which measures the difference in violation outcomes between specialized banks' core and non-core borrowers.

There are several identification challenges in the estimation of θ_1. First, we need to separate the effect of violations from the expected changes in investment and performance associated with differences in firms' fundamentals across violators and non-violators. We address this issue following the "quasi discontinuity" approach implemented by Roberts and Sufi (2009) and Nini et al. (2012), subsequently used to identify various effects of creditors' intervention on firms' outcomes (e.g. Becher et al., 2022; Ersahin et al., 2021). We compare similar firms above and below the relevant covenant threshold by flexibly controlling for a wide range of

firms' characteristics on which covenants are bargained upon—the same firm-level controls as in Equation (4)—and pre-violation trends in firms' assets and tangible assets (Nini et al., 2012), which capture at least part of the expected time-series path of outcomes.[20] Furthermore, we take the within-firm four-quarter difference in the outcomes of interest, removing any firm-level fixed differences across violators and non-violators. We also include industry×year-quarter ($\alpha_{i,t}$) and fiscal-quarters fixed effects ($\alpha_{fiscal\ qtr}$) to account for industry heterogeneity and seasonal patterns in investment.

Second, we need to ensure that any observed differences in outcomes depending on lenders' specialization do not merely reflect the potential correlation between violation outcomes and the interplay of firm characteristics and banks' specialization (Chodorow-Reich & Falato, 2022). To this end, our regression includes interactions between all the above-mentioned firm characteristics and banks' specialization ($X_{f,t} \times Specialization_{b,i,t}$). Furthermore, we account for any bank-specific factors by including bank×year-quarter fixed effects, comparing violators and non-violators across core and non-core borrowers of the same bank.

Finally, our estimate might still be biased by ex-ante differences in the probability of violating a covenant. In fact, we have shown that covenants from specialized banks to core borrowers are slacker. Nonetheless, greater slackness implies that the missteps that led to violations were more notable, making the violations by core borrowers worse. For this reason, the intervention by specialized banks might be harsher when their core borrowers violate ex-ante less strict covenants even if such banks are better at handling their core borrowers' violations. Therefore, the bias we face is against finding evidence of core-borrowers' better outcomes, bolstering the economic significance of a positive finding.

4.2 Results

We now turn to investigating the implications of lenders' specialization for covenant enforcement decisions.

20. In our robustness tests, we further control for continuous functions of these firms' variables as well as their lagged versions.

4.2.1 The effects on corporate investment

We begin our analysis by graphically inspecting whether a covenant violation has a different effect on investment for core borrowers of specialized banks relative to other borrowers. Figure 4 plots the results for all covenant violations in our sample. For graphical purposes, we define specialized banks as those that are in the fourth quartile of the 12-quarter averaged portfolio share distribution in a given industry. We plot in red the average/median investment levels of specialized banks' core customers four-quarter before and after violations, while in dashed blue that of all non-core customers. We can see that the difference in investment levels between the two groups starts to increase and grows over time after a covenant violation, whereas it is negligible before. Specifically, investment levels decrease in the first quarter post-violation for both groups, but the decrease is clearly stronger for non-core borrowers. After the first quarter, investment levels start to increase for both groups, but the recovery is more dramatic for core borrowers.

Our unconditional evidence indicates that core borrowers of specialized banks experience smaller declines in investment following covenant violations. Nonetheless, as discussed in the previous section, there are several concerns in simply comparing the post-violation investment outcomes based on lenders' specialization, which is why we now turn to our regression analysis focusing on new violations. Table 5 presents the results from the estimation of Equation (5) using the four-quarter differences in investment as the dependent variable. As a sanity check, column (1) first reports the estimates without the interaction between the violation and specialization measures, and replicates the standard result that a shift in control rights induces more conservative policies on violating firms (Chava & Roberts, 2008). Reassuringly, the point estimate on the violation dummy indicates that violating firms experience a 40 basis points decline in investment growth, with respect to non-violating borrowers of the same bank, within the same industry. The result is statistically and economically significant, amounting to about 10 percent of the standard deviation in investment changes.

Then, starting with column (2), we present the estimates from the interacted model, where we account for core borrowers separately from the rest. In the first row, we see that for each bank, industry, and time, the change in investment is 82 basis points smaller for new violators that

borrow from banks that have no previous exposure to that industry. The coefficient is still highly statistically significant, while its size is more than doubled, amounting now to one-quarter of a standard deviation. In the third row, we see that this negative impact decreases in magnitude as specialization increases. Considering that for non-core borrowers whose bank has the same exposure as the market ($Specialization = 1$) the reduction in investment amounts to 0.51% of tangible assets, the drop in investment is 60% (0.31/0.51) smaller in magnitude for firms in industries in which their bank is twice as specialized as the market. In further columns, we progressively saturate the regression with firm controls (column (3)), their pre-violation yearly changes in assets and tangible assets (column (4)), and the interactions of our specialization measure with firm controls (column (5)), as well as with pre-violation changes (column (6)). The significance of our estimates is unaffected, with almost no change in the magnitude.

From this table, we learn that the real effects of sudden changes in control rights allocation, induced by covenant violations, display an economically important heterogeneity. We infer that such heterogeneity is strongly influenced by the lender's specialization in the borrower's industry. Specifically, specialized banks require significantly less financial conservatism from their core-customers through their information advantages, leading to lower declines in investment for core-borrowers.

4.2.2 The effects on corporate performance

In addition to investment, we also examine the effect of bank specialization on firms' performance following covenant violations. Indeed, we want to make sure that the less severe intervention we document cannot be possibly related to a reduction in future firm performance. That is, we want to be sure that the less severe intervention by specialized banks stems from their information advantages, not from their leniency.

To understand whether this is the case, in columns (1) and (2) of Table 6, we first look at the effect on accounting-based measures of performance: the ratio of operating cash flow to assets and the natural log of sales. The point estimates on the interaction term are positive and significant for both outcomes. In column (3), we then look at the impact on the firm's expected default probability, which accounts for market performance, providing an external, third-party validation of the value of banks' interventions. The coefficient of the interaction

term is negative and significant. Numerically, these results imply that core borrowers of a bank twice as specialized in one industry experience a 55% smaller drop in cash flows over average assets, a 27% smaller drop in sales growth, and a 25% smaller increase in the expected default probability compared to non-core borrowers, i.e. firms in industries in which the same bank has the same exposure as the market.[21] Logically, they suggest that the greater leeway granted to core borrowers translates into more operational continuity for firms, and that market-based information points to better chances of survival.

Overall, the results indicate that, following a covenant violation, core borrowers of specialized banks on average suffer smaller drops and a swifter recovery in investment, with smaller negative impacts on performance than non-core borrowers. Such evidence suggests that specialized banks better help borrowers improve outcomes when they obtain control rights, signifying positive real effects of specialization that operate through the lenders' influence on firms' corporate governance.

5 Assessment of Alternative Explanations

In this section, we discuss whether the results presented in Tables 2 and 5 could be explained by other reasons than information advantages of specialized banks. We explore three other economic mechanisms that may explain at least in part our results: (i) insurance incentives stemming from a high industry market share; (ii) local knowledge spillovers implied by geographical, rather than industrial, specialization; (iii) the presence of borrower-specific knowledge (i.e., relationship lending). Then, focusing on the outcomes of covenant violations, we deepen our analysis to understand whether we may be observing a specific case of zombie lending.

21. The standalone coefficient on violation indicates the effect of a covenant violation for borrowers whose bank has no previous exposure to that industry, i.e. $Specialization = 0$. The magnitudes presented in this section are obtained by comparing violation outcomes of firms in industries in which the bank has the same exposure as the market ($Specialization = 1$) with firms in industries in which the bank has twice the exposure as the market ($Specialization = 2$).

5.1 High Industry Market Share

First, banks that are specialized in lending towards a given industry might also provide a relatively large share of credit to that industry, i.e. not only the *relative* concentration is high, but also the *absolute* credit provided is. This would point to at least two other potential explanations for our results. On the one hand, if specialization is driven by an industry-specific information advantage, it may itself result in a higher market share. Banks could offer favourable credit terms to crowd out other lenders from a given industry (as in Ioannidou & Ongena, 2010), thereby increasing both their industry market share and their industry portfolio share. If this is the case, the observed effect on contract terms could be driven by the bank's industry market share and not by specialization.

On the other hand, banks with a high market share might have incentives to offer better contract terms to borrowers for reasons unrelated to an information advantage. Specifically, Giannetti and Saidi (2019) show that banks with a high market share in an industry are more likely to internalize negative spillovers and possible systemic effects of tougher credit conditions in that industry in periods of distress. For analogous reasons, banks might have incentives to write less strict contracts, decreasing the probability of triggering covenant violations that might be costly for borrowers operating in industries where they have a high market share.

To address these concerns, we estimate Equation (4) with the variable $\textit{Market Share}_{b,i,t}$, defined as the fraction of credit that bank b provides to industry i relative to the total credit supplied to the industry by all banks in quarter t, averaged over 12 quarters as our baseline measure of specialization. As shown in column (1) of Table 7, the estimated coefficient for industry *market share* on covenant strictness is positive and statistically significant at the 1% confidence level. A 10% greater industry market share implies 4 percentage points stricter covenants within the same bank and at the same time, which is consistent in sign and magnitude with the evidence provided by Gorostiaga (2022).[22] Moreover, controlling for industry market share increases the estimated effect of specialization on covenant strictness by about 70%, indicating that the correlation between market power and specialization may be a relevant source of downward bias.

22. A 10% increase in the bank industry market share is an economically significant variation to consider, being very close to the market share's standard deviation of 14%.

Additionally, we estimate Equation (5) with *Market Share* as a control and its interaction with the violation dummy. As illustrated in Column (1) of Table 8, the point estimates on these variables are not significant, suggesting that market power does not have an effect on bank monitoring following violations. At the same time, the coefficient of *violation*×*specialization* is essentially the same as our baseline result (see Table 5).

5.2 Geographical Proximity

Second, the literature points to the role of geographic distance as an important proxy for the degree of asymmetric information between borrowers and lenders. Loans have been shown to feature more favourable terms when borrowers are geographically closer to lenders (Agarwal & Hauswald, 2010; Degryse & Ongena, 2005), even in the presence of large corporations (Hollander & Verriest, 2016).

We are thus concerned that a bank is specialized in an industry because of lending to specific locations that feature business concentration in that industry and that are geographically close to the bank's headquarters. This geographical proximity between banks and firms in specific industries might in turn explain our results. If this is the case, we would still interpret our results in light of the information advantage of these banks. However, this advantage would not stem from an industry-specific expertise, but from the acquisition of soft information based on geographical proximity.

To address this issue, we estimate Equations (4) and (5) including a dummy variable, $Same\ State_{f,b,t}$, equal to 1 if bank b and firm f are headquartered in the same state in quarter t, and to 0 otherwise.[23] The results are presented in Column (2) of Tables (7) and (8) for the covenant *strictness* and *violation* analyses, respectively. In these tables, the point estimates on the *same state* dummy as well as its interaction with the violation dummy are not significant, while our estimated coefficients of interest remain significant and stable in magnitude. In conclusion, the risk of confusing geographical and industry expertise seems small.

23. We use the historical data on firm and bank locations collected from the SEC filings by Bai et al. (2020) and Gao et al. (2021), and supplement them with Compustat header information when missing.

5.3 Relationship Lending

Third, one could argue that the industry-specific information advantage could originate from an information advantage that is borrower-specific. This would be consistent with widespread "relationship lending" (Boot, 2000). For example, Bharath et al. (2011) and Prilmeier (2017) specifically show that relationship lending matters for the determination of covenants and other contract terms in syndicated loan agreements.

To explore the role that borrower-specific information might have on our results, we define two measures, also employed by Bharath et al. (2011) and Prilmeier (2017). The first one, *Rel. Length*$_{f,b,t}$, denotes the length of a relationship, i.e. the time elapsed between period t and the first interaction between firm f and bank b in DealScan. The second one, *Rel. Intensity*$_{f,b,t}$, captures the intensity of a relationship, i.e. the fraction of total credit to firm f from bank b over the last 3 years prior to the loan inception date t.

We estimate Equations (4) and (5) by interacting these two measures with our main variables of interest. Tables (7) and (8), in Columns (3) and (4), report the results from these regressions. Across all specifications, the point estimates on our main variables are virtually unchanged and remain statistically significant, validating the hypothesis that banks have an information advantage that stems from industry-specific expertise and not only from borrower-specific information.

5.4 Zombie Lending

Finally, our results on differential covenant enforcement by specialized lenders could reflect evergreening, or zombie lending, that is a situation in which a bank keeps lending to firms close to default to avoid recognizing loan losses on its balance sheet. In a recent contribution, Faria-e Castro et al. (2024) suggest that banks with a large share of a firm's debt treat that firm more favorably in situations of financial distress. To the extent that industry-specialized banks might represent a large source of credit for their core borrowers, and that covenant violations might be correlated to financial distress, this mechanism could represent an alternative explanation for our findings.

We show that this explanation is unlikely to drive our results. In Table 9, we conduct an het-

erogeneity analysis based on several proxies of firm quality, such as expected default probability, firms' leverage, and interest coverage ratios. Specifically, we are interested in understanding whether the smaller drop in investment following specialized' lenders intervention after covenant violations is driven by firms characterized by worse fundamentals. To this end, in our baseline specification described in Equation (5) we include a triple interaction terms between specialization, violation status, and a dummy that takes value 1 if the firm is below the median sample value of EDF (Column 1), leverage (Column 2), and interest coverage ratio (Column 3). Across the three columns of Table 9 we can see that the estimate on the trile interaction is negative, and statistically significant for two out of the three measures of firm quality, whereas the coefficient on the interaction between specialization and violation status is still positive and highly significant. This indicates that our results are driven by firms far from financial distress, inconsistent with an evergreening motive.

6 Additional Results and Robustness Checks

In the following, we carry out a battery of robustness tests for both our ex-ante and ex-post results, as well as a placebo test for our ex-post result.

Covenant-lite contracts. From the onset of the 2007-8 financial crisis, the share of leveraged, covenant-light (i.e., covenants with weaker enforcement) loans increased dramatically and the coverage of financial covenants offered by Dealscan appears to have decreased in quality (Bräuning, Ivashina, & Ozdagli, 2022). Such trends may be behind our results. For example, even if overall concentration did not rise (Figure 1), more specialization may have arisen in specific industries and, while specialized banks' terms for core customers as well as their treatment of violations were not really different, they just lent more during the covenant-light period adopting loan boiler-plates less restrictive than the tailored loans of the past.

This explanation sounds unlikely, as all our comparisons are cross-sectional within each bank and industry due to our fixed effects. Moreover, there is insofar no evidence that covenant-light contracts have different real effects (Bräuning et al., 2022). Nonetheless, we re-estimate Equations (4) and (5) by interacting our main variables of interest with the *covenant-lite period* dummy which is equal to 1 for the period of 2008-2019, and to 0 otherwise.

Table A2 documents the analysis for the ex-ante results. We can see that, first, what we fear is not in the data, as the baseline coefficient remains negative and strongly significant, while the interaction with the post-2007 dummy is never negative and significant. Second, we note that core borrowers' contract terms became more restrictive after 2007, albeit noisily so. Nonetheless, after accounting for contract characteristics, joint pre-post core customers strictness stays significantly smaller (Columns (2) and (3)). Third, Column (4) suggests that, while core borrowers' covenants are still laxer overall, repeated core borrowers' terms stopped relaxing more quickly after 2007. This change in comparative strictness' *dynamics* may in part be attributed to the shorter length of the sample, which allows us to documen t less repeated borrowing, but still suggests a greater degree of standardization even among the products that specialized lead arranger propose to their core customer. In any case, whatever the changes in contracts' nature across core and non-core, Table A3 documents that there is still no evidence of their real effects. Across all specifications, our baseline coefficient (line 4) remains unaltered, while the triple interaction (line 6) is never significant.

Using different rolling windows to measure specialization. Our results remain unchanged if we re-calculate bank specialization by averaging industry portfolio shares over 1, 2, 4, or 5 years, instead of 3 years. As seen in Table A4 and Table A5, the effect of the specialization variable on covenant strictness, as well as on investment after a covenant violation, is very similar in both economic magnitude and statistical significance across specialization measures calculated using rolling windows of different lengths.

Constructing loan shares. Our results are also robust when we attribute loan shares to lead arrangers by using different loan samples or different methods. In Tables A6 and A7, we present the results of re-estimating Equations (4) and (5) using a measure of specialization calculated by: In column (1), not dropping loan contracts that are likely to be restatements of existing loans; in column (2), using only loans originated from 1996 onward; in column (3), excluding term loans B, as these are most likely to be sold to institutional investors; in column (4), by attributing loan shares to lead arrangers using the approach by Chodorow-Reich (2014); in column (5), by attributing loan shares to lead arrangers using the method by Doerr and Schaz (2021); in column (6), by attributing loan shares to lead arrangers using the approach by De Haas and Van Horen (2013). In all cases, the estimates are very similar to the baseline

results, both in economic magnitude and statistical significance.

Different measure of specialization. One further concern is that our measure of specialization may put a lot of weight on industries that account for little of total credit. In these industries it is indeed easier for a single lead arranger to appear overexposed. If results are only driven by such cases, we may end up doubting the economic relevance of our estimates. To address this concern, we employ "excess" specialization, from Blickle et al. (2023), obtained by the difference between the bank's portfolio concentration in a given industry and the entire market's concentration in the same industry. More formally, we define this measure as:

$$\textit{Excess Specialization}_{i,b,t} = S_{i,b,t} - S_{i,t}$$

This choice allows us to decrease the weight of industries that account for small fractions of total granted credit compared to our *relative* (baseline) specialization measure.[24] To use a reasonable variation, we consider a change of the *Excess Specialization* variable by 10%. This can, e.g., result from looking at the differences in the strictness of contracts written by a bank that has a portfolio concentration twice as large as the entire market's concentration in a given industry, while that industry absorbs 10% of total market credit at that point in time. Tables A8 and A9 respectively show that such variation (i) correlates with covenants that are around 4 percentage points looser at origination and (ii) leads to around 6 basis points smaller decline in investment after a covenant violation for core borrowers. The first result is in line with our baseline, while the second is almost double in size, suggesting that the lighter touch on violations is especially evident in industries that account for larger portions of total credit.

Results on the violation analysis with additional controls. Our identification strategy for Equation (5) hinges on thoroughly accounting for smooth changes in firms' and credit relationships' characteristics, so that the violation dummy only tracks the impact of the discontinuous transfer in control rights. Our different specifications in Table 5 already suggest that this is not the case, but in Table A10 we go one step further and account progressively for polynomials of order 2 and 3 of our controls, for their lags, and for the interaction between all these additional

24. To give an example, assume that Bank A (Bank B) lends 10% (6%) of its total portfolio to Industry A (Industry B), while market-wide lending to Industry A (Industry B) accounts for 5% (1%). According to our baseline (relative) measure of bank specialization, Banks A and B are specialized in Industries A and B by factors of 2 and 5, respectively. However, both banks' excess specialization is equal (5%) even though the ideal shares for these industries stemming from diversified portfolios are different.

variables and specialization. We see that, except for some increase in noise, our results only slightly decrease in magnitude and stay significant.

Placebo test on the violation analysis. To confirm the credibility of our results in Table 5, we conduct a placebo test assuming that a violation happens four quarters before an actual violation. Specifically, for this analysis, we generate a placebo violation dummy that takes value 1 for four quarters before each new violation, 0 for all other non-violation quarters. As shown in Table A11, the effects of placebo violations, as well as their interactions with specialization, are not significant. That our results disappear when we deliberately misclassify violations confirms the credibility of our baseline results.

Results on the violation analysis by focusing on firms that violated a covenant before. Another concern would be that violators and non-violators might have inherent differences and thus might invalidate the comparison. To address this, we focus only on firms that violated a covenant at least once during our sample period (as in Chava & Roberts, 2008). Nevertheless, as presented in Table A12, our results are very close to our baseline estimates in Table 5.

Results on the violation analysis with single-bank firms. To conduct our *violation* analysis, we link covenant violations to firms' lead lenders by relying on bank-firm relationships in Dealscan. As a benchmark, we make certain assumptions to match violations to a single lender when the firm has multiple lead lenders in a given quarter (see Section 1.1 for details). In Table A13, we show that our results hold without those assumptions, when we focus only on firms with a single lead lender, for which violations can be straightforwardly attributed.

7 Final Remarks

This paper documents that bank specialization in servicing determinate borrower types is common in the US syndicated loan market, that it comes with different contract characteristics, and that it has positive real effects for borrowers. Lenders whose loan share in an industry is larger than the average banks' loan share write laxer covenants to their core customers. Such laxer covenants are not compensated by tighter pricing, loan amounts, or maturity, and come with greater contract terms dispersion, as we would expect if there was greater tailoring to cater to borrowers' need. Finally, when covenant violations suddenly increase lenders' control

rights over borrowers, core borrowers' investment decreases by half as much as the non-core borrowers', with better overall firm performance.

Such results are relevant to the economic debate on bank specialization for two reasons. First, theory suggests that covenant tightness is a valid empirical measure of the information distance between a lender and a borrower. The greater the tightness, the further the information distance. As such, syndicated lending allows for a direct test of theories of lender specialization predicated on comparative information advantage. Our evidence on loan contracts supports that lenders *relative* concentration in catering to specific borrowers is likely to stem from such lenders being closer in the information sense and not, for example, from them trying to maximize the value of deposit insurance by exposing themselves to greater risks. Second, by investigating how the effects of covenant violations differ between core and non-core borrowers, we propose a novel, well identified channel for the real effects of lending specialization, substantiating the wide economic relevance of the phenomenon.

Our work points to a specific case in which credit market structure is a crucial driver not only of the price and quantity of credit, but also of the way lenders get to design and wield control rights on their borrowers. In the case of specialization, we find strong positive effects for borrowers, but we wish to end on a word of caution. That we document how specialized banks may be better at managing their preferred assets should not be read as an overall vindication of specialization as a superior business model in the credit industry. For example, deposit concentration played a role in the demise of SVB bank in March 2023, and specialization in serving tech corporate borrowers may have caused such concentration at least in part. In conclusion, we present here strong evidence on the positive asset-side effects of specialization, but we point to the liability-side effects as a promising area for future research.

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Tables

Table 1. Descriptive Statistics

This table reports the descriptive statistics for "origination" and the "violations" sample after applying the selection criteria described in Section 1. The top part of Panel A refers to loan-level observations. The bottom part of Panel A and Panel B refer to firm-quarter-level observations. All variables are described in Table A1. Changes in: Investment, Operating Cash Flows / Avg. Assets, Log(Sales), EDF represent the difference between the variable at $t+4$ and at t.

	Mean	Std. Dev.	25thPct.	50thPct.	75thPct.	Obs.
PANEL A: ORIGINATION SAMPLE						
Loan variables						
Covenant Strictness	28.628	38.889	0.300	4.400	65.700	6,637
All-In Drawn Spread	192.523	119.809	110.000	175.000	250.000	11,823
All-In Undrawn Spread	28.815	17.553	15.000	25.000	40.000	8,111
Loan Amount ($B)	1.003	2.233	0.169	0.400	1.000	12,046
Maturity (Months)	49.965	20.916	36.000	60.000	60.000	11,901
TCB	125.358	120.810	43.318	86.210	162.323	5,291
Spread	192.032	135.698	100.000	168.333	250.000	11,602
N. Lenders	9.147	7.488	4.000	7.000	12.000	12,046
Revolver Fraction	0.685	0.412	0.249	1.000	1.000	12,046
Specialization	1.340	1.379	0.818	1.051	1.460	11,052
Firm variables						
Ln(Assets)	7.805	1.584	6.689	7.747	8.920	9,596
EDF	0.036	0.139	0.000	0.000	0.000	9,596
Tangibility	0.364	0.261	0.132	0.302	0.583	9,596
Leverage	0.416	3.862	−1.026	0.620	1.523	9,596
Current Ratio	1.707	0.974	1.013	1.493	2.137	9,596
Ln(1+Int. Cover. Ratio)	2.224	0.926	1.584	2.064	2.725	9,596
Market-to-Book	1.620	0.796	1.087	1.373	1.887	9,596
Rated	0.602	0.490	0.000	1.000	1.000	9,596
Rating	4.537	1.059	4.000	5.000	5.000	5,774
N. Loans	7.948	5.999	4.000	7.000	10.000	9,596
PANEL B: VIOLATIONS SAMPLE						
Violation	0.014	0.117	0.000	0.000	0.000	58,246
Specialization	1.409	1.536	0.825	1.063	1.480	55,139
Ln(Assets)	7.361	1.582	6.312	7.377	8.434	58,246
EDF	0.048	0.159	0.000	0.000	0.001	58,246
Tangibility	0.338	0.254	0.123	0.263	0.530	58,246
Leverage	0.336	3.762	−1.009	0.512	1.377	58,246
Current Ratio	1.871	1.047	1.132	1.650	2.330	58,246
Ln(1+Int. Cover. Ratio)	2.289	0.970	1.613	2.148	2.814	58,246
Market-to-Book	1.606	0.800	1.080	1.368	1.858	58,246
Investment	0.051	0.039	0.025	0.041	0.066	57,880
CapEx ($M)	62.628	117.189	4.030	14.736	54.328	57,887
Tangible Assets ($B)	1.728	3.299	0.098	0.371	1.438	58,246
Change in Investment	−0.001	0.034	−0.013	−0.000	0.011	55,951
Change in Oper. Cash Flow / Avg. Assets	−0.004	0.047	−0.018	−0.000	0.015	55,191
Change in Log(Sales)	0.048	0.252	−0.029	0.056	0.138	56,346
Change in EDF	0.005	0.177	−0.000	0.000	0.000	52,889

Table 2. The Effect of Bank Specialization on Covenant Strictness

This table reports the estimates of the coefficients from the following regression:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot Specialization_{b,i,t-1} + \gamma_F \cdot Firm\ Controls_{f,t} + \gamma_L \cdot Loan\ Controls_{l,f,b,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is the measure of covenant strictness for loan l contracted in year-quarter t by bank b to firm f. $Specialization_{b,i,t-1}$ is the ratio of bank b's portfolio share in industry i at quarter $t-1$ (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter $t-1$ (averaged over a rolling 12-quarter window). Firm controls include those reported in the table, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. Loan controls include those reported in the table, plus separate intercepts for different loan purposes (Corporate Purposes, Working Capital, Debt Repayment, Takeover, CP Backup). All variables are described in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Covenant Strictness			
	(1)	(2)	(3)	(4)
Specialization	−3.613***	−3.802***	−3.872***	−7.135***
	(−3.00)	(−3.00)	(−3.28)	(−4.31)
Ln(Assets)		1.306	1.246	3
		(1.13)	(0.89)	(1.63)
EDF		19.99**	19.02**	5.763
		(2.63)	(2.49)	(0.66)
Tangibility		−25.31***	−25.05***	−32.69***
		(−2.75)	(−2.89)	(−5.52)
Leverage		−.2047	−.1863	−.2396**
		(−1.62)	(−1.45)	(−2.16)
Current Ratio		−3.304***	−3.274***	−3.677***
		(−3.39)	(−3.45)	(−3.09)
Ln(1+Int. Cover. Ratio)		−16.46***	−16.42***	−19***
		(−12.0)	(−12.8)	(−13.4)
Market-to-Book		−2.494	−2.552	−1.838
		(−0.87)	(−0.92)	(−0.70)
Ln(Loan Maturity)			.5464	−1.104
			(0.35)	(−0.54)
Ln(Lenders)			−1.201	−.4985
			(−1.00)	(−0.38)
Ln(Loan Amount)			.4558	−.7226
			(0.32)	(−0.31)
Revolver Fraction			1.652	3.584
			(0.73)	(1.53)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Bank × Firm FE	*No*	*No*	*No*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*No*
Rating Dummies	*No*	*Yes*	*Yes*	*Yes*
Loan Purpose Dummies	*No*	*No*	*Yes*	*Yes*
Adj. R^2	.503	.566	.566	.576
Obs.	4,180	4,180	4,180	3,258

Table 3. The Effect of Bank Specialization on Other Contract Terms

This table reports the estimates of the coefficients from the following regression over the full sample from 1996 to 2019:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot Specialization_{b,i,t-1} + \gamma_F \cdot Firm\ Controls_{f,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is one of the variables reported below for loan l contracted in year-quarter t by bank b to firm f. $Specialization_{b,i,t-1}$ is the ratio of bank b's portfolio share in industry i at quarter $t-1$ (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter $t-1$ (averaged over a rolling 12-quarter window). Firm controls include those reported in Table 2, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are described in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Price Terms				Non-Price Terms	
	(1) Loan Spread	(2) AISD	(3) AISU	(4) TCB	(5) Maturity	(6) Loan Amount
Specialization	−6.03***	−3.96**	.14	−9.12*	.011	.037**
	(−2.96)	(−2.43)	(0.51)	(−1.89)	(1.06)	(2.50)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Adj. R^2	.636	.673	.742	.617	.321	.687
Obs.	8,981	9,115	5,649	3,618	9,115	9,115

Table 4. Bank Specialization and Dispersion of Key Contract Terms

This table reports the estimates of the coefficients from the following regression over the full sample from 1996 to 2019:

$$Y_{b,i,t} = \alpha_{b,t} + \alpha_{i,t} + \beta \cdot SpecializationY_{b,i,t} + \varepsilon_{b,i,t}$$

where $Y_{i,b,t}$ is one of the measures of dispersion of either covenant strictness or All-In Drawn Spread as indicated in the columns below, calculated using the distribution of all loans by bank b to industry i in year t. $SpecializationY_{b,i,t}$ is the yearly average (from quarter Q4 of year $t-1$ to Q3 of year t) of the quarterly ratios of bank b's portfolio share in industry i (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter $t-1$ (averaged over a rolling 12-quarter window). t statistics (in parentheses) are obtained from clustering at the bank level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Covenant Strictness				All-In Drawn Spread			
	(1) Max - Min	(2) Range InterQrt.	(3) Std. Dev.	(4) Kurtosis	(5) Max - Min	(6) Range InterQrt.	(7) Std. Dev.	(8) Kurtosis
Specialization (Y)	2.072***	1.08*	−.0371	.0475*	7.753***	.3396	.9662*	.0758***
	(3.26)	(1.73)	(−0.13)	(1.99)	(4.66)	(0.44)	(1.84)	(4.04)
Bank × Year FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × Year FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Adj. R^2	.24	.117	.146	.153	.245	.072	.084	.298
Obs.	2,890	2,890	2,020	1,928	3,311	3,311	3,255	3,178

Table 5. Bank Specialization and Firm Investment: Analysis of Covenant Violations

This table reports the estimates of the coefficients from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter t to $t+4$. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter t, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank b's portfolio share in industry i at time t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter difference in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Violation	$-.0039^{***}$	$-.0082^{***}$	$-.0088^{***}$	$-.0084^{***}$	$-.0085^{***}$	$-.0082^{***}$
	(−3.15)	(−5.40)	(−5.77)	(−5.52)	(−5.68)	(−5.32)
Specialization	$9.5e-05$	$5.0e-05$	$-2.5e-05$	$-5.3e-05$	$.0023^{*}$	.0016
	(0.45)	(0.24)	(−0.12)	(−0.26)	(1.81)	(1.17)
Specialization × Violation		$.0031^{***}$	$.0031^{***}$	$.0031^{***}$	$.003^{***}$	$.003^{***}$
		(3.92)	(4.04)	(3.95)	(3.91)	(3.56)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*No*	*No*	*Yes*
R^2	.12	.12	.122	.137	.122	.138
Obs.	52,517	52,517	52,517	52,517	52,517	52,517

Table 6. Bank Specialization and Firm Performance

This table reports the estimates of the coefficients from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the change from year-quarter t to $t+4$ of the variable indicated in each column. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter t, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank b's portfolio share in industry i at quarter t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter difference in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1) Change in Oper. Cash Flow / Avg. Assets	(2) Change in Log(Sales)	(3) Change in EDF
Violation	$-.009^{***}$	$-.0481^{**}$	$.0484^{***}$
	(−3.12)	(−2.37)	(5.87)
Specialization	$7.4e-04$	−.0024	$4.7e-04$
	(0.32)	(−0.37)	(0.100)
Specialization × Violation	$.0032^{**}$	$.0102^{*}$	$-.0098^{**}$
	(2.32)	(1.73)	(−2.18)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*Yes*	*Yes*	*Yes*
Firm Controls × Spec	*Yes*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*Yes*	*Yes*	*Yes*
R^2	.201	.293	.512
Obs.	51,657	52,755	49,501

Table 7. Bank Specialization and Covenant Strictness: Other Explanations

This table reports the estimates of the coefficients from the following regression:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot Specialization_{b,i,t-1} + \delta \cdot Other\ Var + \gamma_F \cdot Firm\ Controls_{f,t} + \gamma_L \cdot Loan\ Controls_{l,f,b,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is the measure of covenant strictness for loan l contracted in year-quarter t by bank b to firm f. $Specialization_{b,i,t-1}$ is the ratio of bank b's portfolio share in industry i at quarter $t-1$ (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter $t-1$ (averaged over a rolling 12-quarter window). Firm controls include those reported in Table 2, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. Loan controls include those reported in Table 2, plus separate intercepts for different loan purposes (Corporate Purposes, Working Capital, Debt Repayment, Takeover, CP Backup). All variables are described in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Covenant Strictness			
	(1)	(2)	(3)	(4)
Specialization	−6.586***	−3.206**	−3.849***	−3.882***
	(−4.46)	(−2.40)	(−3.28)	(−3.24)
Market Share	4.081***			
	(3.37)			
Same State		−2.028		
		(−0.52)		
Rel. Length			−.0735	
			(−0.39)	
Rel. Intensity				.2646
				(0.24)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*
Loan Controls	*Yes*	*Yes*	*Yes*	*Yes*
Adj. R^2	.567	.565	.566	.566
Obs.	4,180	3,518	4,180	4,180

Table 8. Bank Specialization and Firm Investment: Other Explanations

This table reports the estimates of the coefficients from the following regression:

$$\begin{aligned} Y_{f,t+4} - Y_{f,t} = {} & \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} \\ & + \theta_4 Other\ Var + \theta_5 Violation \times Other\ Var \\ & + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t} \end{aligned}$$

where the dependent variable is the difference in firm f's investment from year-quarter t to $t+4$. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter t, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank b's portfolio share in industry i at quarter t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter difference in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)
Violation	−.0089***	−.0079***	−.0082***	−.0011
	(−3.70)	(−4.12)	(−3.57)	(−0.25)
Specialization	.0016	.0022	.0016	.0016
	(1.16)	(1.50)	(1.17)	(1.16)
Specialization × Violation	.003***	.0023***	.003***	.003***
	(3.57)	(3.05)	(3.56)	(3.52)
Market Share	$7.9e-05$			
	(0.44)			
Market Share × Violation	0.0005			
	(0.62)			
Same State		$-8.0e-04$		
		(−1.52)		
Same State × Violation		−.0021		
		(−0.30)		
Rel. Length			$3.7e-05$*	
			(2.00)	
Rel. Length × Violation			$-8.8e-07$	
			(−0.0035)	
Rel. Intensity				−.0013**
				(−2.20)
Rel. Intensity × Violation				−.008*
				(−1.77)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls × Spec	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*Yes*	*Yes*	*Yes*	*Yes*
R^2	.138	.136	.138	.138
Obs.	52,517	45,430	52,517	52,517

Table 9. Bank Specialization and Firm Investment: Heterogeneity across Firm Quality

This table reports the estimates of the coefficients from the following regression:

$$\begin{aligned} Y_{f,t+4} - Y_{f,t} = {} & \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} \\ & + \theta_4 Other\ Var + \theta_5 Violation \times Other\ Var \\ & + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t} \end{aligned}$$

where the dependent variable is the difference in firm f's investment from year-quarter t to $t+4$. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter t, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank b's portfolio share in industry i at quarter t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter difference in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

Dependent variable:	Z indicates:		
Change in Investment	High EDF	High Leverage	Low Interest Coverage
	(1)	(2)	(3)
Specialization×Violation	.0073***	.0046**	.0029***
	(5.77)	(2.47)	(3.08)
Specialization×Violation×$\mathbb{I}(z = Z)$	−.0108***	−.0126**	−.0036
	(−3.06)	(−2.21)	(−0.75)
Violation	−.0116***	−.0098***	−.0074***
	(−3.03)	(−3.20)	(−3.74)
Specialization	.002	.0015	.0013
	(1.16)	(1.02)	(0.86)
$\mathbb{I}(z = Z)$	−.002*	−.0016***	−.0075***
	(−1.84)	(−2.70)	(−5.82)
Violation×$\mathbb{I}(z = Z)$	.0127	.0175*	.0141**
	(1.50)	(1.86)	(2.50)
Specialization×$\mathbb{I}(z = Z)$	$-8.7e-04$	$8.1e-04$**	.0022***
	(−1.26)	(2.08)	(2.74)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*Yes*	*Yes*	*Yes*
Firm Controls × Spec	*Yes*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*Yes*	*Yes*	*Yes*
R^2	.14	.14	.139
Obs.	51,576	51,819	52,193

Figures

Figure 1. Comparison Between Portfolio Concentration of the Average Bank and the "Market"

This figure plots on the y-axis the *HHI* measure of loan portfolio concentration, and on the x-axis the year at which it is recorded. *HHI* is computed for the Market (blue) and Average Bank (green) portfolios over each year-quarter. A higher value of *HHI* implies that lending to sectors is more concentrated in the market/average bank's portfolio.

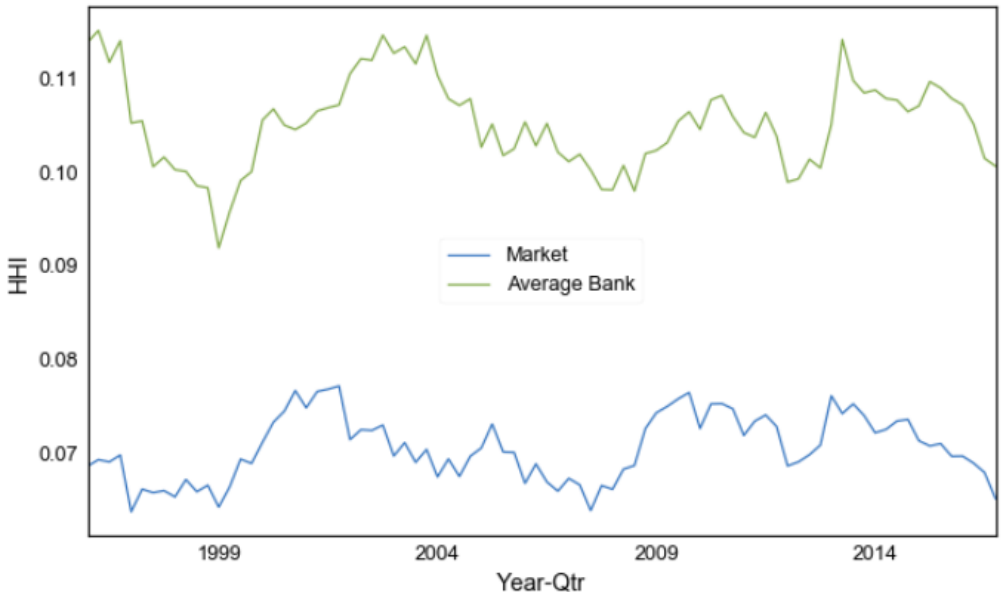


Figure 2. Specialization Is Common Across Industries and Time

This figure presents evidence of specialization in lending towards specific industries in four different moments: 2000q2, 2005q2, 2010q2, 2015q2. Each subfigure reports the box-plot graph, for each of the 25 TFIC industries, of the distribution of banks' demeaned loan portfolio shares in a given industry. Each dot represents an outlier, indicating banks specialized in that industry.

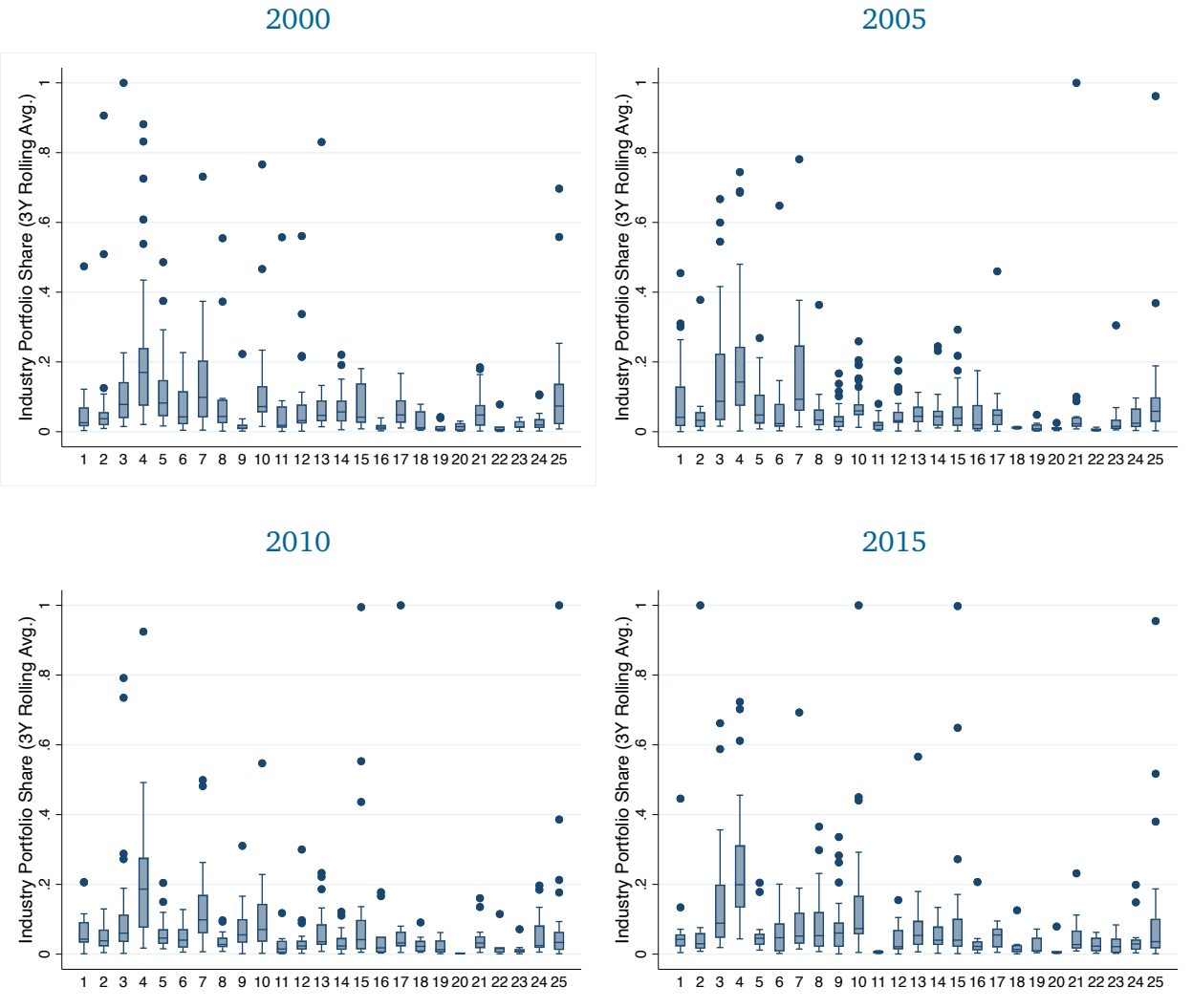


Figure 3. Specialization Is Persistent Over Time

This figure plots the *n*-year autocorrelation of the relative portfolio share, averaged at the bank-year-sector level, where *n* takes value from 1 to 10.

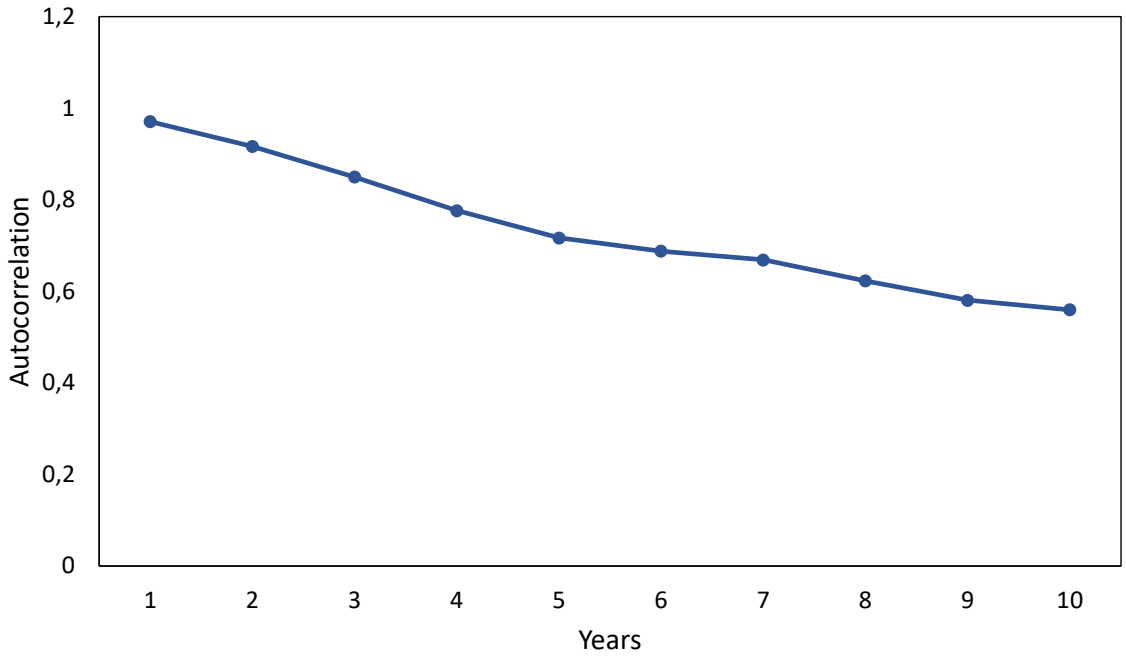
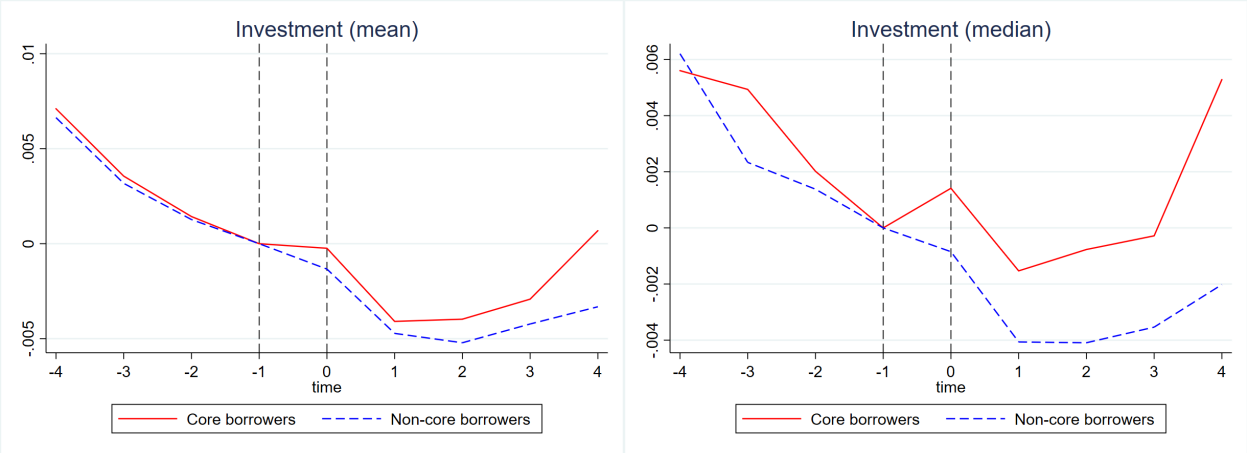


Figure 4. Violations Impact Core Customers' Investment Less

This figure plots the mean (left) and median (right) of investment four quarters before and after covenant violations, separately for core and non-core customers. For this plot, we define core customers as firms borrowing from banks whose lending share is above the 75th percentile of the lending shares' distribution in their industries. For comparability, we normalize the y-axis so the figures for core and non-core borrowers are zero in quarter *t-1*, i.e., the y-axis demonstrates the figure in a given quarter relative to the figure in quarter *t-1*.



Appendix

Table A1. Variable Definitions

Variable Name	Definition	Data Source	Unit
Specialization	Ratio of the share of an industry in the bank's lending portfolio relative to the share of an industry in the entire lending market (defined in Equation (1))	Dealscan	float
Specialization (nY)	Defined in Equation (1), obtained averaging over $4 \times n$ quarters	Dealscan	float
EDF	See Bharath and Shumway (2008), pp. 1247-48	CRSP/ Compustat	float (%)
Assets	`atq`	Compustat	USD Mil
Average Assets	$[\text{Assets}(t) + \text{Assets}(t-1)]/2$	Compustat	USD Mil
Tangible Assets	`ppentq`	Compustat	USD Mil
Tangibility	Tangible Assets/Assets	Compustat	float
Tangible Net Worth	`atq - intanq - ltq`	Compustat	float
Leverage	(`dlttq` + `dlcq`)/Tangible Net Worth	Compustat	float
Current Ratio	`actq/lctq`	Compustat	float
Operating Cash Flows	Rolling 4-qtr sum of `oibdq`	Compustat	float
Int. Cover. Ratio	Operating Cash Flows/Rolling 4-qtr sum of `xintq`	Compustat	float
Equity Market Cap	`prccq×cshoq`	Compustat	float
Book Equity	`atq - ltq + txditcq`	Compustat	float
Market to Book	(Equity Market Cap - Book Equity + Assets)/Assets	Compustat	float
Capital Expenditures	capxy	Compustat	float
Investment	Capital Expenditures/Tangible Assets	Compustat	float
Sales	`saleq`	Compustat	float
Rated	Dummy variable equal to 1 if firm-quarter has a long-term issuer credit rating, and to 0 otherwise	Capital IQ	int (0/1)
Rating	Categorical variable equal to 1 for credit rating "AAA", to 2 for "AA", ... , to 9 for "D"/"SD" (indicating default)	Capital IQ	int
N. Loans	Number of packages per borrower over sample period	Dealscan	int
Covenant Strictness	Ex-ante probability of violating a financial covenant. See Demerjian and Owens (2016)	Dealscan	float (%)
Violation	Dummy equal to 1 if firm violates a covenant	SEC	int

Table A1. Variable Definitions

	in a quarter, and to 0 otherwise		(0/1)
AISD (All-In Spread Drawn)	Average of each facility's `allindrawn` in package weighted by `facilityamt`	Dealscan	basis points
AISU (All-In Spread Undrawn)	Average of each facility's `allinundrawn` in package weighted by `facilityamt`	Dealscan	basis points
Spread over Libor	Average of each facility's `maxbps_libor` in package weighted by `facilityamt`	Dealscan	basis points
TCB	Total cost of borrowing (see Berg et al. 2016)	Dealscan	basis points
Loan Amount	Ln(`dealamount`)	Dealscan	USD
Maturity	Ln(average of each facility's `maturity` in package weighted by `facilityamt`)	Dealscan	months
Lenders	Ln(N. syndicate members)	Dealscan	int
Revolver Fraction	Revolver credit amount in package / `dealamount`	Dealscan	float
Rel. Intensity	Fraction of credit that the firm obtained from the bank over the total amount of credit the firm received in the last 3 years	Dealscan	float
Rel. Length	Time elapsed since the first interaction between the firm and the bank	Dealscan	years
Market Share	Fraction of credit that the bank provides to the industry relative to the total credit supplied to the industry by all banks	Dealscan	float
Same State	Dummy variable equal to 1 if the bank and the firm are headquartered in the same state, and to 0 otherwise	Compustat/ SEC	int (0/1)

Table A2. Bank Specialization and Covenants: Heterogeneity over Time

This table reports the estimates of the coefficients from the following regression:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot Specialization_{b,i,t-1} + \delta \cdot Specialization_{b,i,t-1} \times Post\ 2007_t + \gamma \cdot X_{f,b,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is the measure of covenant strictness for loan l contracted in year-quarter t by bank b to firm f. $Specialization_{b,i,t-1}$ is the ratio of bank b's portfolio share in industry i at quarter $t-1$ (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at quarter $t-1$ (averaged over a rolling 12-quarter window). $Post\ 2007_t$ is a dummy equal to 1 for the period of 2008-2019, and to 0 otherwise. $X_{f,b,t}$ is a vector of firm-level and loan-level controls, which consists of all those included in Table 2, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings, and separate intercepts for different loan purposes (Corporate Purposes, Working Capital, Debt Repayment, Takeover, CP Backup). t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Covenant Strictness			
	(1)	(2)	(3)	(4)
Specialization	-5.473^{***}	-5.111^{***}	-5.2^{***}	-12.45^{***}
	(-3.18)	(-3.03)	(-3.14)	(-4.36)
Specialization × Post 2007	4.368^{*}	3.073	3.121	11.6^{**}
	(1.87)	(1.52)	(1.55)	(2.58)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Bank × Firm FE	*No*	*No*	*No*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*No*
Firm Controls	*No*	*Yes*	*Yes*	*Yes*
Loan Controls	*No*	*No*	*Yes*	*Yes*
Adj. R^2	.504	.566	.566	.578
Obs.	4,180	4,180	4,180	3,258

Table A3. Bank Specialization and Firm Investment: Heterogeneity over Time

This table reports the estimates of the coefficients from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \theta_4 Violation_{f,t} \times Post\ 2007_t + \theta_5 Specialization_{f,t} \times Post\ 2007_t + \theta_6 Violation_{f,t} \times Specialization_{f,t} \times Post\ 2007_t + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter *t* to *t+4*. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter *t*, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of the bank's portfolio share in industry i at time t (averaged over a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $Post\ 2007_t$ is a dummy equal to 1 for the period of 2008-2019, and to 0 otherwise. $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter differences in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. *t* statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Violation	$-.0043^{**}$	$-.0092^{***}$	$-.0097^{***}$	$-.0095^{***}$	$-.0094^{***}$	$-.0094^{***}$
	(−2.48)	(−4.11)	(−4.30)	(−4.36)	(−4.06)	(−4.06)
Specialization	$9.5e-05$	$5.6e-04^{*}$	$4.9e-04$	$5.0e-04$	.0021	.0014
	(0.45)	(1.71)	(1.48)	(1.57)	(1.55)	(0.94)
Specialization × Violation		$.0033^{***}$	$.0033^{***}$	$.0033^{***}$	$.0031^{***}$	$.0032^{***}$
		(3.78)	(3.83)	(3.82)	(3.46)	(3.25)
Specialization × Violation × Post 2007		−.0014	−.0013	−.0013	$-9.7e-04$	−.0012
		(−0.77)	(−0.72)	(−0.73)	(−0.52)	(−0.60)
Other Interaction Terms	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*No*	*No*	*Yes*
R^2	.12	.12	.122	.137	.122	.138
Obs.	52,517	52,517	52,517	52,517	52,517	52,517

Table A4. Bank Specialization and Covenant Strictness: Alternative Time Windows to Compute Specialization

This table reports the estimates of the coefficients on the *Specialization* variable—built based on portfolio shares averaged over different time windows—from the following regression:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot \beta \cdot Specialization\ (nY)_{b,i,t-1} + \gamma_F \cdot Firm\ Controls_{f,t} + \gamma_L \cdot Loan\ Controls_{l,f,b,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is the measure of covenant strictness as for loan l contracted in year-quarter t by bank b to firm f. $Specialization_{b,i,t-1}$ is the ratio of bank b's portfolio share in industry i at quarter $t-1$ (averaged a rolling $4 \times n$-year window) relative to the market-wide share of credit to industry i at quarter $t-1$ (averaged over a rolling $4 \times n$-year window). Firm controls include those reported in Table 2, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. Loan controls include those reported in Table 2, plus separate intercepts for different loan purposes (Corporate Purposes, Working Capital, Debt Repayment, Takeover, CP Backup). All variables are described in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Covenant Strictness				
	(1)	(2)	(3)	(4)	(5)
Specialization (1Y)	-2.877^{**}				
	(-2.48)				
Specialization (2Y)		-3.92^{***}			
		(-3.29)			
Specialization			-3.872^{***}		
			(-3.28)		
Specialization (4Y)				-3.469^{***}	
				(-2.81)	
Specialization (5Y)					-2.817^{**}
					(-2.21)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Loan Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Adj. R^2	.566	.568	.566	.562	.567
Obs.	4,296	4,231	4,180	4,051	3,910

Table A5. Bank Specialization and Firm Investment: Alternative Time Windows

This table reports the estimates of the coefficients on the *Specialization* variable—built based on portfolio shares averaged over different time windows—from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization(nY)_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization(nY)_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization(nY)_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter *t* to *t+4*. $Violation_{f,t}$ is equal to 1 if firm *f* violated a financial covenant at year-quarter *t*, and to 0 otherwise. *Specialization (nY)*$_{b,i,t}$ is the ratio of bank *b*'s portfolio share in industry *i* at time $t-1$ (averaged a rolling $4 \times n$-year window) relative to the market-wide share of credit to industry *i* at time *t* (averaged over a rolling $4 \times n$-year window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter differences in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. *t* statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
Violation	$-.0077^{***}$	$-.0078^{***}$	$-.0082^{***}$	$-.0087^{***}$	$-.008^{***}$
	(−4.40)	(−4.89)	(−5.32)	(−5.60)	(−4.73)
Specialization (1Y)	$.0018^{*}$				
	(1.97)				
Specialization (1Y) × Violation	$.0029^{***}$				
	(3.22)				
Specialization (2Y)		$.0021^{*}$			
		(1.70)			
Specialization (2Y) × Violation		$.0026^{***}$			
		(2.95)			
Specialization			.0016		
			(1.17)		
Specialization × Violation			$.003^{***}$		
			(3.56)		
Specialization (4Y)				.0012	
				(0.84)	
Specialization (4Y) × Violation				$.0031^{***}$	
				(3.62)	
Specialization (5Y)					$9.5e-04$
					(0.67)
Specialization (5Y) × Violation					$.0027^{***}$
					(2.97)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls × Spec	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2	.141	.141	.138	.137	.136
Obs.	54,432	53,484	52,517	51,368	50,131

Table A6. Bank Specialization and Covenant Strictness: Alternative Assumptions for the Computation of Specialization Measure

This table reports the estimates of the coefficients from the following regression:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot Specialization_{b,i,t-1} + \gamma_F \cdot Firm\ Controls_{f,t} + \gamma_L \cdot Loan\ Controls_{l,f,b,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is the measure of covenant strictness for loan l contracted in year-quarter t by bank b to firm f. $Specialization_{b,i,t-1}$ is the ratio of bank b's portfolio share in industry i at time $t-1$ (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time $t-1$ (averaged over a rolling 12-quarter window). Specialization is calculated using: in columns (1), all loans, without dropping loan contracts that are likely to be restatements of existing loans; in columns (2), only loans originated from 1996 onward; in columns (3), excluding term loans B; in columns (4), by attributing loan shares to lead arrangers as in Chodorow-Reich (2014); in columns (5), by attributing loan shares to lead arrangers as in Doerr and Schaz (2021); and in columns (6), by attributing loan shares to lead arrangers as in De Haas and Van Horen (2013). Firm controls include those reported in Table 2, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. Loan controls include those reported in Table 2, plus separate intercepts for different loan purposes (Corporate Purposes, Working Capital, Debt Repayment, Takeover, CP Backup). All variables are described in Table A1 t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Starting Samples			Loan Share Attribution Methods		
	Amend/Restate	From 1996	No Term Loans B	Chodorow-Reich (2014)	Doerr & Schaz (2021)	De Haas & Van Horen (2013)
	(1)	(2)	(3)	(4)	(5)	(6)
Specialization	−3.76***	−3.87***	−3.53***	−2.84***	−2.6**	−3.8***
	(−3.08)	(−3.28)	(−3.04)	(−2.76)	(−2.58)	(−3.22)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Loan Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Adj. R^2	.566	.569	.566	.565	.565	.566
Obs.	4,193	4,173	4,171	4,180	4,180	4,180

Table A7. Bank Specialization and Firm Investment: Alternative Assumptions for the Computation of Specialization Measure

This table reports the estimates of the coefficients from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm f's investment from year-quarter t to $t+4$. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter t, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank b's portfolio share in industry i at time t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). Specialization is calculated using: in columns (1), all loans, without dropping loan contracts that are likely to be restatements of existing loans; in columns (2), only loans originated from 1996 onward; in columns (3), excluding term loans B; in columns (4), by attributing loan shares to lead arrangers as in Chodorow-Reich (2014); in columns (5), by attributing loan shares to lead arrangers as in Doerr and Schaz (2021); and in columns (6), by attributing loan shares to lead arrangers as in De Haas and Van Horen (2013). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter difference in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Starting Samples			Loan Share Attribution Methods		
	Amend/Restate	From 1996	No Term Loans B	Chodorow-Reich (2014)	Doerr & Schaz (2021)	De Haas & Van Horen (2013)
	(1)	(2)	(3)	(4)	(5)	(6)
Violation	−.0079***	−.0082***	−.0085***	−.0089***	−.009***	−.0081***
	(−5.35)	(−5.32)	(−5.48)	(−5.93)	(−6.12)	(−5.33)
Specialization	.0012	.0016	.0016	.0018	.0017	.0016
	(1.05)	(1.17)	(1.14)	(1.31)	(1.24)	(1.25)
Specialization × Violation	.0028***	.003***	.0032***	.0035***	.0036***	.0029***
	(3.73)	(3.56)	(3.74)	(3.71)	(3.67)	(3.55)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls × Spec	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2	.139	.138	.137	.138	.138	.138
Obs.	52,823	52,513	52,396	52,517	52,517	52,517

Table A8. Bank Specialization and Covenant Strictness: Alternative Specialization Measure

This table reports the estimates of the coefficients from the following regression:

$$Y_{l,f,b,t} = \alpha_{b,t} + \alpha_{i,t} + \alpha_f + \beta \cdot \textit{Excess Specialization}_{b,i,t-1} + \gamma_F \cdot \textit{Firm Controls}_{f,t} + \gamma_L \cdot \textit{Loan Controls}_{l,f,b,t} + \varepsilon_{l,f,b,t}$$

where $Y_{l,f,b,t}$ is the measure of covenant strictnes for loan l contracted in year-quarter t by bank b to firm f. $\textit{Specialization}_{b,i,t-1}$ is the difference between the bank b's portfolio share in industry i at time $t-1$ (averaged a rolling 12-quarter window) and the market-wide share of credit to industry i at time $t-1$ (averaged over a rolling 12-quarter window). Firm controls include those reported in Table 2, plus separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. Loan controls include those reported in Table 2, plus separate intercepts for different loan purposes (Corporate Purposes, Working Capital, Debt Repayment, Takeover, CP Backup). All variables are described in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	Covenant Strictness			
	(1)	(2)	(3)	(4)
Excess Specialization	−3.41*	−4.021**	−4.019**	−9.391***
	(−1.84)	(−2.08)	(−2.12)	(−2.85)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Bank × Firm FE	*No*	*No*	*No*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*
Firm FE	*Yes*	*Yes*	*Yes*	*No*
Firm Controls	*No*	*Yes*	*Yes*	*Yes*
Loan Controls	*No*	*No*	*Yes*	*Yes*
Adj. R^2	.503	.565	.565	.576
Obs.	4,180	4,180	4,180	3,258

Table A9. Bank Specialization and Firm Investment: Alternative Specialization Measure

This table reports the estimates of the coefficients from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Excess\ Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Excess\ Specialization_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Excess\ Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter *t* to *t+4*. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter *t*, and to 0 otherwise. $Specialization_{b,i,t}$ is the difference between bank b's portfolio share in industry i at time t (averaged a rolling 12-quarter window) and the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter difference in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. *t* statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Violation	−.0039***	−.0049***	−.0054***	−.005***	−.0054***	−.005***
	(−3.16)	(−4.19)	(−4.65)	(−4.35)	(−4.60)	(−4.31)
Excess Specialization	.0002	.0001	$1.1e-05$	$-8.0e-05$	.0002	.00016
	(0.57)	(0.38)	(0.030)	(−0.22)	(0.45)	(0.41)
Excess Specialization × Violation		.0059***	.0059***	.0058***	.0058***	.0057***
		(3.59)	(3.60)	(3.43)	(3.58)	(3.23)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*No*	*No*	*Yes*
R^2	.12	.12	.122	.137	.122	.138
Obs.	52,517	52,517	52,517	52,517	52,517	52,517

Table A10. Bank Specialization and Firm Investment: Additional control variables a lá Nini et al. (2012)

This table reports the estimates of the coefficients from the following regression:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 \Gamma_{f,t} + \Phi_2 \Gamma_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm f's investment from year-quarter t to $t+4$. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter t, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank b's portfolio share in industry i at time t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $\Gamma_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, their second- and third-degree polynomials, their lagged 4-quarter values, plus the lagged 4-quarter differences in Log(Assets) and Tangibility, and separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings, All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Violation	−.0082***	−.0067***	−.0066***	−.0077***	−.0068***	−.0066***
	(−5.38)	(−3.11)	(−2.98)	(−4.79)	(−3.10)	(−2.77)
Specialization	−5.4e−05	−2.7e−05	−1.8e−05	.0158***	.0016	.0018
	(−0.26)	(−0.17)	(−0.11)	(3.29)	(1.08)	(0.20)
Specialization × Violation	.0031***	.0022*	.0022*	.0027***	.0023*	.0022*
	(3.91)	(1.89)	(1.87)	(3.29)	(1.81)	(1.69)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Higher Order Firm Controls	*Yes*	*No*	*Yes*	*Yes*	*No*	*Yes*
Lagged Firm Controls	*No*	*Yes*	*Yes*	*No*	*Yes*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*
Higher Order Firm Controls × Spec	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Lagged Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
R^2	.138	.15	.151	.139	.151	.152
Obs.	52,517	43,691	43,691	52,517	43,691	43,691

Table A11. Bank Specialization and Firm Investment: Placebo Experiment

This table reports the estimates of the coefficients from the following regression over a sample that excludes firm-quarters in which firms report a violation:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times PlaceboViolation_{f,t} + \theta_2 PlaceboViolation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 \Gamma_{f,t} + \Phi_2 \Gamma_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter *t* to *t+4*. $PlaceboViolation_{f,t}$ is equal to 1 at time t if firm f violated a financial covenant in year-quarter *t+4*, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank *b*'s portfolio share in industry i at time t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $\Gamma_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, their second- and third-degree polynomials, their lagged 4-quarter values, plus the lagged 4-quarter differences in Log(Assets) and Tangibility, and separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings, All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Placebo Violation	−.004	−.0034	−.0037	−.0035	−.0036	−.0034
	(−1.49)	(−0.90)	(−0.93)	(−0.91)	(−0.90)	(−0.88)
Specialization	$4.8e-05$	$5.1e-05$	$-2.4e-05$	$-5.2e-05$	.0021*	.0016
	(0.24)	(0.25)	(−0.11)	(−0.25)	(1.74)	(1.11)
Specialization × Placebo Violation		−0.0004	−.0004	−0.0002	−0.0004	−.0003
		(−0.24)	(−0.20)	(−0.11)	(−0.22)	(−0.13)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*No*	*No*	*Yes*
R^2	.121	.121	.123	.138	.123	.139
Obs.	51,843	51,843	51,843	51,843	51,843	51,843

Table A12. Bank Specialization and Firm Investment: Only Firms in Violation at Least Once

This table reports the estimates of the coefficients from the following regression only by using firms that have violated a covenant:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter *t* to *t+4*. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter *t*, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank *b*'s portfolio share in industry i at time t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter differences in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. t statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Violation	−.0039***	−.008***	−.0084***	−.0077***	−.0085***	−.0078***
	(−3.17)	(−4.57)	(−5.02)	(−4.71)	(−4.97)	(−4.94)
Specialization	$4.1e-04$	$3.1e-04$	$3.2e-04$	$3.4e-04$	.0027*	.0023
	(1.17)	(0.88)	(0.88)	(1.03)	(1.85)	(1.31)
Specialization × Violation		.003***	.003***	.0029***	.0032***	.003***
		(3.44)	(3.56)	(3.45)	(3.68)	(3.79)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*No*	*No*	*Yes*
R^2	.183	.183	.185	.2	.185	.202
Obs.	21,650	21,650	21,650	21,650	21,650	21,650

Table A13. Bank Specialization and Firm Investment: Only Single-Bank Lenders

This table reports the estimates of the coefficients from the following regression only by using firms that have a single lender in each quarter:

$$Y_{f,t+4} - Y_{f,t} = \theta_1 Specialization_{b,i,t} \times Violation_{f,t} + \theta_2 Violation_{f,t} + \theta_3 Specialization_{b,i,t} + \Phi_1 X_{f,t} + \Phi_2 X_{f,t} \times Specialization_{b,i,t} + \alpha_{i,t} + \alpha_{b,t} + \eta_{fiscal\ t} + \varepsilon_{f,t}$$

where the dependent variable is the difference in firm *f*'s investment from year-quarter *t* to *t+4*. $Violation_{f,t}$ is equal to 1 if firm f violated a financial covenant at year-quarter *t*, and to 0 otherwise. $Specialization_{b,i,t}$ is the ratio of bank *b*'s portfolio share in industry i at time t (averaged a rolling 12-quarter window) relative to the market-wide share of credit to industry i at time t (averaged over a rolling 12-quarter window). $X_{f,t}$ is a vector of firm-level controls consisting of all those included in Table 2, plus the lagged 4-quarter differences in Log(Assets) and Tangibility, as well as separate intercepts for Capital IQ S&P Long Term Issuer Credit Ratings. All variables are defined in Table A1. *t* statistics (in parentheses) are obtained from two-way clustering at the bank and firm level. ***, **, * indicate statistical significance at the 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Violation	−.0041***	−.0093***	−.0099***	−.0094***	−.0096***	−.0091***
	(−3.04)	(−5.22)	(−5.40)	(−5.25)	(−5.05)	(−4.93)
Specialization	$1.2e-04$	$7.6e-05$	$-5.9e-06$	$-2.1e-05$	.0031**	.002
	(0.51)	(0.32)	(−0.025)	(−0.087)	(2.36)	(1.36)
Specialization × Violation		.0038***	.0038***	.0037***	.0037***	.0036***
		(5.37)	(5.45)	(5.46)	(4.47)	(4.18)
Bank × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry × YearQtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Fiscal Qtr FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm Controls	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Diff. Firm Controls	*No*	*No*	*No*	*Yes*	*No*	*Yes*
Firm Controls × Spec	*No*	*No*	*No*	*No*	*Yes*	*Yes*
Diff. Firm Controls × Spec	*No*	*No*	*No*	*No*	*No*	*Yes*
R^2	.132	.133	.134	.15	.135	.151
Obs.	42,338	42,338	42,338	42,338	42,338	42,338