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Non-bank lending and firm performance: Evidence from the syndicate loan market

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ABSTRACT

We find that in the leveraged loan sector, firms borrowing from non-banks have lower profitability following loan originations, compared to firms borrowing from banks, after controlling for observable factors. As non-bank borrowers experience less intense monitoring than bank borrowers, they engage in more risk-taking, which could explain their lower profitability following loan issuance. Using the leveraged lending guidance as a plausibly exogenous shock, which resulted in the migration of borrowers from banks to non-banks, we provide causal evidence corroborating our main results. Overall, our findings suggest that macroprudential policies which exclusively target the traditional banking sector may have negative consequences.

1. Introduction

In recent decades, non-banks have emerged as significant participants in the syndicated loan market. Increasingly, non-banks directly negotiate with the borrowers by taking the role of lead arranger in the syndicate. The rise of the non-banks has coincided with the expansion of the leveraged loan market segment, which mainly includes loans to high-risk borrowers. In 2006, the size of the leveraged loan market was $400 billion, and it has increased to over $1 trillion by 2018, with over 1000 issuers.[2] Despite the dramatic increase in non-bank lending in the syndicated loan market, little is known about the implications of non-bank lending for borrowers' post-loan outcomes. In this paper, we examine the effect of non-bank lending on the borrower's performance in the syndicated loan market.[3]

The expansion of non-bank lending has been viewed as a direct consequence of banks retreating from the high-risk segment of the lending market due to regulatory restrictions, and non-banks filling the void (Kim et al., 2018; Cortés et al., 2020; Gopal and Schnabl, 2022). We ask if there are real consequences of this substitution of bank lending with non-bank lending. Such real consequences would arise if banks and non-banks differ with respect to their lending technologies. Theoretical models highlight banks' special role as information producers and effective monitors of borrowers, mitigating potential conflicts of interest between managers and creditors in the presence of asymmetric information, especially when the borrowers are risky and informationally opaque (e.g., Diamond, 1984; Besanko and Kanatas, 1993; Holmstrom and Tirole, 1997; Boot, 2000).

As regulators have been concerned about the stability of the banking sector, they have taken steps, such as issuing the leveraged lending guidance, to reduce the exposure of banks to the riskier leveraged loan sector. Kim et al. (2018) document that following the guidance clarifications in November 2014, banks reduced their lending in the leveraged

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[2] See the S&P Global report, *"Its Official: US Leveraged Loans Are A $1 Trillion Market"*, 30th April 2018.

[3] Non-banks participate in both the direct and syndicated loan markets (e.g., Erel and Inozemtsev, 2025). In this paper, we focus on the non-bank lead arrangers in the syndicated loan markets.

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loan market, but leveraged lending migrated to non-banks (such as hedge funds, private equity funds, and mutual funds). Given the unregulated nature of the non-bank sector, it is important to understand whether non-bank lenders pose a significant risk to the borrowing firms, and through this channel, the broader economy.

A large body of the literature highlights banks' comparative advantage in information acquisition and monitoring (Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986). Consistent with banks' unique monitoring role, the issuance of bank loans is usually associated with favourable reactions from investors (see, for example, James (1987) and Lummer and McConnell (1989)). Prior studies show that bond issuers benefit from cross-monitoring by banks and obtain lower bond yields (Datta et al., 1999; Ma et al., 2019). There is also evidence that bank monitoring can reduce corporate earnings management (Ahn and Choi, 2009), reduce demand for disclosure by shareholders (Vashishtha, 2014), and substitute for internal corporate governance (Byers et al., 2008).

While non-bank institutions have been increasing their participation in the syndicated loan market, an important question that arises is whether non-banks can perform a similar role of monitoring like banks do. Little research directly addresses the monitoring incentives and capacity of non-banks, but prior studies document that banks and non-banks are not perfect substitutes in the syndicated loan market. Specifically, these studies provide evidence that banks and non-banks design loan contracts in different ways, which may reflect their different lending technologies and preferences. Chernenko et al. (2022) find that loans by non-banks are less likely to contain financial covenants for ex-post monitoring, but instead include warrants to align interests. One potential explanation for this is that non-bank institutions are less adept at collecting information from firms (Drucker and Puri, 2009; Nandy and Shao, 2010). In a similar vein, Beyhaghi et al. (2019) find that the addition of non-banks to loan syndicates results in a longer loan maturity, consistent with the view that non-banks minimize the frequency of information acquisition and renegotiation.

Further, Gustafson et al. (2021) find that longer maturity loans are monitored less frequently, while Cerqueiro et al. (2016) find that reduced monitoring incentives result in longer review intervals for borrowers' pledged collateral.[4] In addition, Beyhaghi et al. (2019) find that non-banks are more likely to exit loan syndicates rather than renegotiate the loan due to their less stable funding sources compared with banks. Therefore, non-banks are less likely to maintain a long-term lending relationship than banks. Overall, this strand of the literature suggests that non-banks may have inadequate incentives and capacity to monitor borrowers compared with traditional banks. Building on the prior literature, we predict that borrowers of non-banks have worse performance after loan originations compared to borrowers of banks. This low performance could be driven by high risk-taking incentives of borrowers in the absence of monitoring from lenders (Jensen and Meckling, 1976; Smith and Warner, 1979; Eisdorfer, 2008; Gilje, 2016)

For our analysis, we use data from the US syndicated loan market from 1997–2016. The key empirical challenge in our analysis is that the average borrower of banks is fundamentally different from the average borrower of non-banks, as several studies find that borrowers of non-banks are riskier and less profitable (see e.g., Carey et al., 1998; Denis and Mihov, 2003; Chernenko et al., 2022). To address this concern, we use an entropy balancing approach to achieve covariate balance among the observable factors to ensure that the borrowers of banks and non-banks are statistically indistinguishable in terms of the key firm characteristics after the observations are re-weighted by the entropy balancing method. While matching can control for observable differences, there could be unobservable differences which are relevant. Therefore, we perform a difference-in-difference analysis by exploiting the leveraged lending guidance as an exogenous shock to the market structure, which arguably made risky borrowers more likely to be matched with non-banks.

First, we present the cross-sectional results. We find that non-bank borrowers have lower earnings before interest (*EBITDA*) and return on assets (*ROA*) following loan originations, after controlling for firm-specific and contract-specific characteristics. On average, non-bank borrowers have 1.1 % lower *EBITDA* annually, relative to bank borrowers, in the three years after loan originations. Further analysis reveals that borrowers of non-banks have higher risk levels in terms of *Stock Return Volatility, Idiosyncratic Risk, EBITDA Volatility*, and *ROA Volatility*. These results are consistent with the conjecture that non-banks have a lower capacity to monitor borrowers, leading to higher risk-taking and lower profitability (Jensen and Meckling, 1976; Smith and Warner, 1979; Eisdorfer, 2008; Gilje, 2016).

Existing papers argue that higher asset growth and higher acquisition activity could be important channels through which managers can increase firms' risk leading to poor firm performance (Jensen, 1986; Titman et al., 2004; Cooper et al., 2008; Fahlenbrach and Stulz, 2011; Cain and McKeon, 2016). Building on this argument, we test whether high risk of non-bank borrowers post-loan issuance could be driven by their asset growth and acquisition activity. Our results show that borrowers of non-banks have higher level of acquisition expenses and asset growth compared with borrowers of banks. This finding supports our prediction that non-bank borrowers' higher risk could be explained by higher acquisition and higher asset growth.

To provide further evidence on the monitoring role of non-banks in explaining our findings, we divide the borrowers of non-banks into two groups based on whether some borrowers of non-banks are still likely to be subject to bank monitoring. We classify a borrower of non-banks to be subject to monitoring if it also borrows from bank lead arrangers during the same year. We find evidence that the negative effect of non-bank lending on firm performance is stronger for borrowers who only borrow from non-bank lead arrangers during a year.

While the use of the entropy balancing technique in the cross-sectional analysis accounts for the observable characteristics, it does not account for potential unobservable differences between bank and non-bank borrowers. To address this endogeneity problem, we employ an exogenous shock in the form of the leveraged lending guidance. In March of 2013, the Office of the Comptroller of the Currency (OCC), Board of Governors of the Federal Reserve System (Board) and the Federal Deposit Insurance Corporation (FDIC) jointly issued guidance to banks on the appropriate origination of leveraged lending.[5] The aim of the guidance was to curb risky lending by banks and to improve the underwriting standards. However, as documented by Kim et al. (2018), banks generally did not reduce their leveraged lending after the initial issuance of the guidance. Later in November 2014, clarifications were issued to answer commonly asked queries,[6] and the regulated banks responded by cutting their leveraged lending. However, the non-banks who were unaffiliated with regulated banks instead increased their leveraged lending, to fill the resulting void.

Consequently, the leveraged lending guidance can be viewed as an exogenous shock to the leveraged loan market structure: by discouraging banks from issuing loans to the leveraged (high-risk) borrowers, the guidance pushed these borrowers towards non-banks. We expect that the prospects of these borrowers would be adversely affected following the guidance clarification due to the increased probability of having to borrow from non-banks (or not being able to borrow at all).

[4] Consistent with previous studies, we find that non-banks design syndicate loan contracts that rely less on monitoring. Syndicate loans originated by non-banks overall are likely to have higher loan spread, longer maturity, and are less likely to contain financial covenants.

[5] Details can be found at https://www.federalreserve.gov/supervisionreg/srletters/sr1303a1.pdf

[6] Details are here: https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20141107a3.pdf

For our analysis on the leveraged lending guidance, we employ the regulatory leniency index provided by Agarwal et al. (2014). The assumption is that leveraged-loan borrowers are more likely to shift to non-banks for debt financing or face a reduction in credit supply following the guidance clarification in a state with strict bank regulators. Consistent with our expectation, we find that 1) borrowers from states with strict regulators are more likely to contract with non-banks after the shock; 2) banks reduced their leveraged loan issuance in the strictly regulated states after the shock while non-banks did not. This change in the market structure can potentially lead to an exogenous reduction in the extent of monitoring and credit supply received by borrowers, impacting their performance and risk-taking post-loan issuance. We examine firms' performance and risk around the clarification of the leveraged lending guidance, and we find that borrowers from strictly regulated states have lower profitability and higher risk-taking after the guidance clarification in November 2014.

To summarize, we show that non-bank lending in the syndicated loan market is associated with worse performance and higher risk-taking of borrowers after loan originations. This finding is consistent with the view that non-banks have less incentives and capacity to monitor borrowers. Existing studies provide evidence for regulatory spillovers: when banks have regulatory constraints, non-banks fill the resulting void (Kim et al., 2018; Abuzov et al., 2018; Calem et al., 2020; Schenck and Shi, 2022). If banks and non-banks are perfect substitutes, such macroprudential policies are ineffective, but value-neutral for borrowers. Our results indicate that policies which constrain the traditional banking sector, without concurrently constraining the non-banks, can in fact have detrimental impact on borrowers' performance. In a nutshell, asymmetrically regulating banks and non-banks affects the market structure, with real negative consequences for borrowers.

2. Related literature

Our study adds to the growing literature on non-bank lending (Sufi, 2007; Nandy and Shao, 2010; Ivashina and Sun, 2011; Lim et al., 2014; Chernenko et al., 2022; Beyhaghi et al., 2019). In recent decades, non-bank financial institutions have significantly expanded their presence in the syndicated loan market, increasingly acting as lead arrangers in loan syndications. The matching between borrowers and non-banks in the syndicated loan market can be viewed as an equilibrium process. On the borrowers' side, one primary reason that firms borrow from non-bank lead arrangers is that they face limited credit supply from banks due to mainly regulatory restrictions. For instance, Chernenko et al. (2022) argue that bank regulations restrict banks from lending to risky borrowers. More specifically, several papers document that banks retreated from the leveraged loan market following the leveraged lending guidance (Kim et al., 2018; Schenck and Shi, 2022; Calem et al., 2020). In a similar vein, Bednarek et al. (2023) find that non-bank financial institutions expand their credit supply to risky firms when there is a sudden increase in bank capital requirements; Peia et al. (2023) find that borrowers are more likely to borrow from non-banks following an exit of a major bank.

On the lenders' side, one motivation for investing in non-banks is the potential for higher yields. Unlike traditional banks, which primarily rely on core deposits, non-banks tend to depend more heavily on equity capital and wholesale funding (Berlin and Mester, 1999; Xiao, 2020; Jiang et al., 2020). Investors in non-banks are generally more risk-tolerant than depositors in traditional banks, and this greater risk appetite is compensated by higher yields. For example, Lim et al. (2014) highlight that hedge fund investors seek investment opportunities offering yields higher than those available from traditional banks.

Prior studies also focus on differences between bank and non-bank lenders in terms of how they design loan contracts. Nandy and Shao (2010) document that loan spreads in non-bank loans are higher than those in bank loans. Further, they report that post-loan issuance, the creditworthiness of non-bank borrowers declines more often than that of bank borrowers. Similarly, Lim et al. (2014) find that loan spreads for non-bank tranches are higher than bank tranches within the same contracts when the fundings from banks are less available.

Chernenko et al. (2022) examine the characteristics of firms that borrow from non-bank lenders. They use a random sample of publicly traded middle-market firms over the period 2010–2015 and report that the cost of borrowing from non-bank lenders is higher. This finding is consistent with those from Nandy and Shao (2010) and Lim et al. (2014). Chernenko et al. (2022) find that loans with non-bank lenders contain fewer financial covenants than those with bank lenders, but non-bank lenders are more likely to include warrants and convertible debts as alternative ways to align interests. Their results also show that non-bank borrowers are relatively smaller than firms that rely on bank financing, and they engage in more R&D activities and have relatively poorer performance.

Our study contributes to the burgeoning literature on non-banks by providing novel evidence that non-bank borrowers have lower operating performance and higher risk-taking than bank-borrowers post-loan issuance due to inadequate monitoring by non-bank lenders. Our findings complement the findings from prior studies on non-banks in syndicated loan markets, which show that non-bank lenders are less adept in collecting information from borrowers and they are more likely to exit loan syndicate (Drucker and Puri, 2009; Nandy and Shao, 2010; Beyhaghi et al., 2019), as such, non-banks design loan contracts in a way that relies less on monitoring.[7]

Chernenko et al. (2022) use a sample of middle-market firms and find that non-banks rely less on financial covenants as tools of monitoring and their borrowers have similar operating performance as the borrowers of banks after controlling for borrower characteristics. In our sample of the leveraged loans, controlling for observable characteristics does not fully explain the negative effect of non-banks on borrower performance. The difference may be because our sample mainly includes large public firms that borrow from a non-bank lead arranger in syndicate loan markets.

Our results also complement the findings from Irani et al. (2021). Their results highlight the negative effects of non-bank exposure on loan market outcomes (non-bank loans are less likely to be rolled over and they experience a higher price volatility in the secondary market), while we provide evidence on how non-bank lending can lead to negative consequences in firm real outcomes in terms of performance and risk.

Furthermore, we contribute to the debate on the impact of a macroprudential policy, i.e., the US leveraged lending guidance. Following this guidance, banks retreated from the leveraged loan market, leaving a void to be filled by the non-bank institutions (Schenck and Shi 2017; Kim et al., 2018; Abuzov et al., 2018; Calem et al., 2020; Newton et al., 2020).[8] Prior research shows that this guidance indeed reduced the leveraged lending by banks while pushing the leveraged loans to the non-banks who are less subject to the regulation. This finding is consistent with the regulatory arbitrage argument (Plantin, 2014; Stein, 2010). Following the guidance, non-banks expanded their lending by

[7] There is also another stream of literature that focuses on the screening and monitoring role of non-banks in the direct lending market. Block et al (2024) conduct a survey of large private credit managers, who report that they engage in extensive screening and monitoring. Jang (2025) uses data for direct loans to PE buyouts and finds that financial covenants are ubiquitous in direct lending, potentially reflecting a more active lending technology. Compared with syndicated lending, in direct lending loans typically involve sole-lender or contain few syndicated members (Loumioti, 2022). Berger and Udell (2002) document that the organizational structure of a lender with higher agency costs can compromise monitoring of borrowers when loan officers have misaligned incentives with the bank. In addition, Lin et al. (2012) and Sufi (2007) document that lead arrangers' monitoring incentives can be compromised when they retain only a part of a loan because monitoring efforts are costly.

[8] Similarly, Gopal and Schnabl (2022) find that non-bank lending offsets the decline in bank lending following the financial crisis.

borrowing from banks.

Hence, there has been a debate on whether tightening the macroprudential regulation on bank capital induces a shift away from the banking sector to the shadow banking sector, and leaves the financial system equally risky, and can render the regulation ineffective. Elliott et al. (2019) finds a similar effect of non-banks increasing their lending when banks retreat due to tightening monetary policy. Martinez-Miera and Repullo (2019) argue that tighter capital requirements can lead to a shift of risky firms from regulated to unregulated finance. Our study contributes to this debate by providing novel evidence that non-bank lenders in the leveraged loan market are associated with negative consequences for borrowers, pointing to unintended negative consequences of these policies.

Finally, our study contributes to the literature which studies the role of banks as special lenders. Prior theoretical literature posits that bank financing is special (Diamond, 1984; Ramakrishnan and Thakor, 1984; Fama, 1985; Boyd and Prescott, 1986; Diamond, 1991). James (1987) and Lummer and McConnell (1989) show that bank financing adds value to borrowers, relative to alternate forms of external financing, e.g., public debt. These studies generally compare bank loans to public debt

Table 1
Summary statistics. This table reports the summary statistics of key variables for the sample of leveraged loans, which include non-bank loans and bank loans. Firm characteristics are based on the information nearest to loan originations. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A. Full sample of leveraged loans

Contract terms	N	Mean	Median
Facility Size	12,900	230.426	100
Term Loan	12,900	0.417	0
Log (Maturity)	12,900	3.801	4
Secured	12,900	0.810	1
Financial Covenants	12,900	0.659	1
All-in-drawn	12,900	2.913	3
Refinance Loan	12,900	0.693	1
General Covenants	12,900	0.658	1
Borrower Characteristics			
Total Assets	6970	2452.317	560.076
Size	6970	6.331	6.328
Leverage	6970	0.325	0.307
EBITDA	6970	0.106	0.114
ROA	6692	0.024	0.051
MTB	6970	1.621	1.341
Cash	6970	0.122	0.057
Tangibility	6970	0.349	0.244
CAPEX	6970	0.076	0.040
Acquisition Expenses	6719	0.092	0.000
Asset Growth	6970	0.227	0.059
Adjusted Altman-Z	6970	1.254	1.264
Stock Return Volatility	6970	0.543	0.481
Idiosyncratic Risk	6970	0.485	0.423
EBITDA Volatility	6660	0.047	0.028
ROA Volatility	6273	0.061	0.032

Panel B. Non-bank and bank loan sample

	Non-bank Loans			Bank Loans				
Contract Terms	(1) N	(2) Mean	(3) Median	(4) N	(5) Mean	(6) Median	(5) - (2) *t*-test	(6) - (3) Wilcoxon
Facility Size	1232	177.694	50	11,668	235.994	100	4.74***	11.39***
Term Loan	1232	0.484	0	11,668	0.410	0	−4.93***	−4.99***
Log (Maturity)	1232	3.916	4	11,668	3.789	4	−8.85***	−5.72***
Secured	1232	0.854	1	11,668	0.806	1	−4.50***	−4.10***
Financial Covenants	1232	0.504	1	11,668	0.675	1	11.47***	12.03***
All-in-drawn	1232	3.981	4	11,668	2.801	2	−20.87***	−26.90***
Refinance Loan	1232	0.605	1	11,668	0.703	1	6.73***	7.10***
General Covenants	1232	0.572	1	11,668	0.667	1	6.39***	6.64***
Borrower Characteristics								
Total Assets	711	3098.637	503.013	6259	2378.897	564.276	−2.26**	0.38
Size	711	6.337	6.221	6259	6.330	6.336	−0.10	0.38
Leverage	711	0.354	0.323	6259	0.321	0.305	−3.47***	−3.12***
EBITDA	711	0.081	0.100	6259	0.109	0.116	5.46***	6.01***
ROA	689	0.001	0.039	6003	0.027	0.052	4.22***	4.42***
MTB	711	1.658	1.330	6259	1.617	1.342	−0.99	0.64
Cash	711	0.119	0.055	6259	0.122	0.057	0.40	0.08
Tangibility	711	0.326	0.201	6259	0.351	0.249	1.85*	3.91***
CAPEX	711	0.071	0.032	6259	0.076	0.041	1.13	5.51***
Acquisition Expenses	683	0.090	0.000	6036	0.093	0.000	0.29	1.64
Asset Growth	711	0.218	0.033	6259	0.228	0.061	0.37	3.23***
Adjusted Altman-Z	711	1.130	1.163	6259	1.269	1.275	2.39**	2.58***
Stock Return Volatility	711	0.587	0.521	6259	0.538	0.476	−4.14***	−4.19***
Idiosyncratic Risk	711	0.526	0.463	6259	0.480	0.419	−4.28***	−4.34***
EBITDA Volatility	674	0.052	0.031	5986	0.046	0.028	−2.38**	−1.83*
ROA Volatility	640	0.076	0.043	5633	0.059	0.031	−4.41***	−5.55***

or equity financing, and thus, some of their results may be driven by the different types of markets, e.g., public versus private markets. Our study differs from these as we compare private debt (loans) extended by banks and non-banks; so, the observed differences in real outcomes,i.e., borrower's performance and risk-taking post-loan issuance, are driven by differences in the type of institution (bank or non-bank) making the loan rather than the different types of external financing, i.e., public versus private debt.

3. Data and sample

We collect information on the leveraged loans issued to US firms in the US syndicated loan market during the period 1997–2016 from the Loan Pricing Corporation (LPC) Dealscan database. The leveraged loans make up the bulk of the non-bank lending, which are typically riskier, with higher spread, and made to those smaller, younger, riskier firms, arguably with a higher degree of information asymmetry. In our study, we follow the Dealscan market segment classification. The LPC defines a leveraged loan as "loan to a borrower rated BB+/Ba1 or lower with pricing thresholds based on market trends which change over time".

We exclude facilities issued to financial service firms with SIC codes from 6000 to 6999. Firm-level information comes from Compustat. The two datasets are then merged by the Compustat-Dealscan link file provided by Chava and Roberts (2008). The merge gives us a sample of 12, 900 leveraged loans, corresponding to 6970 firm-year observations with non-missing information on all control variables. Our sample size is comparable to that in Lim et al. (2014) if we restrict the sample for the same period.

3.1. Lender classification and definition of non-bank and bank lenders

Following Lim et al. (2014), we classify lenders into nine types: commercial banks, investment banks, finance companies, hedge funds or private equity funds (HF/PE), mutual funds, pension funds, CDOs, insurance companies, and other. The details of the selection process is in the Appendix 2. We define a lender to be a non-bank if it is categorized as "Finance company", "HF/PE" (Hedge fund/Private Equity), "Mutual fund", "Pension fund", "CDO", "Insurance company", or "Other". We create a dummy variable, *Non-bank*, which is equal to one if any of a facility's lead arrangers is a non-bank, and zero if all its lead arrangers are banks. We define a lender to be a bank if it is categorized as "Commercial bank" or "Investment bank".

3.2. Summary statistics

Table 1 presents the summary statistics for the firms in the leveraged loan market, and further for the borrowers of bank and non-bank lead arrangers. Detailed variable definitions can be found in the Appendix 1. We winsorize the firm characteristics at the 1st and 99th percentile.

First, we consider the loan characteristics summarized in Panel A of Table 1. We observe that non-banks make smaller loans and are more likely to be term loans. On average, 81.0 % of leveraged loans are secured by collateral and it is 85.4 % (80.6 %) for non-bank (bank) loans. Non-banks appear less likely to impose financial covenants (e.g., on average, 50.4 % of non-bank loans impose covenants compared to 67.5 % of bank loans). Finally, non-banks charge higher spreads. The average spread is 398 basis points for the non-bank loans, while it is 280 basis points for the bank loans.

Next, we compare the firm characteristics between bank and non-bank borrowers in Panel B. We observe that non-bank borrowers are less profitable than bank borrowers. The mean *EBITDA* is 8.1 % for the non-bank borrowers, while it is 10.9 % for the bank borrowers. In addition, we also find that non-bank borrowers are riskier as measured by the *Adjusted Altman-Z* score, *Stock Return Volatility, Idiosyncratic Risk, EBITDA Volatility, ROA Volatility*, and *Leverage* ratio. For other characteristics, we find that borrowers of non-banks have fewer tangible assets and lower capital expenditures but are comparable with borrowers of banks in firm size, market valuation, and cash holding.

4. Results

Our empirical analysis consists of two parts. In the first part of analysis, we exploit the cross-sectional sample of the US firms who have participated in the US syndicated loan market during the period 1997–2016. In the second part of analysis in Section 4.2, we exploit quarterly data for a sub-period around the leveraged lending guidance, from 2010/q1 to 2016/q4.

4.1. Cross-sectional regressions

4.1.1. Entropy balancing

Our summary statistics show that borrowers of banks and non-banks are statistically different in terms of several covariates, and this raises the concern that our empirical analysis can be biased due to model dependence. To conduct a comparison of the borrowers of banks and non-banks, we use the entropy balancing method proposed by Hainmueller (2012) to achieve covariate balance between the two groups. Ho et al. (2007) demonstrate that a sample with covariate balance can improve the robustness of estimation to potential model misspecifications.

To execute entropy balancing, we solve an optimization problem which yield a set of weights for the observations in the control group (borrowers of banks). We then apply the weights to the observations in the control group such that the weighted mean of each required covariate for the control group is identical to that of the treatment group (borrowers of non-banks). Specifically, we require covariate balance of the pre-loan *Size, Leverage, EBITDA, CAPEX, MTB, Cash, Tangibility, Adjusted Altman-Z,* and *Idiosyncratic Risk*. The weights calculated are then applied to further regression analysis.

Compared with the propensity-score matching (PSM) approach, entropy balancing has several advantages. First, PSM assigns discrete weights of zero and one to the observations in the control group, while entropy balancing assigns continuous weights. Therefore, entropy balancing better utilize information from the control group that it preserves a richer dataset for analysis, while PSM usually results in a reduction of sample size. Second, researchers commonly iterate the PSM process to achieve the desired level of covariate balance, while in entropy balancing, covariate balance is automatically achieved through an optimization algorithm.

Table 2 shows the mean value differences in the covariates between before and after matching at the firm-year level. The differences in means are calculated by the regressions of each variable on the dummy variable of *Non-bank*. Before the entropy balancing, we find that the two groups are statistically different in terms of several covariates. We then apply the weights calculated from the entropy balancing to the borrowers of banks and find that the weighted means of this group are almost identical to those of the borrowers of non-banks. This indicates that the two groups are statistically indistinguishable in terms of these observable factors after entropy balancing.

4.1.2. Estimation

We estimate three regression models; Eq. (1), which is at the loan facility level, Eq. (2), which is at the deal level, and Eq. (3), which is at firm-year level. We start with Eq (1) as follows:

$$Y_{il} = \alpha + \beta \times Non - bank_{il} + \gamma \times X_{i\ pre} + \pi \times Z_{il} + Industry - Year + Purpose_{il} + \epsilon_{il} \quad (1)$$

where i denotes firm, l denotes loan facility, and the dependent variable, Y_{il} represents facility-level contract terms, i.e., loan spread, facility size, and whether loan facility is secured or not. As some contract terms, i.e., financial covenants, could be at deal level, we run the following

Table 2
Entropy balancing. This table presents the test of covariate balance between borrowers of banks and non-banks, before and after the entropy matching. The variables in entropy balancing are *Size, Leverage, EBITDA, CAPEX, MTB, Cash, Tangibility, Adjusted Altman-Z,* and *Idiosyncratic Risk*. The differences in means are calculated by the regressions of each variable on the dummy variable of *Non-bank*. The weights calculated from the entropy balancing are applied to the regressions after the entropy balancing. The variables are defined in Appendix 1. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels.

Variables:	Mean			Differences in Mean	
	Borrowers of Non-banks (1)	Borrowers of Banks Pre-match (2)	Borrowers of Banks After-Match (3)	Pre-match (1)-(2)	After-match (1) – (3)
$Size_{pre}$	6.337	6.33	6.337	0.007	0
$Leverage_{pre}$	0.3539	0.3214	0.3539	0.032***	0
$EBITDA_{pre}$	0.08069	0.1087	0.08069	−0.028***	0
$Cash_{pre}$	0.1194	0.1224	0.1194	−0.003	0
MTB_{pre}	1.658	1.617	1.658	0.041	0
$Tangibility_{pre}$	0.3258	0.3512	0.3258	−0.025*	0
$CAPEX_{pre}$	0.07104	0.07649	0.07104	−0.005	0
Adjusted Altman-Z_{pre}	1.13	1.269	1.13	−0.138**	0
Idiosyncratic $Risk_{pre}$	0.5262	0.4799	0.5262	0.046***	0

regression model at deal level:

$$Y_{id} = \alpha + \beta \times Non - bank_{id} + \gamma \times X_{i\ pre} + \pi \times Z_{id} + Industry - Year + Purpose_{id} + \epsilon_{id} \quad (2)$$

where d denotes deal level, and the dependent variable, Y_{id}, represents deal-level contract terms, i.e., presence of financial covenants. Next, we have the regression model for post-loan issuance outcomes at firm-year level:

$$Y_{it} = \alpha + \beta \times Non - bank_{it} + \gamma \times X_{i\ pre} + \pi \times Z_{it} + Industry - Year + \epsilon_{it} \quad (3)$$

where the dependent variable (Y_{it}) post-loan issuance outcomes (i.e., borrower profitability or riskiness). For post-loan outcomes, we take the average over the three years following loan origination $[t+1, t+3]$ or any of the 3 years for which data is available, where t is the year of the loan issuance.

In Eq (1), (2), and (3), the key variable of interest is the dummy variable *Non-bank*. On the facility and deal level, it equals one if any lead arranger is a non-bank. On the firm-year level, it equals one if any lead arranger to whom the firm contracts with is a non-bank during a firm-year.[9] For all regressions, we include the firm-level control variables represented by the vector $X_{i\ pre}$: the three-year lagged average of *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables represented by the vector Z.[10] $Industry - Year$ denotes the industry times year fixed effects based on the Fama-French 12 industries. $Purpose_{il(d)}$ represents facility (deal) purpose fixed effects, and it is included if the dependent variable is a facility (deal) level contract term. Firm-level controls use the information that is nearest to the loan originations. To estimate Eq. (1) to (3), we use OLS method and cluster standard errors at the firm-level. Our regressions have a cross-sectional structure as in Jiang et al. (2010), Chernenko et al. (2022), Dass and Massa (2011), Delis et al. (2017), and Biswas et al. (2017).

4.1.3. Design of syndicated loan contracts by non-banks

In this section, we investigate the design of syndicated loan contracts by non-banks compared with that of banks by estimating the Eq. (1) and (2) with the contract terms as the dependent variables. Table 3 presents our OLS estimation results based on entropy-balanced sample.

In column (1), the dependent variable is the all-in-drawn spread divided by 100. We find that the coefficient for *Non-Bank* is positive and is statistically significant at 1 % level. This result is consistent with prior studies showing that non-bank institutions on average charge higher loan prices compared to banks (Lim et al., 2014; Chernenko et al., 2022).

To explore the monitoring incentives of non-banks, we next investigate other non-pricing contract terms:

In column (2), the dependent variable is the logarithm of facility amount in million dollars. We find that non-bank loans are smaller in size, which is consistent with non-banks managing their exposure by making smaller loans. In column (3), the dependent variable is the logarithm of loan maturity in months. We find that non-bank loans on average have longer maturity, which is consistent with Beyhaghi et al. (2019) showing that non-banks minimize the frequency to acquire information from borrowers because they are less adept to information acquisition. Gustafson et al. (2021) also find that longer maturity loans are monitored less frequently, which is consistent with the view that

Table 3
Contract terms. This table presents the OLS estimation results for contract terms using the entropy balanced sample of leveraged loans. Column (1) to (4) reports estimation results for contract terms on the facility level while Column (5) reports estimation results for financial covenants on the contract level. Firm-level control variables are *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables are *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* In column (5), continuous loan term variables are averaged; loan term dummy variables take the value 1 only if any facility in the deal takes the value 1; and Log *(Facility Size)* is replaced by Log *(Deal Size)*. The variables are defined in Appendix 1. Industry dummies are based on the 12 Fama-French industries. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10 %, 5 % and 1 %, respectively.

Dependent Variables:	(1) All-In-Drawn	(2) Log (Facility Size)	(3) Log (Maturity)	(4) Secured	(5) Financial Covenants
Non-bank	0.768***	−0.246***	0.115***	0.054***	−0.069***
	(13.34)	(−5.58)	(6.44)	(3.97)	(−3.87)
Constant	3.416***	−0.701*	3.602***	0.162	0.505***
	(8.39)	(−1.82)	(31.27)	(0.99)	(3.27)
Controls	Yes	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	No
Deal Purpose Fixed Effects	No	No	No	No	Yes
Observations	12,900	12,900	12,900	12,900	7892
R-squared	0.38	0.62	0.38	0.24	0.56

[9] In an un-tabulated test, we use the share of non-bank lead arrangers instead of the non-bank lending dummy in a sub-sample where the information on lender shares is available, and our results are robust.

[10] On the facility level, contract term variables include *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* For firm-year or deal level regressions, continuous loan term variables are averaged, and loan term dummy variables takes the value 1 only if any facility in the in the firm-year or the deal takes the value 1. If a regression is on the deal level, Log *(Facility Size)* is replaced by Log *(Deal Size)*.

shorter loan maturity can increase monitoring incentives because lenders have more flexibility to use the information gathered in the subsequent lending.[11] Therefore, our results are consistent with the hypothesis that non-banks monitor their borrowers less diligently. In column (4), our result shows that non-bank loans are more likely to include collateral than bank loans. Manove et al. (2001) argue that lenders view collaterals as substitutes for screening and monitoring. As such, our result suggests that non-bank borrowers are less likely to be monitored than bank borrowers. Our result is also consistent with the notion of Gopal and Schnabl (2022) that while banks focus more on cash flow from operations, finance companies (as a type of non-bank) focus more on collateral as ultimate mean of repayment.

In column (5), we investigate whether non-bank loans include more financial covenants than bank loans. Prior studies show that financial covenants are important tools for lenders to monitor the borrowers, as covenants are based on borrowers' accounting information (Rajan and Winton, 1995; Park, 2000). Consistent with prior research (Chernenko et al., 2022), our results show that non-bank loans are less likely to include financial covenants suggesting that non-banks have less incentives and capacity of monitoring through financial covenants.

Overall, we find evidence consistent with the hypothesis that non-banks design "arm's length" loan contracts and monitor their borrowers less diligently. Due to the different incentives and preferences of banks and non-banks reflected in their design of loans, caution should be taken while considering potential implications of borrowers' post-loan performance as non-banks increase their presence in the leveraged loan market. In the further analyses, we investigate the effect of non-bank lending on borrowers' operating performance and riskiness post-loan issuance.

4.1.4. Post-loan firm performance and risk-taking of borrowers with non-bank lenders

Table 4 presents the regression analysis for the borrowers' post-loan performance. In Panel A, the dependent variable is *EBITDA*. In column (1), the dependent variable *EBITDA* is averaged over three years following loan originations. The coefficient for *Non-bank* is negative and statistically significant at the 5 % level. The magnitude of the coefficient is 1.1 % compared with the sample mean of 10.6 %, indicating that the future profitability can be lower by approximately 10.4 % for non-bank borrowers compared to observably similar borrowers of banks. In columns (2) to (4), *EBITDA* takes the value at each year respectively, and we find that the coefficient is statistically significant within two years after loan origination. In Panel B, the dependent variable is *ROA*, and we observe qualitatively similar results to those in Panel A, with the coefficient being statistically significant for one year after loan origination.[12]

One potential explanation for the lower post-loan performance of non-bank borrowers is the higher level of risk-taking. Prior studies document that borrowers of leveraged loans have low credit quality, therefore closer to financial distress (Lim et al., 2014; Berlin et al., 2020). Consequently, they have incentives for risk-taking, which can potentially detriment their value and operating performance (Jensen and Meckling, 1976; Eisdorfer, 2008). In addition, prior research also provides evidence that lender monitoring can effectively reduce firms' risk-taking (Smith and Warner, 1979; Gilje, 2016; Saunders and Song, 2018; Hong et al., 2021). Therefore, we predict that inadequate of monitoring from non-bank lead arrangers might induce firms to engage in more risk-taking, resulting in lower operating performance.

In Table 5, we test whether non-bank borrowers take more risk than bank borrowers post-loan issuance using *Stock Return Volatility, Idiosyncratic Risk, EBITDA Volatility*, and *ROA Volatility*, which are proxies for measuring risk-taking. We find consistent evidence that borrowers of non-banks have higher risk levels in the three years following loan originations. Using *Idiosyncratic Risk* as an example, the coefficient has a magnitude of 2.3 %, indicating an economic magnitude that accounts for 4.7 % of the sample average (48.5 %).

We next explore the potential sources of higher risk-taking by borrowers of non-banks. Prior research shows that acquisition activities and asset growth could be potential channels through which managers increase firms' risk-taking, which could lead to poor performance (Jensen, 1986; Titman et al., 2004; Cooper et al., 2008; Cain and McKeon, 2016). In Table 6, we examine borrowers' acquisition expenses and asset growth following loan originations. In Panel A, we find that non-bank borrowers have higher acquisition expenses, and the effect is concentrated within the first year after loan origination.[13] Similarly, in Panel B, we observe that asset growth is greater for non-bank borrowers and the effect is statistically significant within the first year after loan origination. These results suggest that higher risk of non-bank borrowers post-loan issuance could be driven by their higher acquisition activities and higher asset growth.

Overall, our findings corroborate previous studies arguing that non-banks have lower monitoring incentives and capabilities than banks

Table 4
Borrower performance post-loan issuance. This table presents OLS estimation results for borrower performance post-loan issuance using the entropy balanced sample of leveraged loan borrowers on the firm-year level. Firm-level control variables are *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables are *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* On the firm-year level, continuous loan term variables are averaged; loan term dummy variables take the value 1 only if any facility in the firm-year takes the value 1. The variables are defined in Appendix 1. Industry dummies are based on the 12 Fama-French industries. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A.

Dependent Variable: *EBITDA*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Non-bank	−0.011***	−0.010***	−0.011**	−0.006
	(−3.05)	(−2.71)	(−2.54)	(−1.17)
Constant	−0.034	−0.053	0.064**	0.029
	(−0.85)	(−1.33)	(2.01)	(0.77)
Controls	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6970	6952	6350	5824
R-squared	0.554	0.605	0.440	0.360

Panel B.

Dependent Variable: *ROA*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Non-bank	−0.014***	−0.012**	−0.006	−0.002
	(−2.79)	(−2.24)	(−1.21)	(−0.33)
Constant	−0.110**	−0.166***	0.015	−0.005
	(−2.35)	(−3.50)	(0.42)	(−0.14)
Controls	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6827	6725	6161	5649
R-squared	0.448	0.459	0.362	0.280

[11] See also Rajan and Winton (1995), Barclays and Smith (1995).

[12] Given that non-bank borrowers on average have higher interest expenses while *ROA* is a measure after the deduction of interest payments, we adjust the ROA by adding the interest expenses from the Compustat.

[13] One possibility is that non-banks are more likely to participate in syndicated loans that are specifically for acquisition purposes. In un-tabulated analysis, we examine whether loans originated by non-bank lead arrangers are more likely to be M&A related. Following Chen and Wu (2021), we define acquisition loans to be those with purposes, "Takeover", "Acquisition Line", and "Merger". We do not find evidence suggesting that non-bank originated loans are more likely to be M&A related.

Table 5
Borrower risk-taking post-loan issuance. This table presents OLS estimation results for borrower risk-taking post-loan issuance using the entropy balanced sample of leveraged loan borrowers on the firm-year level. Firm-level control variables are *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables are *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* On the firm-year level, continuous loan term variables are averaged; loan term dummy variables take the value 1 only if any facility in the firm-year takes the value 1. The variables are defined in Appendix 1. Industry dummies are based on the 12 Fama-French industries. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A.

Dependent Variable: *Stock Return Volatility*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Non-bank	0.023***	0.015	0.017*	0.017
	(2.65)	(1.54)	(1.75)	(1.60)
Constant	0.685***	0.566***	0.684***	0.655***
	(12.83)	(10.87)	(9.17)	(8.51)
Controls	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6889	6869	6236	5667
R-squared	0.590	0.583	0.532	0.479

Panel B.

Dependent Variable: *Idiosyncratic risk*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Non-bank	0.022***	0.010	0.015*	0.018*
	(2.63)	(1.19)	(1.75)	(1.86)
Constant	0.711***	0.564***	0.727***	0.680***
	(14.15)	(10.85)	(10.49)	(9.78)
Controls	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6837	6815	6185	5634
R-squared	0.604	0.613	0.537	0.488

Panel C.

Dependent Variable:	(1) EBITDA Volatility$_{[t+1, t+3]}$	(2) ROA Volatility$_{[t+1, t+3]}$
Non-bank	0.005**	0.008**
	(2.17)	(1.97)
Constant	0.098***	0.101***
	(6.67)	(4.02)
Controls	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes
Observations	5802	5550
R-squared	0.439	0.387

Table 6
Borrower expansion post-loan issuance. This table presents OLS estimation results for borrower expansion, i.e., *Acquisition Expenses* and *Asset Growth*, post-loan issuance using the entropy balanced sample of leveraged loan borrowers on the firm-year level. Firm-level control variables are *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables are *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* On the firm-year level, continuous loan term variables are averaged; loan term dummy variables take the value 1 only if any facility in the firm-year takes the value 1. The variables are defined in Appendix 1. Industry dummies are based on the 12 Fama-French industries. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A.

Dependent Variable: *Acquisition Expenses*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Non-bank	0.014**	0.028***	0.004	0.005
	(2.55)	(2.87)	(0.82)	(0.83)
Constant	0.098**	0.147*	0.043	0.134*
	(2.11)	(1.82)	(1.44)	(1.84)
Controls	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6876	6741	6161	5657
R-squared	0.200	0.205	0.154	0.118

Panel B.

Dependent Variable: *Asset Growth*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Non-bank	0.037***	0.073***	0.009	0.011
	(2.65)	(2.94)	(0.73)	(0.81)
Constant	0.209	0.164	0.217	0.321*
	(1.49)	(0.92)	(1.17)	(1.92)
Controls	Yes	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6970	6955	6359	5832
R-squared	0.236	0.232	0.187	0.147

(Drucker and Puri, 2009; Nandy and Shao, 2010; Chernenko et al., 2022; Beyhaghi et al., 2019).[14] Our study provides novel evidence highlighting the implications of less monitoring by non-bank lenders. Notably, we show that non-bank borrowers engage in higher risk taking and lower operating performance following loan issuance.

4.1.5. Test of the composition of lead arrangers

In the previous section, we present suggestive evidence that non-bank lending is associated with lower profitability and higher risk for borrowers. To further investigate the monitoring channel, we conduct an analysis exploring the heterogeneities within the borrowers of non-banks based on the extent of monitoring they receive.

So far, we have defined a borrower as a borrower of non-banks if the borrower contracts with any non-bank lead arranger during a year. However, it is likely that the borrower also contracts with bank lead arrangers within the same year, which may indicate that the borrower is still subject to the monitoring from bank lenders. We construct two additional dummy variables. *Non-bank Only* is a dummy variable, which is equal to one if the borrower only borrows from non-bank lead arrangers during a year. *Mixed Lenders* is a dummy variable, which is equal to one if the firm borrows from both non-bank and bank lead arrangers during a year. We use these two dummy variables to replace the *Non-bank* dummy in the regressions. Table 7 present our estimation results.

In Table 7, we conduct regressions considering lender composition based on the entropy balanced sample. In Panel A, column (1), we find that the effect of non-bank lending on post-loan *EBITDA* is concentrated within the borrowers who borrow from non-bank lead arrangers only during a year. The coefficient for *Non-bank Only* is negative and statistically significant, while the coefficient for *Mixed Lenders* is statistically insignificant. In addition, a Wald test rejects the hypothesis that the difference between these two coefficients is zero. In column (2), the dependent variable is the post-loan *ROA*. Again, we find that the negative effect of non-bank lending concentrates within the borrowers who borrow only from non-banks. In Panel B and Panel C, we find similar results for the firm risk measures.

Overall, we find that the negative effect of non-banks on post-loan performance disappears if their borrowers are still subject to monitoring from banks. These results are consistent with the hypothesis that

[14] One alternative explanation is that lenders renegotiate when there are temporary shocks to performance. If non-banks experience larger frictions when renegotiating, then non-banks will be less likely to renegotiate loans than banks when borrowers have improvements in performance. Empirically, this can result in a negative coefficient of the non-bank indicator. We find that most of our results are robust when we exclude amended loans from the sample, which are identified by the DealScan database.

Table 7
Test on the monitoring channel based on lender composition. Panel A presents OLS estimation results for borrower performance post-loan issuance incorporating the impact of mixed lenders, while Panel B and Panel C report estimation results for the measures of firm risk. We use the entropy balanced sample of leveraged loan borrowers for our regression analysis on the firm-year level. *Non-bank Only* is a dummy variable that is equal to one if a borrower only borrows from non-bank lead arrangers during a year, and zero otherwise; *Mixed Lenders* is a dummy variable that is equal to one if a borrower borrows from both non-bank and bank lead arrangers during a year, and zero otherwise. Firm-level control variables are *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables are *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* On the firm-year level, continuous loan term variables are averaged; loan term dummy variables take the value 1 only if any facility in the firm-year takes the value 1. The variables are defined in Appendix 1. Industry dummies are based on the 12 Fama-French industries. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A.

Dependent Variables:	(1) $EBITDA_{t+1,t+3}$	(2) $ROA_{t+1,t+3}$
(1) *Non-bank Only*	−0.019***	−0.021***
	(−3.35)	(−2.92)
(2) *Mixed Lenders*	−0.001	−0.004
	(−0.21)	(−0.61)
Constant	−0.031	−0.107**
	(−0.81)	(−2.34)
Wald Test F-Statistics (1) = (2)	6.74***	3.29*
Controls	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes
Observations	6970	6827
R-squared	0.56	0.45

Panel B.

Dependent Variables:	(1) *Stock Return Volatility*$_{t+1,t+3}$	(2) *Idiosyncratic Risk*$_{t+1,t+3}$
(1) *Non-bank Only*	0.043***	0.040***
	(3.17)	(2.97)
(2) *Mixed Lenders*	0.013	0.010
	(1.00)	(0.83)
Constant	0.691***	0.712***
	(12.78)	(14.08)
Wald Test F-Statistics (1) = (2)	2.97*	3.23*
Controls	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes
Observations	6889	6837
R-squared	0.59	0.61

Panel C.

Dependent Variables:	(1) *EBITDA Volatility*$_{t+3}$	(2) *ROA Volatility*$_{t+3}$
(1) *Non-bank Only*	0.014***	0.022***
	(3.35)	(3.44)
(2) *Mixed Lenders*	−0.000	0.001
	(−0.02)	(0.26)
Constant	0.113***	0.112***
	(6.13)	(4.07)
Wald Test F-Statistics (1) = (2)	8.68***	7.20***
Controls	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes
Observations	5802	5550
R-squared	0.42	0.37

non-bank lending is related to lower post-loan performance due to less monitoring.

4.2. Difference-in-difference: the leveraged lending guidance

In our cross-sectional analysis, we utilize the entropy balancing method to achieve covariate balance. However, our analysis may still suffer from omitted variable biases due to unobservable factors. To address this concern, we conduct a difference-in-difference analysis by exploiting an exogenous shock to the leveraged loan market, i.e., the leveraged lending guidance, regarding how the lenders changed their leveraged lending activities and the impact on the borrowers. In March of 2013, the OCC, Fed Board, and the FDIC jointly issued the guidance to banks on the appropriate origination of leveraged loans. Later in November of 2014, the agencies issued clarifications to commonly asked queries. Kim et al. (2018) document that regulated banks cut their leveraged lending after the guidance was clarified, while unregulated non-banks substituted banks in this market segment, undermining the effectiveness of the policy. The guidance altered the market structure as bank lending to the sector is curtailed but not non-bank lending (which increased). This plausibly exogenous variation allows us to get a robust causal estimate of the effect of non-bank lending on borrower outcomes. Hence, compared to the cross-sectional analysis above, this analysis accounts for potential non-observable factors confounding our results.

Table 8
Summary statistics for the guidance period. This table reports the summary statistics of firm-specific variables for the sample of leveraged loan borrowers from 2010/q1 to 2016/q4. Firm-specific variables are lagged for one quarter. Strict States (Non-Strict) are those states with strict (non-strict) banking regulators, where the regulatory leniency index is below (above) the sample median, and zero otherwise. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A.

Borrower Characteristics	Leveraged Loan Borrowers		
	(1)	(2)	(3)
	N	Mean	Median
Total Assets	21,198	4079.931	1238.453
Size	21,198	7.170	7.106
Leverage	21,198	0.295	0.271
EBITDA	21,122	0.030	0.030
ROA	21,198	0.005	0.008
MTB	21,198	1.659	1.401
Cash	21,198	0.125	0.075
Tangibility	21,198	0.287	0.203
CAPEX	21,198	0.014	0.008
Adjusted Altman-Z	21,198	1.288	1.299
Stock Return Volatility	21,198	0.433	0.386
Idiosyncratic Risk	21,198	0.362	0.322

Panel B.

Borrower Characteristics	Borrowers from Strict States			Borrowers from Non-Strict States				
	(1) N	(2) Mean	(3) Median	(4) N	(5) Mean	(6) Median	(5) - (2) *t*-test	(6) - (3) Wilcoxon
Total Assets	10,948	4981.702	1320.709	10,250	3116.753	1163.188	−14.55***	−11.63***
Size	10,948	7.298	7.162	10,250	7.034	7.041	−13.43***	−11.69***
Leverage	10,948	0.304	0.281	10,250	0.286	0.260	−5.83***	−6.69***
EBITDA	10,909	0.032	0.031	10,213	0.029	0.030	−7.03***	−6.68***
ROA	10,948	0.006	0.009	10,250	0.004	0.008	−5.84***	−7.65***
MTB	10,948	1.614	1.370	10,250	1.706	1.436	7.10***	8.45***
Cash	10,948	0.112	0.070	10,250	0.139	0.082	14.06***	11.06***
Tangibility	10,948	0.308	0.234	10,250	0.265	0.177	−13.09***	−15.58***
CAPEX	10,948	0.015	0.009	10,250	0.013	0.008	−7.38***	−5.19***
Adjusted Altman-Z	10,948	1.407	1.400	10,250	1.162	1.186	−13.62***	−13.69***
Stock Return Volatility	10,948	0.429	0.382	10,250	0.437	0.390	2.91***	4.63***
Idiosyncratic Risk	10,948	0.356	0.317	10,250	0.369	0.328	5.24***	7.35***

In this analysis, the treatment status of firms is determined by whether a firm is in a state with strict bank regulators. We utilize the data regarding bank regulator leniency for each state provided by Agarwal et al. (2014). Agarwal et al. (2014) construct the index based on the spreads between the CAMELS ratings assigned by the federal and state regulators using a regression approach for each state. They find that in general federal regulators assign higher CAMELS ratings which indicate worse outcomes for banks. Therefore, a higher value of the index indicates more lenient state regulators. Chernenko et al. (2022) demonstrate that banks regulated by strict regulators are more likely to engage with non-banks. Therefore, we hypothesize that following the guidance clarification, borrowers in the states with strict bank regulators are more likely to shift to non-banks for debt financing or face a reduction in credit supply because banks may face stronger regulatory deterrents for their risky lending practices. Such a change in market structure could alter the extent of monitoring and availability of financial resources received for borrowers, thereby potentially affecting their outcomes post-loan issuance.

Specifically, we define a dummy variable, *Strict*, which equals one if a borrower is in a state where the regulatory leniency index is below the sample median, reflecting stricter regulatory oversight on banks, and zero, otherwise. Table 8 presents summary statistics of firm-specific variables at quarterly level for firms who participated in the US syndicated loan market during the period from 2010/q1 to 2016/q4. We find that borrowers from strictly regulated states are larger in size, more profitable (as measured by *EBITDA* and *ROA*), less risky (indicated by lower *Stock Return Volatility* and *Idiosyncratic Risk*) and have higher leverage ratios than those from non-strict states.

4.2.1. Non-bank lending after guidance clarification

Next, we test whether borrowers are more likely to shift to non-bank lead arrangers following guidance clarification by estimating the following equation:

$$Non-bank\ Lead_{il} = \alpha + \beta_1 \times Strict_i \times Post_t + \beta_2 \times Post_t + \beta_3 \times Strict_i + \gamma \times X_{it-1} + Industry - Year + Purpose_{il} + \epsilon_l \quad (4)$$

In Eq. (4), the dependent variable is *Non-bank Lead*, which is a dummy variable if a loan facility contains non-bank lead arrangers. The vector, X_{it-1} contains the firm-level control variables, which are lagged by one quarter. Industry-year fixed effects and loan purpose fixed effects are included. The sample period is from 2010/q1 to 2016/q4, while *Post* is a dummy variable indicating the period after the guidance clarification from 2014/q4 to 2016/q4.

In Table 9, column (1), we present the regression results using the linear probability model. We find that the coefficient for *Strict x Post* is positive and statistically significant showing that following guidance clarification, firms are more likely to borrow from non-banks. In columns (2) and (3), we also use the Probit and the Logit estimation and find similar results.

4.2.2. Leveraged loan issuance after guidance clarification

In addition, lenders may change their supply of credit following the guidance clarification. Therefore, we test whether lenders reduce their leveraged loan issuance following guidance clarification by estimating the following equation:

Table 9
Borrowing from non-banks around the guidance period. This table presents estimation results for firm's likelihood of borrowing from non-bank lead arrangers post-guidance period on the loan level. *Strict* is a dummy variable, which is equal to one if a borrower is from a state with strict banking regulators, where the regulatory leniency index is below the sample median, and zero otherwise. *Post* is a dummy variable, indicating the period after the leveraged lending guidance clarification, which is defined as 2014/q4 to 2016/q4. The sample period is from 2010/q1 to 2016/q4. In columns (1) to (3), we use the linear probability, probit, and logit model, respectively. Firm-level control variables are *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*; and contract term control variables are *Term Loan, All-in-drawn,* Log *(Facility Size), Financial Covenants,* Ln *(Maturity), Secured, General Covenants,* and *Refinance.* R-squared is reported in column (1); Pseudo R-squared is reported in column (2) and (3). *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Dependent Variable: *Non-bank Lead*	(1) Linear Probability	(2) Probit	(3) Logit
Strict × *Post*	0.056**	0.378**	0.829**
	(2.06)	(1.99)	(2.08)
Strict	−0.010	−0.041	−0.079
	(−0.45)	(−0.31)	(−0.30)
Post	−0.003	−0.021	−0.273
	(−0.07)	(−0.07)	(−0.41)
Constant	−0.202	−3.531***	−6.154***
	(−1.48)	(−4.31)	(−3.76)
Controls	Yes	Yes	Yes
Industry-Year Fixed Effects	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes
Observations	3624	3437	3437
R-squared / Pseudo R-squared	0.18	0.24	0.24

Table 10
Leveraged loan issuance by the lenders around the guidance period. This table presents estimation results for lenders' leveraged loan issuance around the guidance clarification. The dependent variable is the logarithm of one plus the number of leveraged loans originated by each lender in each state in each quarter. *Strict* is a dummy variable, which is equal to one if a state is with strict banking regulators, where the regulatory leniency index is below the sample median, and zero otherwise. *Post* is a dummy variable, indicating the period after the leveraged lending guidance clarification, which is defined as 2014/q4 to 2016/q4. Non-bank is a dummy variable that equals one if the lender is a non-bank. Log *(1+Total Issuance)* is the logarithm of one plus the number of all loans originated by each lender in each state in each quarter. The sample period is from 2010/q1 to 2016/q4. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Dependent Variables:	(1) Log (1+Leveraged Loans)	(2) Log (1+Leveraged Loans)
Non-bank × Strict × Post		0.012**
		(2.05)
Strict × Post	−0.006**	−0.008***
	(−2.30)	(−2.66)
Non-bank × Post		−0.002
		(−0.59)
Post	0.002	0.002
	(1.06)	(1.11)
Log (1+Total Issuance) × Post	−0.027***	−0.026***
	(−5.27)	(−5.23)
Log (1+Total Issuance)	0.759***	0.759***
	(135.25)	(135.17)
Constant	−0.010***	−0.010***
	(−7.97)	(−7.97)
Lender-State Fixed Effects	Yes	Yes
Observations	131,012	131,012
R-squared	0.70	0.70

Table 11
Borrower performance and risk around the guidance period. This table presents estimation results for firms' performance and risk post-guidance period on the firm-quarter level. *Strict* is a dummy variable, which is equal to one if a borrower is from a state with strict banking regulators, where the regulatory leniency index is below the sample median, and zero otherwise. *Post* is a dummy variable, indicating the period after the leveraged lending guidance clarification, which is defined as 2014/q4 to 2016/q4. The sample period is from 2010/q1 to 2016/q4. Firm-level control variables are one-period lagged *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*. In Panel A and B, *EBITDA* is excluded from control variables; in Panel C and D, *Idiosyncratic Risk* is excluded from the control variables. The variables are defined in Appendix 1. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Panel A.

Dependent Variable: *EBITDA*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Strict × *Post*	−0.003***	−0.003**	−0.004***	−0.004***
	(−2.75)	(−2.39)	(−3.11)	(−3.11)
Post	−0.002***	−0.003***	−0.001*	−0.001
	(−2.63)	(−3.49)	(−1.72)	(−1.56)
Constant	0.068***	0.055***	0.071***	0.069***
	(5.90)	(5.12)	(6.48)	(6.14)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	21,319	21,198	20,908	20,660
R-squared	0.115	0.103	0.071	0.046

Panel B.

Dependent Variable: *ROA*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Strict × *Post*	−0.003*	−0.002	−0.003**	−0.003**
	(−1.91)	(−1.42)	(−2.22)	(−2.03)
Post	−0.003**	−0.004***	−0.002**	−0.002**
	(−2.47)	(−3.58)	(−2.12)	(−2.21)
Constant	0.052***	0.030***	0.050***	0.050***
	(4.84)	(2.73)	(4.69)	(4.66)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	21,374	21,322	21,036	20,788
R-squared	0.09	0.07	0.05	0.04

Panel C.

Dependent Variable: *Stock Return Volatility*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Strict × *Post*	0.021**	0.018*	0.020**	0.021**
	(2.29)	(1.91)	(2.18)	(2.30)
Post	0.008	−0.001	0.007	0.015**
	(1.14)	(−0.11)	(1.08)	(2.25)
Constant	0.861***	0.962***	0.844***	0.740***
	(16.31)	(16.97)	(16.27)	(14.29)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	21,919	21,811	21,601	21,377
R-squared	0.12	0.12	0.10	0.08

Panel D.

Dependent Variable: *Idiosyncratic Risk*	(1) $t+1, t+3$	(2) $t+1$	(3) $t+2$	(4) $t+3$
Strict × *Post*	0.020**	0.017**	0.019**	0.020**
	(2.41)	(2.01)	(2.25)	(2.33)
Post	0.014**	0.008	0.014**	0.020***
	(2.30)	(1.33)	(2.33)	(3.21)
Constant	0.695***	0.784***	0.682***	0.596***
	(14.63)	(15.74)	(14.48)	(12.49)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	21,824	21,543	21,445	21,277
R-squared	0.15	0.14	0.13	0.11

$$Log\ (1 + Leveraged\ Loans)_{lst} = \alpha + \beta_1 \times Strict_l \times Post_t + \beta_2 \times Post_t + Log\ (1 + Total\ Issuance)_{lst} \times Post_t + Log\ (1 + Total\ Issuance)_{lst} + Lender - State_{ls} + \epsilon_l \quad (5)$$

In Eq. (5), the dependent variable is Log *(1+Leveraged Loans)*, which is the logarithm of one plus the number of leveraged loans issued in each state and quarter by each lender. The key independent variable $Strict_l$ is a dummy variable that is equal to one if a state is with strict bank regulators. To control for the lender size effect, we also include the logarithm of one plus of total number of loans issued in each state in each quarter, together with its interaction with the *Post* dummy. We use the *Lender-State* fixed effect in this regression, and the sample include the lenders that participated in the syndicated loan market from 2010/q1 to 2016/q4.

In Table 10, column (1), we find that the coefficient on the interaction term is negative and statistically significant at 5 % level. This result indicates that lenders reduced their leveraged lending after the guidance clarification in states with strict regulators. The stand-alone *Post* indicator represents the change in the leveraged loan issuance for the lenders based in state with lenient regulators. We observe that the coefficient for *Post* is smaller in magnitude and not statistically significant. In column (2), we modify the regression model by including the triple interaction term *Non-bank* × *Strict* × *Post* and mutual interaction term *Non-bank* × *Post,* where *Non-bank* is an indicator variable showing if the lender is a non-bank. The coefficient for the triple interaction term is positive and statistically significant, indicating that the decrease in the leveraged loan issuance is mitigated if the lender is a non-bank. This result suggests that the reduction in the leveraged loan lending concentrates within the bank lenders, which is consistent with previous research (Kim et al., 2018).

Our result supplements the previous result that the leveraged lending guidance made firms in strictly regulated states more likely to borrow from non-banks, but also induced a reduction in the overall supply of credit to these borrowers.

4.2.3. Firm performance and risk-taking

In this section, we investigate whether borrowers' operating performance and risk around guidance clarification vary depending on regulatory strictness of state where firms operate. We estimate the following regression model:

$$Y_{it} = \alpha + \beta_1 \times Strict_i \times Post_t + \beta_2 \times Post_t + \gamma \times X_{it-1} + \mu_i + \epsilon_i \quad (6)$$

where Y_{it} is the dependent variable, which denotes either firm-level performance, i.e., *EBITDA, ROA*, or firm-level risk, i.e., *Stock Return Volatility* and *Idiosyncratic Risk*. The regressions include firm fixed effects μ_i in all specifications which subsumes the coefficient on the *Strict* variable as it is time-invariant at the firm-level. We cluster standard errors at the firm level.

Table 11 presents our estimation results. In Panel A, column (1), the dependent variable is *EBITDA* which is averaged over three forward periods. The interaction term, *Strict* × *Post,* is negative and statistically significant at 1% level. This indicates that following guidance clarification, borrowers from strictly regulated states have larger decline in their profitability. From column (2) to (4), we use the dependent variable in each of the three forward periods and find that the coefficient estimates are statistically significant in all regressions. In Panel B, we use *ROA* as the proxy for profitability and we obtain qualitatively similar results.

In Panel C and D, the dependent variables are *Stock Return Volatility* and *Idiosyncratic Risk*, which are proxies for firm risk. We find consistent evidence that following guidance clarification, borrowers from strictly regulated states display larger increase in their risk.

Therefore, our results are consistent with the narrative that the leveraged lending guidance has triggered a migration of risky lending to non-banks. This effect has been shown to be more pronounced in states with strict bank regulators. An unintended consequence is that the borrowers who shift to non-banks are likely to experience reduced monitoring. Consistent with this, we find evidence that borrowers from strictly regulated states have worse outcomes in terms of lower profitability and higher risk, following the clarification of the leveraged lending guidance.

In an un-tabulated test, we repeat our analysis using the initial issuance in 2013/q1 as the shock. We find that coefficient on the interaction term is not statistically significant. This is consistent with

Table 12
Parallel trend test. This table presents the parallel trend estimation results for the borrower performance and risk taking around the guidance clarification on the firm-quarter level. *Strict* is a dummy variable, which is equal to one if a borrower is from a state with strict banking regulators, where the regulatory leniency index is below the sample median, and zero otherwise. The sample period is from 2010/q1 to 2016/q4. *Post (+2)* is a dummy variable that is equal to one if the period is from 2016/q1 to 2016/q4; *Post (+1)* is a dummy variable that is equal to one if the period is from 2014/q4 to 2015/q4; *Post (−1)* is a dummy variable that is equal to one if the period is from 2014/q1 to 2014/q3; *Post (−2)* is a dummy variable that is equal to one if the period is from 2013/q1 to 2013/q4; *Post (−3)* is a dummy variable that is equal to one if the period is from 2012/q1 to 2012/q4; *Post (−4)* is a dummy variable that is equal to one if the period is from 2011/q1 to 2011/q4. Firm-level control variables are one-period lagged *Size, Leverage, Cash, EBITDA, MTB, Tangibility, CAPEX, Adjusted Altman-Z,* and *Idiosyncratic Risk*. In column (1) and (2), *EBITDA* is excluded from control variables; in column (3) and (4), *Idiosyncratic Risk* is excluded from the control variables. The variables are defined in Appendix 1. *t-Statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10 %, 5 % and 1 % levels, respectively.

Dependent Variables:	(1) $EBITDA_{t+1,t+3}$	(2) $ROA_{t+1,t+3}$	(3) $Stock\ Return\ Volatility_{t+1,t+3}$	(4) $Idiosyncratic\ Risk_{t+1,t+3}$
Strict × Post (+2)	−0.004**	−0.002	0.006	0.006
	(−2.20)	(−1.11)	(0.51)	(0.56)
Strict × Post (+1)	−0.004**	−0.004*	0.019	0.020*
	(−2.07)	(−1.81)	(1.48)	(1.75)
Strict × Post (−1)	−0.002	−0.001	−0.011	−0.003
	(−1.18)	(−0.74)	(−1.05)	(−0.34)
Strict × Post (−2)	−0.001	−0.001	−0.012	−0.007
	(−0.77)	(−0.52)	(−1.26)	(−0.78)
Strict × Post (−3)	−0.000	−0.000	−0.007	−0.006
	(−0.18)	(−0.21)	(−0.74)	(−0.70)
Strict × Post (−4)	0.000	−0.000	−0.013*	−0.014**
	(0.36)	(−0.22)	(−1.84)	(−2.19)
Post (2)	−0.003**	−0.003*	−0.019*	0.008
	(−2.48)	(−1.82)	(−1.95)	(0.84)
Post (1)	−0.008***	−0.008***	−0.029***	−0.000
	(−5.44)	(−4.67)	(−3.13)	(−0.03)
Post (−1)	−0.006***	−0.006***	−0.060***	−0.019***
	(−4.65)	(−3.94)	(−7.46)	(−2.60)
Post (−2)	−0.004***	−0.003**	−0.070***	−0.029***
	(−3.38)	(−2.30)	(−9.72)	(−4.36)
Post (−3)	−0.003***	−0.003**	−0.021***	−0.002
	(−2.92)	(−2.12)	(−3.03)	(−0.33)
Post (−4)	−0.003***	−0.002**	0.039***	0.013***
	(−3.05)	(−1.98)	(7.20)	(2.62)
Constant	0.062***	0.048***	0.686***	0.636***
	(5.40)	(4.35)	(12.53)	(12.31)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	21,319	21,374	21,919	21,824
R-squared	0.13	0.11	0.20	0.16

Kim et al. (2018) showing that the initial guidance issuance did not trigger the migration of borrowers from banks to non-banks. Also, our results suggest that the leveraged lending guidance as a shock is plausibly exogenous. If the guidance were issued because the agencies anticipated the deteriorations in the real outcomes of borrowers, we should observe the negative impact on the treatment group at the initial issuance itself, which does not seem to be the case until after the clarifications.

4.2.4. Parallel trends

One major assumption for a valid difference-in-difference analysis is that there are no differential trends in the outcomes for the treatment and control groups before the shock. To test for the parallel trend assumption, we run regressions by dividing the sample period into multiple sub-periods. We construct several new dummy variables representing each sub-period: *Post (−5), Post (−4), Post (−3), Post (−2), Post (−1), Post (+1)*, and *Post (+2)*.[15] The period represented by *Post (−5)* serves as the base period, and, therefore, it is omitted from the regressions. We include the remaining dummies together with their interactions with the *Strict* dummy in the regressions. Table 12 presents our results.

In column (1), the dependent variable is *EBITDA*. We find that only the interactions *Strict* × *Post (+1)* and *Strict* × *Post (+2)* have statistically significant coefficients at 1 % level, and both are negative, while the coefficients on other interaction terms are relatively smaller and statistically insignificant. This result provides strong evidence that the effect of the leveraged lending guidance is only pronounced after the clarification. Similarly, in column (2) with *ROA* as the dependent variable, we find that only the interaction *Strict* × *Post (+1)* has a negative and statistically significant coefficient, providing support that the parallel trend assumption holds for our analysis. At last, in column (4), we find that the increase in *Idiosyncratic Risk* is driven by the first period after guidance clarification. Overall, parallel trend assumption is satisfied in our analysis.

5. Conclusion

In this paper, we provide evidence that non-banks and banks are not perfect substitutes in the syndicated loan market. We find that, on average, non-bank borrowers have lower profitability and higher risk during the post-loan period. Our findings are consistent with the view that non-banks provide less intense monitoring than banks. The leveraged lending guidance, which was issued in Q1:2013 and clarified in Q4:2014, triggered migration of leveraged loans to non-banks, post-clarification. Borrowers from states with strict bank regulators are more likely to borrow from non-bank lead arrangers, and have lower profitability and higher risk, post-clarification.

Our results provide support for the view that non-banks have lower monitoring incentives and capacity. Often, macroprudential policies which restrict the activities of the regulated sector can be rendered ineffective if the unregulated sectors fill the void created by the shrinking of the regulated sector. Our findings suggest that regulations (such as the leveraged lending guidance) which exclusively target the traditional banking sector, and thereby, trigger the migration of borrowers to the non-bank sector, maybe imprudent, beyond being ineffective.

CRediT authorship contribution statement

Sonny Biswas: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Neslihan Ozkan:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Junyang Yin:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization.

Appendix 1. Variable definitions

Loan Characteristics	
Leveraged Loan	A dummy variable that is equal to one if the facility is a leveraged loan, and zero otherwise. The LPC defines a leveraged loan as "loan to a borrower rated BB+/Ba1 or lower with pricing thresholds based on market trends which change over time".
Non-bank	A dummy variable that is equal to one if a facility has at least one non-bank lead arranger, and zero otherwise. On the firm year level, this variable is equal to one if a borrower ever borrowed from non-bank lead arrangers during a year, and zero otherwise. Non-bank institutions include "Finance company", "HF/PE", "Mutual fund", "Pension fund", "CDO", "Insurance company", and "Other" following the classification method by Lim et al. (2014).
Bank	Bank institutions include "Commercial bank" and "Investment bank" following the classification method by Lim et al. (2014).
Non-bank Only	A dummy variable that is equal to one if a borrower only borrows from non-bank lead arrangers during a year.
Mixed Lenders	A dummy variable that is equal to one if a borrower borrows from both non-bank and bank lead arrangers during a year.
Facility Size	The total dollar amount of a facility.
Log (Facility Size)	The logarithm of facility size in million dollars.
Term Loan	A dummy variable that is equal to one if the facility is a term loan, and zero otherwise.
Maturity	The maturity of a facility in months.
Ln (Maturity)	The logarithm of *Maturity*.
Secured	A dummy variable that is equal to one if a facility includes collateral, and zero otherwise.
Financial Covenants	A dummy variable that is equal to one if a contract includes financial covenants.
General Covenants	A dummy variable that is equal to one if a contract includes general covenants. General covenants include equity issuance sweep, excess cash flow sweep, asset sales sweep, debt issuance sweep, insurance proceeds sweep, dividend restrictions, and a clause which requires lenders to hold certain amount of commitments to approve any modifications to the deal.
Refinance Loan	A dummy variable that is equal to one if the facility is a refinance loan, and zero otherwise.
All-in-drawn	"The amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with any annual (or facility) fee paid to the bank group." (According to DealScan). If a facility is a fixed-rate facility, we calculate the all-in-drawn as the average of the maximum and minimum number of the basis points added to the current interest level. We scale the variable to the percentage term.
Firm Borrower Characteristics	
Total Assets	The total amount of assets in millions.
Size	The logarithm of the total amount of assets.

(*continued on next page*)

[15] *Post(−5)* denotes the period from 2010/q1 to 2010/q4; *Post(−4)* denotes the period from 2011/q1 to 2011/q4; *Post(−3)* denotes the period from 2012/q1 to 2012/q4; *Post(−2)* denotes the period from 2013/q1 to 2013/q4; *Post(−1)* denotes the period from 2014/q1 to 2014/q3; *Post(+1)* denotes the period from 2014/q4 to 2015/q4; and *Post(+2)* denotes the period from 2016/q1 to 2016/q4.

(*continued*)

Leverage	The ratio of long-term debt plus debt in current liabilities to the current total assets.
EBITDA	The ratio of earnings before interest to the average of lagged and current total assets.
ROA	The ratio of income before extraordinary items plus interest expenses over the average of lagged and current total assets.
Adjusted Altman-Z	The Adjusted Altman-Z Score is calculated as 1.2*working capital/total assets + 1.4*retained earnings/total assets + 1.0*sales/total assets.
MTB	The total assets minus the common equity, plus the common shares outstanding times the annual close price per share, divided by the current total assets.
Cash	The ratio of cash and short-term investments to the lagged total assets.
Tangibility	The ratio of net property, plant, and equipment to the lagged total assets.
CAPEX	The ratio of capital expenditure to the lagged total assets.
Acquisition Expenses	The ratio of acquisition expenses over the lagged total assets.
Asset Growth	The yearly growth in total assets.
Stock Return Volatility	The annualized volatility on weekly stock return.
Idiosyncratic Risk	The annualized volatility on the residuals from the regressions of weekly stock return on lead, lag, and current return of the S&P Index, for each firm in each year.
EBITDA Volatility	The standard deviation of EBITDA over [t-2, t].
ROA Volatility	The standard deviation of ROA over [t-2, t].
Additional Variables	
Post	A dummy variable indicating the period after the leveraged lending guidance clarification, which is defined as 2014/q4 to 2016/q4
Strict	A dummy variable, which is equal to one if a borrower is from a state with strict banking regulators, where the regulatory leniency index (Agarwal et al., 2014) is below the sample median. The data can be found at Amit Seru's website.

Appendix 2. Lender classification process

We start with the commercial banks in our sample. A lender is classified as a commercial bank if it falls in the DealScan categories of "US Bank", "African Bank", "Asian-Pacific Bank", "Foreign Bank", "Eastern Europe/Russian Bank", "Middle Eastern Bank", "Western European Bank", or "Thrift/S&L". We also check the lenders with primary Standard Industrial Classification (SIC) codes of 6011 to 6082, 6712 or 6719, to identify additional commercial banks. We further add a lender to be commercial bank if we can find similar names classified as commercial banks in the LMW list, or the business description in Bloomberg or the company websites indicates that the company provides commercial banking services. Following Lim et al. (2014), we classify finance companies affiliated with commercial banks as commercial banks.

To identify investment banks, we start with DealScan category of "Investment Bank", and we check the lenders with primary SIC code of 6211 to identify additional investment banks. We further classify a lender as an investment bank if we can find valid references in the LMW list or the business description in Bloomberg or the company websites indicates that it provides investment banking services. To identify insurance companies, we check the lenders in the DealScan category "Insurance Company" and with primary SIC codes of 6311 to 6361, 6399, or 6411.

To identify hedge funds and private equity funds (HF/PE), we start with the DealScan category "Institutional investor – Hedge fund". We add a lender to be HF/PE if we can find valid references in the LMW list. Following Lim et al. (2014), we examine a lender's business description in Bloomberg or the company websites and classify it as HF/PE if the lender engages in hedge fund or private equity fund activities or manages assets for high-net worth individuals. In addition, if we can find a similar name for a lender in the Lipper TASS database, we do a further investigation to check if the lender is likely to engage in hedge fund activities based on our sources of information.

To identify finance companies, we start with the DealScan category "Finance Company". We manually check each lender in this category and some lenders are re-classified as other types, while some remain in this category according to the LMW list and the business descriptions in Bloomberg or the company websites. For other lenders whose types are ambiguous, like the ones not classified by the DealScan, "Institutional Investor – Other," or "Other", we add a lender to the category if we can find similar names in the LMW list who are classified as finance companies, or the business description indicates that the lender provides financial services, but it does not explicitly indicate that the lender belongs to other types.

Finally, if a lender's information is limited or its type is still ambiguous after we resort to our sources of information including the DealScan classifications, we classify it in the category "Other".[16] We exclude lenders who are not financial firms according to the business descriptions. We append the sample of lenders by additional 465 lead arrangers.

Data availability

Data will be made available on request.

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[16] We don't identify additional mutual funds, pension funds, and CDOs. Pension funds and insurance companies seldom act as lead arrangers. Some CLOs are classified as "CDO", while some CDOs or CLOs are classified as "HF/PE" by Lim et al. (2014). We follow their method of classification.

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