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Abstract

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JEL Classification: G30, G20

Keywords: cost of debt, Collateral Laws, Access to credit

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1. Introduction

Collaterals are specific assets of a borrowing firm pledged against a loan taken to secure repayment to the lender. Broadly used worldwide, they appear in loan contracts accounting for over two-thirds of those issued in recent years.[1] A plausible reason for the use of collaterals, as indicated by the theories on secured debt (e.g., Smith and Warner, 1979; Bester, 1985; Stulz and Johnson, 1985; Besanko and Thakor, 1987; Boot, Thakor, and Udell, 1991; Rajan and Winton, 1995) is that they help reduce the frictions and agency costs associated with debt financing. Specifically, all else equal, collaterals make obtaining credit easier for firms. Thus, to increase credit access for firms, particularly small and medium enterprises (SMEs), many countries have reformed their legal framework to allow for more types of assets, specifically movable assets, such as equipment and machinery, and inventories, to be used as collaterals in secured credit transactions in addition to the widely accepted immovable assets, such as land and buildings.[2] While these reforms have made credit more available for firms,[3] their impact on the cost of credit remains underexplored. Since the cost of debt is a critical factor in corporate decisions about daily operations and new investments, we examine the effect of collateral reforms on firms' debt financing costs.

[1] Using all loan contracts with information on the existence of collateral requirement in the DealScan database, we calculate the fraction of the dollar amount of secured loans over all loans issued in each year and find that the fraction of secured loans exceeds 60% in most of the years after 2000. According to the U.S. Board of Governors of the Federal Reserve System i, the percentage of commercial and industrial loans secured by collaterals has also stayed around 60% since 2016 in the United States. Data retrieved from FRED, Federal Reserve Bank of St. Louis: https://fred.stlouisfed.org/series/ESANQ, January 12, 2022.

[2] In the 1990s, a number of Eastern European countries, such as Poland and Romania, implemented laws that made movable assets legally pledgeable (Campello and Larrain, 2016). More recently, the World Bank Group has been assisting its government clients, such as China, Colombia, and Nigeria, in modernizing legislation concerning secured transactions and building electronic collateral registries to facilitate secured lending. For more information see https://www.worldbank.org/en/topic/financialsector/brief/collateral-registries

[3] Campello and Larrain (2016) document an increase in the leverage ratio of firms in the Eastern European countries that enlarged the collateral menu to include movable assets. The World Bank Group also reports a significant increase in the origination of secured loans involving movable assets in the reforming countries.

We focus on the collateral reforms in Europe, which pioneered the modernization of the legal framework for secured lending with movable collaterals. Before the reforms, movable assets could not be credibly pledged as collaterals to obtain debt financing. Specifically, they could be easily moved or misappropriated, which led their asset value to be undersized by creditors in case of default. While many firms were abundant with movable assets, their transferable nature made them hardly accepted by banks. Accordingly, the traditional legal system typically required the physical transfer of movable assets to creditors to establish security interests (i.e., possessory interests) over these assets, which imposed immense costs on firms because they could not use the equipment and machinery for their business operations once they were pledged to a third party. Therefore, writing a standard loan contract secured by movables with a bank was remarkably challenging for firms. These restrictions, however, were effectively removed following the reforms that legally allowed for non-possessory security interests to be taken over movable assets. Specifically, the legal reforms allowed a firm to pledge a movable asset, such as equipment and machinery, to a bank while still physically possessing it without compromising its operational flexibility. Moreover, the reforms required the establishment of collateral registries to improve transparency in the claims over movable collaterals, thus reducing the risk of misappropriation.[4] As a result, the menu of collaterals has been effectively enlarged because both borrowers (lenders) are more able to supply (accept) movable assets to secure a loan. The various classes of movable assets form the new contracting space for the negotiation of prices and terms of secured lending. Yet, the real implication of the cost of debt is theoretically ambiguous.

[4] Haselmann, Pistor, and Vig (2009) show that banks are more willing to lend to firms in an effective collateral regime that recognizes non-possessory security interests in movable assets. Love, Martinez Pería, and Singh (2016) document an increase in bank financing after the introduction of collateral registries for movable assets, particularly for small, young firms.

At the extensive margin, when firms previously unable to borrow from banks could access bank credit after the reform, the cost of borrowing decreased from a prohibitively high level that prevented them from borrowing to an affordable level. The subsequent reduction in the cost of debt cannot be captured in data because none of their loans were observable before the reform. Therefore, we focus on the average cost of debt at the intensive margin, whereby firms already having access to the debt capital market are given more options to secure loans under the new legal framework.

On the one hand, having movable assets as legally pledgeable collaterals could decrease firms' average cost of debt for the following reasons. First, as shown by Jensen and Meckling's (1976) and Myers' (1977) theoretical works, having more collaterals, including movable assets, could decrease the cost of debt by reducing the agency problems arising from the conflict of interests between shareholders and debtholders. Specifically, as creditors can seize the collaterals when firms default, they can spend fewer resources on negotiating contract terms and monitoring firms' observance of these terms, the cost of which is otherwise borne by the shareholders in the form of a higher interest rate in the absence of collaterals (Stulz and Johnson, 1985). Second, securing debt with movable assets can limit firms' cash payouts and asset substitution because it prevents firms from selling the pledged assets for dividends or exchanging them for a riskier asset (Smith and Warner, 1979; Stulz and Johnson, 1985). Moreover, with more movable assets available to secure debt, firms can finance more positive net present value (NPV) projects, if available, thus reducing underinvestment problems and increasing firm value (Stulz and Johnson, 1985).[5] Firm value can be further enhanced by the possibility of pledging movables without

[5] If firms can finance the purchase of an asset by issuing new debt and securing it with the purchased asset, the security provision can divert some payoffs of the new investment from existing debtholders to shareholders and increase their incentives to accept positive NPV projects (Stulz and Johnson, 1985).

transferring physical possession to preserve firms' operational flexibility. In these regards, the cost of debt can be further reduced for firms owing to lower risks and greater distributable cash flows to debtholders.[6]

On the other hand, the legal reforms that enlarged the collateral menu may increase the debt cost for three reasons. First, investors of debt newly issued after the reforms, anticipating firms to issue more secured debt to finance subsequent investments, may ask for a higher interest rate as compensation for potential redistribution of their wealth to shareholders as a result of the anticipated action (Stulz and Johnson, 1985). Although wealth redistribution may also incentivize firms to mitigate underinvestment problems and increase firm value, the cost to debtholders may still exceed the benefit if firms do not have many positive NPV projects to take. Second, as predicted by Rajan and Winton's (1995) model, when assets that depreciate quickly, such as inventories, are used as collaterals to secure a debt, a strong signal of borrower difficulty is transmitted to the market, which in turn induces debtholders to demand a higher interest rate.[7] Third, creditors may incur extra monitoring costs to ensure that the collaterals are not subject to potential misappropriation by the borrowers (Stulz and Johnson, 1985). As the collateral reforms make movable assets pledgeable without the physical transfer of the assets to creditors, the creditors may be concerned about improper sales or the substitution of the assets pledged, thereby imposing a higher interest rate to compensate for the specific monitoring costs.

In sum, the impact of allowing the pledging of movables on the cost of corporate credit is an empirical question. To answer this question, we use a difference-in-differences (DID) approach

[6] The benefits have accrued to not only debtholders secured by movables but all other debtholders, albeit not uniformly.
[7] Upon receiving the negative signal from newly issued debt secured by movables, existing debtholders may also refuse to roll over loans that increases the likelihood of firm liquidation. Thus, investors of the newly issued secured debt need to commit more resources to monitoring to mitigate or reverse the negative externality, which will induce them to charge a higher interest rate as well.

and exploit two sources of variation in estimating the effects of reforms that enlarge the collateral menu. First, we compare firms in a reforming country before and after the reform. The staggered nature of the collateral law reforms allows us to better isolate the impact of collateral laws than a one-time shock to a single economy. Second, we differentiate firms based on the extent to which they operate in sectors that rely on the use of machinery and other movable assets owing to the nature of the sector's operation and production (Campello and Larrain 2016). Presumably, firms in industries that rely more intensively on movable assets are subject to a more significant impact from the legal reform that expands the class of pledgeable assets to movables. We use industries in the US as the benchmark to measure the reliance on the use of movable assets in the absence of financing constraints because (1) the US presumably has the most efficient financial market and the most advanced production technologies in the world, enabling its firms to adopt a desired mix of fixed and movable assets in production,[8] and (2) it has the state-of-art legislation for secured transactions over movable assets, whereby the use of movables as collaterals is almost legally frictionless.[9] This strategy mirrors the spirit of Rajan and Zingales (1998), who measure the degree of external financial dependence based on U.S. industries and identify the causal effect of financial dependence on economic growth by differentiating firms along this dimension in their seminal work. In a similar vein, this empirical strategy enables us to better isolate the effects of collateral-menu-enlarging reforms on the cost of credit.

Specifically, we conduct our baseline analysis at the facility level of syndicated loans. We focus on the major loan types, namely, revolvers and term loans, issued by publicly listed firms in European countries from 1995 to 2019. Loan information is obtained from the DealScan database,

[8] Movable assets account for about 60% of capital stock in U.S. firms (World Bank, 2019).
[9] Article 9 of the Uniform Commercial Code in the U.S. is regarded as the state-of-the-art legislation on secured transactions over movable assets. Owing to its efficient legal environment for secured transactions, movable assets have been employed as collaterals in about 70% of small business lending in the US (World Bank, 2019).

which is further matched with the financial information of the public firms covered by the Worldscope database. To mitigate the impact of potentially confounding events during a long sample period, we restrict the observations in the treated countries to within 10 years before to 10 years after each reform.[10] Thus, our sample consists of 1,377 firms with 5,564 facilities from 3,721 deals (packages) in 28 European countries from 1995 to 2019.[11]

We measure the costs of debt using loan spreads. As mentioned above, our empirical strategy compares the loan spreads of firms operating in sectors with high versus low movability of assets before and after the passage of the law enlarging the collateral menu. This strategy enables us to address potentially omitted variable bias by including, in addition to an assortment of the time-varying loan-, firm-, industry-, and country-level characteristics commonly used in debt pricing literature, firm fixed effects and country-year fixed effects, conditioning out the potential influences of time-invariant differences across firms and time-varying factors across countries (e.g., nationwide changes in political regimes, macroeconomic conditions, and legal frameworks).

Before conducting our core analysis, we test whether the collateral law reform affects secured debt issuance. Using the loan-level dataset, we find a 9% relative increase in the likelihood of secured loan issuances after the collateral laws become effective in the country for firms operating in a sector endowed with many movable assets. Then, in our baseline analysis of the impact of collateral reforms on loan spreads, we find a material relative increase in loan spreads for firms operating in sectors with high-movable assets after their country adopted the collateral

[10] As firms do not issue loans as frequently as each year, this window preserves an adequate number of loan observations for each firm to ensure the precision of estimation based on our DID design with firm fixed effects. The results are robust within a window from five years before to five years after each reform.

[11] We start from 59,417 facilities issued by non-financial firms in European countries from 1995 to 2019 in DealScan Database, among which we retain 22,297 facilities by requiring basic loan variables, such as all-in spread drawn and facility amount, to be available, and focusing on two major loan types, namely, term loan and revolver. Then, we further restrict to public firms covered by the Worldscope database. Finally, we end up with a sample of 1,377 firms that issued 5,564 facilities in 3,721 deals.

law reform. Depending on the specifications, the relative increase in loan spread is up to 15%. As the mean spread before the reforms is 134 basis points, the reforms result in a jump of up to 20 basis points in the average cost of debt, which translates into an increase in annual interest expenditures of about 0.7 million USD per loan facility given the average loan size. These findings are consistent with the view that following the expansion of the legal collateral menu, banks charge a higher price from borrowers, as they anticipate potential wealth redistribution induced by newly issued debts, take movable collateral as a negative signal on firms' credit quality, or pay extra monitoring costs to mitigate the concerns about improper sales or substitution of the pledged assets.[12]

We conduct several robustness checks to evaluate whether our baseline results are sensitive to different model specifications, samples, and estimators. We find that our core findings are robust to (1) including more granular fixed effects (e.g., lender fixed effects), (2) controlling additional confounding factors, (3) restricting to firms that have loan issuance both in pre- and post- reform years, (4) using a shorter window from five years before to five years after each reform, (5) excluding all U.K. firms, and (6) using robust estimators to address the criticism that the treatment estimate obtained from staggered law DID can be biased when early adopting countries are improperly used as control (e.g., Larcker and Wang, 2022). Next, we examine different identification issues and run several tests to address the omitted variables and reverse causality concerns. First, we show that loan activities in a country cannot predict the timing of a country adopting collateral laws. Second, our dynamic analyses show that loan spreads exhibit no difference between industries with differential levels of movability before a country enacts

[12] As shown in the channel analysis below, we find that the increase of loan spreads is greater (1) among industries with lower growth opportunities, where the cost of wealth redistribution is greater, (2) when firms have higher risks of default, and (3) when the legal environment is weaker, namely, when the risk of misappropriating movable collaterals is higher.

collateral laws, and the positive effects of the laws only take place after the effective year. Furthermore, when we replace the event time with a randomized one, the placebo effect is statistically indistinguishable from zero. Collectively, our findings mitigate the concern that our baseline results are driven by omitted variables.

We then examine the underlying channels through which collateral reforms affect the cost of debt. Specifically, we investigate whether the cost-increasing effects on debt financing caused by the collateral laws for movables-intensive companies vary in a theoretically predictable manner. To this aim, we distinguish firms by (1) the availability of growth opportunities, (2) the distance to default, and (3) the strength to which the legal system protects creditors' rights in the country where they operate. To the extent that wealth redistribution problems would particularly impact debtholders' benefits when firms do not have many positive NPV projects to take, banks would charge higher interest rates for firms with less growth opportunity. Furthermore, as using movable collateral can signal borrower difficulty, the treatment effects are more pronounced for firms closer to default. In addition, since creditors use higher interest rates to mitigate their concerns about pledged assets and compensate for extra monitoring costs, the treatment effects are more pronounced for borrowers in countries with weaker legal environments to ensure the claims on pledged assets. We find that the effects of collateral laws on debt financing costs are stronger among firms with lower growth opportunities or closer to default and in countries with a weaker legal environment. These cross-sectional heterogeneities are consistent with the argument that the laws induce anticipation effects and extra monitoring costs for creditors, with positive repercussions on financing costs.

Finally, we broaden our baseline implication by considering the effect on other loan terms after the law reforms. In particular, we find that creditors are particularly likely to include covenant

provisions in loan contracts when lending to firms in high-movable industries. These findings are consistent with the arguments mentioned above in support of the cost-increasing effect of the reform because an increase in covenants concentrates on those imposing requirements on leverage and financial performance, as well as those associated with asset sales and collateral release. Specifically, since these restrictions are likely to address the potential wealth redistribution effect of subsequent secured debt issuance and misappropriation of pledged assets, they complement the higher borrowing costs that we document above.

The paper makes the following contributions. First, it adds to the understanding of the effect of collateral law reforms that facilitate using movable assets as collaterals. Specifically, with a focus on the cost of debt, we extend the work of Campello and Larrain (2016) that documents an increase in firms' borrowing and investing activities following the collateral reforms in the Eastern European countries. Using a loan-level dataset covering 28 European countries, we find that expanding the collateral menu increases the average financing cost. The rise in cost is higher among firms with lower growth options or operating in countries with a weaker legal environment, which is in line with the findings of Calomiris et al. (2017) that the loan-to-value ratio of loans secured by movables (versus immovables) is lower in countries with weak collateral laws. In this way, we also add to the extensive literature examining the determinants of debt financing costs, including creditor rights (Qian and Strahan, 2007; Bae and Goyal, 2009), information asymmetry (Ivashina, 2009), political connections (Francis, Hasan, and Zhu, 2014), and democratization (Delis, Hasan, and Ongena, 2020).

Second, we add to the discussions on a more nuanced role of collaterals in debt financing. Previous research examines how the change in collateral value affects debt capacity and financing cost. Existing studies tend to agree on a positive (negative) correlation between collateral value

and debt capacity (cost), based on the evidence from the land and real estate market, which supplies the most widely used form of collaterals (e.g., Gan, 2007; Chaney, Sraer, and Thesmar, 2012; Cerqueiro, Ongena, and Roszbach, 2016, 2020). Another stream of work stresses the asset value based on redeployability. Tirole (2010) suggests that more redeployable collateral can be sold for a higher price in case of default, thus reducing the costs of external finance (Tirole, 2010), which is empirically confirmed by Benmelech and Bergman (2009), among others. Moreover, Falato et al. (2020) show that the form of collaterals matters. Their model implies that a shift toward intangible capital shrinks firms' debt capacity if only tangible capital can serve as collateral. Using patent collaterals in the US, Mann (2018) empirically finds that the pledgeability of intangible assets helps firms obtain debt financing. Our paper contributes to a more comprehensive understanding of the nuanced role of different forms of collaterals by exploring the effect of movable collateral law reforms on the cost of debt.

2. Data

2.1 Loan Spreads

We measure the debt costs using loan spreads and conduct our main analyses at the loan facility level. We obtain the loan data from Thomson Reuters Loan Pricing Corporation's DealScan database, which provides integrated loan information, including loan type, loan maturity, loan size, and covenants. These multi-dimensional records help us construct relevant loan-level variables. Following the standard practice in the literature (e.g., Graham, Li, and Qiu, 2008), we define loan spread as the amount of interest in basis points paid over the London Interbank Offered Rate (LIBOR) (or LIBOR equivalent) for each dollar drawn down. The loan spread includes the relative fees paid to the lending banks (i.e., the all-in spread drawn item in DealScan). To further mitigate positive skewness concerns, we take the logarithm form. Thus, our dependent variable,

Log (Loan Spread), is equal to the natural logarithm of the loan spread for a given loan facility. Table 1 provides the summary statistics of the key variables used in our analysis. As shown, the average loan spread in our sample corresponds to 165 basis points.

2.2 Sample Selection

We compile a facility-year-level dataset to evaluate how a country's reform of collateral laws affects debt financing costs. Specifically, we treat each loan facility in a year as a single observation, as a single loan package may consist of multiple loan facilities with varying interest rates. In particular, our sample starts with all 59,417 loan facilities in the DealScan database issued by non-financial firms in European countries from 1995–2019. We start from 1995, the year before the first country enforced the collateral law, and end in 2019, and 26,827 loan facilities remain when we further require that basic loan characteristics, such as spread, maturity, and size, are non-missing. We also restrict our attention to the most commonly discussed facility types (e.g., Lim, Minton, and Weisbach, 2014)—that is, revolvers and term loans—for easier treatment comparison, which leaves us with 22,297 facility observations. Then, we obtain data from Thomson Reuters' Worldscope database to construct firm-level control variables. Worldscope mainly covers financial data for publicly listed firms worldwide and provides standardized account information for easy comparison across countries. We manually match loan information to firms' financial statements in Worldscope based on the names and addresses of firms in both databases. A considerable portion of observations from non-listed firms is dropped after this mapping procedure. Furthermore, our sample for the main regressions is limited to a [−10, +10] window around the reform years for treated firms. The above screening procedures yield a combined dataset of 1,377 firms with 5,564 facilities from 3,721 deals in 28 European countries.

2.3 Collateral Law Reforms

We collect and consolidate information on security transaction reforms governing collateral usage among European countries from multiple sources, including projects conducted by legal practitioners (e.g., the Secured Transactions Law Reform Project), official legislative doctrines, and academic works on laws and finance (e.g., Campello and Larrain 2016; Castellano and Dubovec 2018). According to Castellano and Dubovec (2018), some European countries, such as Hungary, Romania, and Slovakia, reformed their collateral laws using the European Bank for Reconstruction and Development (EBRD) Model Law on Secured Transactions. France reformed the country's security transactions doctrines and passed Ordonnance 2006-346 based on the United Nations Commission on International Trade Law (UNCITRAL) Model Law. Other countries, such as Belgium and Italy, promulgated their own laws allowing pledging non-possessory movables based on international standards.

Collateral law reforms empower firms to make use of movable collateral more effectively, as they (1) allow parties to establish non-possessory interests over movable properties in secured debt transactions, (2) require the establishment of a collateral registry for movables, and/or (3) allow out-of-court enforcement for lenders to repossess the collateral in most of the countries. In this way, borrowers no longer need to physically transfer the possession of their movables to the creditors when pledging them as collateral. Thus, the reforms effectively enlarge the scope of assets that can be used to pledge as collateral.

We present the legal reform information across countries in Appendix A2. Specifically, the reform year indicates the effective year of a country's collateral law. If an effective year is missing, we use the law enactment year as the reform year. As shown, nine of the 28 European countries have passed a new legal doctrine that facilitates pledging movable assets as collateral in secured

lending. The passage of collateral laws is staggered among different countries, generating multiple shocks to multiple nations at different times. Accordingly, we construct a dummy variable, *Reform*, which equals 1 for a country in the years after the reform of such laws to facilitate the usage of movable assets as credible collateral in firms' loan issuance and 0 otherwise.

2.4 Industry-level Movable Asset Index

As the collateral reforms legally permit firms to pledge movables, such as machinery and equipment, in security transactions, we theorize that they have a more significant effect on firms operating in industries that use movable properties more intensively in production processes. Hence, we explore the extent to which cross-industry demand for movable assets varies due to the nature of production and technological factors. This strategy enables us to isolate the impact of reforms that enlarge the collateral menu on debt costs.

To evaluate an industry's inherent demand for machines and other movable properties, we use Campello and Larrain's (2016) method. Specifically, we retrieve data on the use of movable assets for firms in the US as the benchmark, as the US is considered the most developed financial market with the least financing frictions.: In other words, compared with firms in the rest of the world, U.S. firms face less severe financial constraints, and their use of movable assets is more likely to reflect the desired demand for these assets in their production processes.

To construct an industry-specific index of movable assets' demand, we extract the U.S. company data from Compustat using the period from 1983 to 1994—a decade prior to our sample period—and we compute the ratio of movable assets to the total assets for each firm in a year, where movable assets equal the sum of machinery and equipment and total inventory. Then, we compute the average of this movable-to-total-assets ratio for each firm over the decade, and for each 2-digit SIC industry, we take the median value across firms as the industry's movable assets

index. Finally, we construct *High Movable Assets*, which is an indicator that equals 1 if an industry's movable index is over the sample median and 0 otherwise.

2.5 Controls

To mitigate the concern that various loan-, firm-, and country-level characteristics could shape debt pricing, we include an assortment of controls that are commonly used in previous studies (e.g., Graham, Li, and Qiu, 2008; Delis, Hasan, and Ongena, 2020; Lin, Wei, and Zhao, 2022). For loan-level features, we control for loan size, maturity, and performance pricing indicator. For firm-level characteristics, we include several primary financial factors, namely *Log (Assets)*, *Log (Age)* (the natural logarithm of the age of a firm), *Market to Book*, *Leverage*, *ROA*, *Cash*, and *PPE*. As in Lin, Wei, and Zhao (2022), we also include additional controls that may influence firms' debt financing costs, including *R&D*, an indicator for firm-year observations where R&D data are missing, and *Closely Held*, the latter of which is defined as the fraction of shares held by insiders and large institutional investors of a firm. We also incorporate Z-score to capture a firm's distance to default. We further include a trend variable, *Industry Q*, defined as the median Tobin's Q of firms in the same 2-digit SIC industry in a given year following Lin, Wei, and Zhao (2022) to control for industry-wide growth opportunities. All continuous variables are winsorized at the top and bottom 1 percentile of their distributions to help mitigate concerns stemming from the influence of extreme values. Appendix A1 presents detailed definitions and data sources of all the variables used in this study.

3. Empirical Results

3.1 Collateral Law Reform and Issuance of Secured Loans

We begin with the impact of collateral reforms on loan issuance activities. As mentioned above, reforms aiming to expand the class of collaterals in loan contracts increase firms' ability to

issue secured debt, especially for firms operating with more movable assets. To evaluate the impact of collateral reforms on secured loan issuance, we estimate the following DID specification:

$$D\_Secured_{l,i,c,t} = \alpha_0 + \beta_0 \times Reform_{c,t} \times High\ Movable\ Assets_j$$
$$+\boldsymbol{\gamma X'_{i,t}} + \mu \boldsymbol{Z'_{l,t}} + \delta_i + \delta_{c,t} + \varepsilon_{i,c,t}, \quad (1)$$

where *l*, *i*, *j*, *c*, and *t* index loan, firm, industry, country, and year, respectively. The dependent variable is a dummy, $D\_Secured_{l,i,c,t}$, that indicates whether a loan facility is secured in a year. $Reform_{c,t}$ denotes a dummy variable that equals 1 if country *c* has reformed its collateral laws by year *t* and 0 otherwise. We differentiate industries by the intensity of their use of machinery and other movable assets; firms in high-movable-assets sectors should react more distinctly to the legal reform. $High\ Movable\ Assets_j$ equals 1 when a firm has an industrial movable asset index above the sample median and 0 otherwise. Thus, the coefficient β_0 captures the difference in changes of the likelihood of secured loans between firms in high- and low-movable-assets sectors before and after the legal reform. If the inclusion of movable assets as collateral facilitates borrowers' access to secured loans, we expect β_0 to be positive. We include a set of time-varying controls in Equation (1). $\boldsymbol{X'_{i,t}}$ denotes a vector of the time-varying firm and industry characteristics, namely *Log(Assets)*, *Log(Age)*, *Market to Book*, *Leverage*, *ROA*, *Cash*, *PPE*, *R&D*, *D_R&D Missing*, *Z-score*, *Closely Held*, and *Industry Q*. We also incorporate a set of loan-level characteristics ($\mu \boldsymbol{Z'_{l,t}}$), namely *Log (Loan Size)*, *Log (Maturity)*, and *Performance Pricing*. Moreover, we include firm (δ_i) and country-by-year fixed effects ($\delta_{c,t}$). Therefore, all country-specific traits and the linear terms of *Reform* and *High Movable Assets* are absorbed. Previous studies suggest that business loans can be classified into categories and that borrowers may take out loans for various reasons, such as corporate initiatives, debt repayments, working capital, and takeovers (Huang et al., 2018). These different types and purposes of loans are associated with varying levels of risk; hence, they may

be priced differently. Thus, we estimate the model regressions by incorporating loan type and loan purpose fixed effects. We estimate Equation (1) using ordinary least squared regression (OLS), with standard errors clustered at the country level to account for within-country correlations.

The results reported in Table 2 show that the coefficients on the interaction term $Reform_{c,t} \times High\ Movable\ Assets_j$ are significantly positive, suggesting that for firms operating in high-movable-assets sectors, the law reforms expanding collateral menus facilitate firms' access to secured loans. The results hold despite the fact that the stand-alone term, *Reform*, is included or regardless of whether the time-varying controls are incorporated or not. The economic magnitude is also substantial. As shown in column (4), with the full regression specification, after the legal reforms are adopted, there is a 9% higher increase in the likelihood of secured loan issuance for firms operating in high-movable-assets sectors. Specifically, our results support the validity of using the legal reform to identify changes in firms' accessibility to the secured loan market, which is the precondition for discussing and exploring the effect on loan cost and covenants.

3.2 Baseline Analysis

Next, we use a similar DID design to examine the impact of the reform on loan pricing. As mentioned above, the law reforms that enlarged the collaterals menu were adopted across countries in different years in our sample period. Thus, we classify firms into treatment and benchmark groups. The treatment group contains firms in the years after the countries adopt the collateral reforms, and the benchmark group includes firms in the years where the countries have not yet initiated the reforms. We then use the following regression model to test our hypothesis:[13]

[13] We also examine the aggregated impact of the reforms on loan spreads using the following specification:

$$Log(Loan\ Spread)_{l,i,c,t} = \alpha_1 + \eta_1 \times Reform_{c,t} + \boldsymbol{\gamma X_{i,t}^{'}} + \boldsymbol{\mu Z_{l,t}^{'}} + \delta_i + \delta_t + \varepsilon_{l,i,c,t.}$$

$$Log(Loan\ Spread)_{l,i,c,t} = \alpha_1 + \eta_0 \times Reform_{c,t} \times High\ Movable\ Assets_j$$

$$+\gamma \boldsymbol{X}'_{\boldsymbol{i,t}} + \mu \boldsymbol{Z}'_{\boldsymbol{l,t}} + \delta_i + \delta_{c,t} + \varepsilon_{l,i,c,t}, \quad (2)$$

where *l, i, j, c,* and *t* indicate the loan facility, the firm, the industry, the country, and the year, respectively. The dependent variable $Log(Loan\ Spread)_{l,i,c,t}$ is defined as the natural logarithm of the amount a borrower pays in basis points over the LIBOR rate (or equivalent) for each dollar drawn down from the loan. The key explanatory variable is the interaction term of *Reform* × *High Movable Assets*. *Reform* and *High Movable Assets* are defined as in Equation (1). Our focus is on the coefficient, η_0, which is a difference-in-differences estimator capturing the difference in changes in loan spreads between firms in high- and low-movable-assets sectors before and after the legal reform.

The specification includes various firm- and loan-level characteristics. $\boldsymbol{X}'_{\boldsymbol{i,t}}$ represents a set of time-varying controls (i.e., *Log(Assets), Log(Age), Market to Book, Leverage, ROA, Cash, PPE, R&D, D_R&D Missing*, *Z-score*, *Closely Held*, and *Industry Q*), while $\boldsymbol{Z}'_{\boldsymbol{l,t}}$ represents a set of loan traits (*Log (Loan Size), Log (Maturity)*, and *Performance Pricing*). δ_i and $\delta_{c,t}$ denote the firm and country-by-year fixed effects, respectively, that help condition out any time-invariant factors across firms and time-varying country characteristics. These fixed effects also absorb the linear terms of *Reform* and *High Movable Assets*. We also include loan type and loan purpose fixed effects. Appendix Table A1 provides detailed variable definitions. We estimate Equation (2) using OLS, with standard errors clustered at the country level.

As shown in Table 3, we find evidence that loan spreads increase significantly for firms in high-movable-assets sectors after their countries reform the collateral laws. Specifically, we adopt

The results are reported in Appendix Table A3. As shown, the coefficients on *Reform* are statistically non-significant on average.

a step-wise design and begin in column (1) with the specification incorporating the stand-alone term *Reform*. Then, we add the country-by-year fixed effects from column (2); therefore, the stand-alone terms are absorbed. We test the effect without any controls to mitigate the concern that some firm-level and loan-level controls may be endogenous. Next, in columns (3) and (4), we gradually add firm- and loan-level controls. Finally, we sub-group our whole sample by the loan type and present the results in columns (5) and (6).

Across all the columns, the interaction term, *Reform* × *High Movable Assets*, is positively and statistically significant. The economic magnitude is also meaningful. Following the legal reform, the loan spread increases up to 15% more for firms operating in high-movable-assets sectors than those operating in low-movable-assets sectors. Specifically, we witness an increase of 20 basis points (= 15% × 134) in loan spread, as the pre-reform loan spread is 134 basis points on average. Given that the average loan size in our sample is 342 million dollars, we calculate that the economic effect corresponds to a 0.7 million dollars (= 0.20% × 342) increase in annual interest expenses per loan issued. These results suggest that the collateral-enlarging reforms lead to higher debt financing costs, particularly for firms in highly movable industries. In addition to the key explanatory variables, the association between the control variables and loan spreads is also consistent with previous findings (e.g., Graham, Li, and Qiu, 2008; Lin, Wei, and Zhao, 2022). For example, loan spreads are negatively associated with firm size and profitability, and loan size, whereas they are positively associated with firm leverage and loan maturity.

3.3 Robustness Tests

3.3.1 Additional Controls

We conduct a series of robustness checks to strengthen our baseline findings. In column (1) of Panel A in Table 4, we try to mitigate the concern that our results are driven by banks lending

to riskier firms by relaxing lending standards when more movables become pledgable following the collateral reforms. We capture this confounding factor by incorporating an additional firm-level control, that is, the idiosyncratic volatility of stock returns (*IVOL_Stock Return*). Specifically, we extract daily stock returns data from DataStream Database, and for each firm-year, we run a standard market model. Idiosyncratic stock return volatility is defined as the standard deviation of residuals across a firm-year. The results show that the coefficient on the *IVOL_Stock Return* is positively significant, but the additional control cannot alter our main findings.

In column (2), we include an additional array of country traits interacted with *High Movable Assets* to our main specification. These additional controls help mitigate the concern that the increase in loan spread for high-movable assets firms after the reform might be driven by concurrent changes in a country's economic development or other legal reforms that are correlated with the collateral reform and shape financing costs differently between high- and low-movable-assets sectors. Following Lin, Wei, and Zhao (2022), we include an array of country traits: the logarithm form of GDP, GDP per capita, GDP growth rate, cross-border business activities measured as FDI, and governments' effectiveness index to capture legal strength across nations. These macro-level variables are collected from the World Bank. Specifically, we add the interaction term between the country traits (*GDP*, *GDP per capita*, *GDP growth*, *FDI*, and *Government Effectiveness*) and the index of movable assets. The results show that the treatment effect is not altered by controlling for these macro terms, and the coefficient on *Reform* × *High Movable Assets* is still positive and statistically significant.

Then, in columns (3) and (4) of Panel A, we add lender fixed effects and secured fixed effects, respectively. The results show that our results remain qualitatively the same. Specifically, the cost-increasing effect is not confounded by lenders' characteristics or loan security type.

3.3.2 Alternative Samples

Panel B of Table 4 presents the results for alternative samples. In column (1), we focus on the firms that have loan issuance covered by DealScan both before and after the reform years. Then, in column (2), we drop the observations from the UK, which account for the largest proportion of our whole sample. In column (3), we consider a shorter window to test Equation (2) by restricting the sample to a window of [−5, +5] years around the reform years. As shown in this panel, the coefficients of the interaction term *Reform* × *High Movable Assets* remain positive and highly statistically significant across all columns.

Recent work in econometric theory casts doubt on the validity and robustness of staggered DID designs (e.g., Baker, Larcker, and Wang, 2022). Accordingly, to address the potential problems with a staggered treatment design in the presence of the treatment effects heterogeneity, we provide a stacked regression as an alternative to our baseline panel specification following Cengiz et al. (2019). To do so, we first create a [-10, +10] window dataset for each of nine treated countries that have reformed their collateral laws during the sample period, respectively. We call each event-specific dataset as an event cohort, which includes one single treated country and all clean control countries. Clean control countries are those that do not have legal reforms around the 20-year panel around the event; other countries are dropped from this cohort. As we have nine treated countries in our baseline sample, there are nine event-specific cohorts. Then, we stack all nine cohorts and employ a regression specification analogous to the baseline specification to obtain an alternative DID estimation. Specifically, the included fixed effects are specific to each cohort (e.g., cohort-firm fixed effects). Robust standard errors are also clustered at the cohort-country level.

Colume (4) of Panel B reports the results of the stacked DID regressions. As shown, the interaction term *Reform* × *High Movable Assets* enters the regressions in a sizable and positively significant manner, which confirms our baseline findings. In other words, our findings are unlikely to be driven by the biases introduced by using improper control groups (e.g., those with early collateral reforms) in a staggered DID setting.

4. Identification Issues

In this section, we conduct several tests to strengthen the validity of our identification strategy and further mitigate the concerns of potentially omitted variables and reverse causality problems. First, in the hazard model, we mitigate the reverse causality concerns by showing that the bank loan activities in a country cannot predict the timing of that country adopting the collateral laws, which means that the pre-existing debt level cannot drive the passage of the laws and that the legal changes are exogenous, at least in our test setting. Second, by examining the dynamic effects, we find no evidence for a pre-trend; thus, the foundational assumption for our DID identification is not likely to be violated. Third, we conduct a placebo test to further condition out the omitted factor issue in our identification strategy.

4.1 Timing of Collateral Laws

As a validity test that mitigates reverse causality concerns, we examine whether the timing of the law enactment in a given country is affected by the pre-existing loan traits in that country. Following previous studies (e.g., Beck, Levine, and Levkov 2010), we use a hazard model and assume that the hazard rate follows a Weibull distribution to examine whether the pre-existing loan traits in a country predict the timing of when the country adopts the law.

The results reported in Panel A of Table 5 suggest that the pre-existing loan traits aggregated at the country level do not predict the timing of the law adoption by that country.

Specifically, the dependent variable is the natural logarithm of the expected time until the law adoption (i.e., survival time), and a greater value of survival time implies a lower likelihood of adopting the law. The loan-traits-related explanatory variables in the hazard model are loan spread, loan amount, and loan maturity, averaged across all loan facilities at the country-year level. We also control for country-specific economic traits, namely *Ave_Log(Assets)*, *Ave_Log(Age)*, *Ave_Market to Book*, *Ave_Leverage*, *Ave_ROA*, *Ave_Cash*, *Ave_PPE*, *Ave_R&D*, *Ave_Z-score*, *Ave_Closely Held*, and *Ave_ Industry Q*. In particular, we take the average value of each firm-level variable in the same country-year as the aggregated country-level controls. We also add the macro factors discussed above, including *Log (GDP)*, *Log (GDP per capita)*, *GDP Growth*, *FDI*, and *Government Effectiveness.* As shown, none of the loan trait measures in a country enters significantly, suggesting that the pre-existing loan traits, including loan spread, do not predict the timing of a country adopting the law. Thus, our findings are less likely to be subject to reverse causality concerns.

4.2 Dynamic Effects and Placebo Test

To further assess the validity of the empirical setting, we analyze the dynamic effect of the collateral reforms on the cost of debt. By tracing the changes in loan spread around the collateral reforms, we verify (1) whether potentially omitted factors influence the loan spread of the treated and control groups differentially before the reforms and (2) whether and when the actual effect of collateral reforms occurs after the reforms. We use the following regression specification in Equation (3) to conduct the analysis:

$$Log(Loan\ Spread)_{l,i,c,t} = \omega_0 + \sum_{\tau=-2}^{\tau=2+} \alpha_\tau \times Reform_{c,t}^{\tau} \times High\ Movable\ Assets_j$$

$$+\boldsymbol{\gamma X'_{i,t}} + \boldsymbol{\mu Z'_{l,t}} + \delta_i + \delta_{c,t} + \varepsilon_{l,i,c,t}, \quad (3)$$

where *l*, *i*, *j*, *c*, and *t* index loan facility, firm, industry, country, and year, respectively. $\sum_{\tau=2-}^{\tau=1} \eta_\tau \times Reform_{c,t}^{\tau}$ (where $\tau = -2, -1, 0, +1, 2+$) refers to a set of dummy variables indicating the relative year since country *c* reformed the law. For example, $Reform_{c,t}^{-1}$ equals 1 for country *c* if year *t* is one year before the reform of the law and 0 otherwise. $Reform_{c,t}^{1}$ equals 1 for country *c* if year *t* is one year after country *c* reformed the law and 0 otherwise. The dummy for at least three years before the reform is excluded, as it serves as the benchmark. Other variables are the same as in Equation (2). If unobservable confounding factors or systematic differences between the treated and control groups, other than collateral reforms, drive the cost of debt, we would expect to find significant changes in the loan spreads prior to the year of reform.

Panel B of Table 5 reports the estimation results of the dynamic analyses. The coefficients on $Reform_{c,t}^{-2} \times High\ Movable\ Assets_j$ and $Reform_{c,t}^{-1} \times High\ Movable\ Assets_j$ are statistically non-significant and economically small in columns (1) and (2), suggesting that the loan spreads in a country exhibit no difference between industries with different levels of movable assets index before the collateral reforms in that country, satisfying the parallel trend assumption. Specifically, the change in loan spreads of firms in industries operating with intensive use of movable assets evolves similarly to that of other industries in the same country before adopting the laws. The positive effects of the laws take place after the reform year. The dynamic effects presented in Table 5 Panel B further mitigate the omitted variable concerns.

We further conduct a randomized test to mitigate the concern that unobservable factors may confound our specification and further check the validity of our identification. To do so, we randomly assign sample countries to the treatment and control groups, regardless of whether they reformed the collateral law. We then define a variable *Pseudo-Reform* that equals 1 for the treatment firms and zero for control firms in this randomized sample and then re-run the baseline

regression after replacing *Reform* in Equation (2) with *Pseudo-Reform*. This approach effectively eliminates the effect of collateral reform but retains the impact of other non-randomized factors. If other confounding factors drive our baseline results for the relation between collateral reforms and loan spreads, the results should persist even in this randomized sample; otherwise, the results disappear. The results of the placebo test are presented in column (2) of Table 5, Panel B. We find that the interaction term *Pseudo-Reform* × *High Movable Assets* enters non-significantly, supporting the conclusion that the increasing effect on loan spreads is due to collateral reforms rather than potential confounding factors.

5. Mechanisms

In this section, we investigate whether the heterogeneous effects of the collateral reforms on debt costs vary across firms and countries in a theoretically predictable manner. More specifically, the cross-sectional analyses allow us to draw a more complete picture of the effect of the reforms, understand the mechanisms, and explore the channels through which expected changes in the collaterals menu affect the pricing incentives of debtholders.

5.1. Growth Opportunities

We start our heterogeneity analyses by distinguishing firms by their growth opportunities. As mentioned above, when firms can issue more secured debt with movable assets acceptable as collaterals after the reforms, two opposing implications are cast on the wealth of debtholders: First, debtholders anticipate a wealth redistribution to the shareholders with expanded borrowing capacity. Specifically, if shareholders subsequently issue new secured debt, part of the movables, which the previous lenders could have seized in case of default, would now be pledged to the new lenders and create value for the shareholders. Second, if the new debt issued is used for financing positive NPV projects, the created value can be shared by previous lenders. Therefore, given that

the potential wealth redistribution problems arise due to newly issued debts and harm debtholders more when firms do not have many positive NPV projects to take, banks charge higher interest rates for firms with lower growth opportunities. Thus, our results should be more pronounced for the low-growth-opportunity group.

We use country-industry-specific market-to-book ratios to gauge the degree of growth opportunities. For each country-industry-year, we calculate the average MTB ratio across firms to obtain an MTB ratio. A higher ratio indicates higher growth potential or more promising investment projects available for firms. Then, we distinguish the observations by whether the market-to-book ratio is above the sample median value or not.

Table 6 presents our sub-sample estimation results. As shown, we find that the increase in the loan spread of firms operating in high-movable-asset sectors following the collateral reforms only holds in the low-growth-opportunity group. Specifically, the estimated coefficient on *Reform* × *High Movable Assets* is significantly positive at the 1% level in the low-growth-opportunity group. However, for the high-growth-opportunity group of firms, the loan spread change is not significant. The difference in the coefficient estimates between the high- and low-growth-opportunity groups is statistically significant. Our findings are consistent with our prediction that firms with less potential positive NPV projects indeed trigger negative anticipation effects, and thus a higher spread is charged by banks.

5.2 Distance to Default

Our second test distinguishes firms by their stability. When the debt is secured by movable collaterals, which depreciate much faster than land and real estate properties, it sends out a strong signal of firm difficulty to the market, which translates into a higher loan spread being charged by all new lenders. While for existing lenders, they may sub-optimally refuse to roll over debt,

increasing firms' insolvency risk. Accordingly, new lenders of movable-secured loans may be incentivized to tone down the negative signal by committing more resources for monitoring, but they will still ask for a higher interest rate as compensation. In these regards, we expect the treatment effects to be more pronounced for firms closer to default.

We retrieve financial data from Worldscope and construct the Altman's. Z-score to gauge a firm's distance to default. We calculate the score at the firm-year level. A higher Z-score indicates less risk of default. Then, we divide our sample into two sub-groups based on whether a firm has a one-year lagged Z-score falling below the sample median or not. Finally, we re-run Equation (2) for each sub-sample separately.

Table 7 reports the estimation results. We find that the collateral reform has a more significant impact on the cost of debt among firms close to default. Specifically, the coefficient on *Reform* × *High Movable Assets* is significantly positive at the 1% level in the less stable group. However, we fail to find a similar increase in loan spread for the more stable firms, and the coefficient estimate on the interaction variable of interest is negative. Moreover, the difference test between the two sub-groups is highly significant at the 1% level. Thus, our results support the argument that banks react more strongly to the legal reform when extending loans to less stable firms.

5.3 Creditor Rights

Our final heterogeneity test distinguishes firms operating in countries with varying strengths of legal environment protecting creditors' rights. When the protection for debtholders is weak, movable collaterals may still be subject to misappropriation despite the establishment of the collateral registries. Creditors may thus pay extra monitoring costs to mitigate concerns about the pledged movable assets, and to compensate for this specific cost induced by collateral reforms,

they may charge a higher interest rate. Therefore, we expect the cost-increasing effect induced by the collateral menu expansion to be more pronounced for firms operating in countries with weaker legal environments.

To measure differences across countries in the strength of legal rights, we use the World Bank's Doing Business dataset to measure the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The World Bank measure is based on a questionnaire administered to financial lawyers and verified through analysis of laws and regulations and public sources of information on collateral laws. The legal rights index for each country ranges from 0 to 12. A higher score indicates stronger legal enforcement and thus less monitoring costs for lenders.

In Table 8, each column reports results for the sub-samples of loans with above- or below-median index scores. We find that the interaction term *Reform* × *High Movable Assets* enters positively and significantly in column (1), that is, the increase of debt costs appears in the weaker legal enforcement sub-sample. In contrast, the treatment effects in the strong legal enforcement group are negative, suggesting that other channels (i.e., mainly, the reduction of agency costs of debt) can dominate when the protection for debtholders is stronger. Together with the significant results in the test on the difference of sub-group coefficients, we confirm our conjecture that the cost-increasing effects are more pronounced for firms in countries with weak legal environments.

6. Additional Analyses: Collateral Laws and Covenants

So far, we have documented a relative increase in loan spreads among high-movable industries following the collateral menu expansion. In this section, we assess whether the collateral reforms also shape other loan terms, such as the use of covenants. The theoretical prediction on the use of covenants, however, is ambiguous. On the one hand, covenants and collaterals are

considered substitutes in credit transactions. Thus, having more movable collaterals may reduce the need for covenants. On the other hand, more covenants may be imposed to restrict improper firm actions that may lead to wealth redistribution to shareholders or misappropriation of movable collaterals.

To test this conjecture, we measure covenant information for each loan issuing deal in our sample. For the covenants measure, we consider the intensity of all covenants in terms of the total number, namely, *Log (1 + # of Cov)*, which is the natural logarithm of one plus the total number of all covenants in a loan package. Then, we categorize the restrictive covenants into three groups: financing, investment, and general covenants related to the use of cash holding and proceeds (e.g., Billett et al., 2007; Christensen and Nikolaev, 2012; Hollander and Verriest, 2016). The first group restricts borrowers' financing activities by placing limits on their overall borrowing and debt ratios. The second group of covenants is designed to limit investment-related expenditures. The third group reflects the general requirements on the use of cash flows, cash holdings, cash proceeds from asset sales or other activities, and restrictions on cash payout. Accordingly, we define *Log(1+# of Cov_Fin)*, *Log(1+# of Cov_Invest)*, and *Log(1+# of Cov_Gen)* based on specific types of restrictive covenants.

Next, we conduct our tests using these measures of covenants as the dependent variables. We construct deal-level counterparts for each facility-level control variable. *Log (Deal Size)* is the natural logarithm of the deal amount, and *Log (Average Maturity)* is the natural logarithm of the average maturity (months) across facilities in the same deal. We also include deal purpose fixed effects. The other controls remain the same. Our results are presented in Table 9.

We find that after the passage of the collateral laws, creditors include relatively more covenant provisions in the loan contracts when lending to firms in high-movable-assets industries.

When examining the specific groups of covenants, we find that the increase in covenants concentrates on those imposing requirements on leverage and financial performance concerning debt repayment abilities (e.g., interest coverage ratio) and on those associated with the use of cash proceeds from asset sales or other financing activities and limits on cash payout. Since these restrictions likely address the potential wealth redistribution effect of subsequent secured debt issuance and misappropriation of pledged assets, they complement the higher borrowing costs documented above. Moreover, we do not find any significant change in the covenants related to restrictions on investment, which suggests that lenders are concerned that insufficient investment opportunities may lead to higher costs associated with wealth redistribution, thereby imposing no further restrictions on it. Therefore, the findings are consistent with our views in support of a cost-increasing effect of the reform.

7. Conclusion

In this paper, we examine the effect of collateral law reforms that include movable assets as legal collateral across European countries on debt financing costs. To isolate the treatment effects, we exploit two sources of variation in our empirical strategy: (1) changes in loan spreads before and after the reforms and (2) differences between industries operating with varying degrees of demand for movable assets in the production process. Using a loan dataset for a [−10, +10] window around the legal reform years spanning 1995 to 2019, we find that the secured loan issuance increases substantially following the reforms, suggesting that the changes to the legal framework enhance the borrowing ability of firms in industries operating with intensive use of movable assets. A further increasing effect is identified on the costs of credit. We find that the loan spreads increases for high-movable-asset firms after a country adopts the collateral laws. Given a publicly listed borrower in our sample with an average loan amount of 342 million dollars, a

positive treatment effect corresponds to a 0.7 million dollar increase in annual interest expenses. Potential wealth redistribution, negative signaling of movable collaterals, and extra monitoring costs associated with the expansion of the collateral menu to cover movable assets contribute to the increase in debt costs. In addition, we find that the effects are stronger among firms with lower growth opportunities, closer to default, and operating in weaker legal environments. Through additional tests, we document an increase in the intensity of including loan covenants in an issue, which completes and supports our core findings. Overall, these results are consistent with the argument that collateral laws increase firms' ability to take on secured loans while increasing the average credit costs.

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Table 1 Summary Statistics

This table presents summary statistics for the key variables used in the following tests. We have loan-, firm-, macro-, and deal-level variables, which are defined in detail in the Appendix.

	Obs.	Mean	Std. Dev.	p10	Median	p90
Loan-level variables						
Log(Loan Spread)	5,564	4.707	0.961	3.219	4.868	5.858
Log(Maturity)	5,564	3.967	0.468	3.526	4.094	4.431
Log(Loan Size)	5,564	19.651	1.533	17.717	19.708	21.584
Performance Pricing	5,564	0.112	0.315	0	0	1
Firm-level variables						
Log(Assets)	4,334	22.121	1.772	19.873	21.955	24.612
Log(Age)	4,334	2.860	1.016	1.609	2.833	4.331
Market to Book	4,334	2.283	5.630	0.638	1.784	4.588
Leverage	4,334	0.328	0.179	0.110	0.314	0.554
ROA	4,334	0.032	0.080	-0.040	0.034	0.107
Cash	4,334	0.059	0.059	0.007	0.042	0.130
PPE	4,334	0.572	0.400	0.070	0.530	1.100
R&D	4,334	0.009	0.021	0	0	0.029
D_RD Missing	4,334	0.602	0.490	0	1	1
Z-score	4,334	2.046	1.630	0	1.834	4.026
Closely Held	4,334	0.322	0.271	0.006	0.269	0.716
Industry Q	4,334	1.311	0.293	0.999	1.222	1.764
Macro-level variables						
Log(GDP)	4,334	27.916	0.946	26.418	28.386	28.724
Log(GDP per capita)	4,334	10.512	0.410	10.117	10.580	10.807
GDP Growth	4,334	2.152	2.074	0.156	2.197	4.180
FDI	4,334	5.199	8.009	0.789	2.876	11.042
Government Effectiveness	4,334	1.494	0.538	0.920	1.627	1.933
Deal-level variables						
Log(1+# of Cov)	2,909	0.670	0.915	0	0	2.079
Log(1+# of Cov_Fin)	2,909	0.081	0.283	0	0	0
Log(1+# of Cov_Gen)	2,909	0.048	0.262	0	0	0
Log(1+# of Cov_Invest)	2,909	0.009	0.099	0	0	0
Log(Average Maturity)	2,909	3.934	0.415	3.434	4.094	4.431
Log(Deal Size)	2,909	20.329	1.369	18.588	20.402	22.015

Table 2 Collateral Law Reform and Secured Loan Issuance

The table reports the results of DID regressions that examine whether the collateral law reform affects the issuance of secured loans. We focus on a [-10, +10] window around the reform years. The dependent variable is a dummy that indicates the secured loans. *Reform* is a dummy variable equal to 1 after the year in which a country adopts the new laws and 0 otherwise. *High Movable Asset* equals 1 if the movability score of an industry is above the sample median. All regressions are estimated using OLS, and we include firm FE and year FE in column (1) and then replace year FE with country-by-year FE in the following columns. Therefore, the stand-alone terms are absorbed. All control variables are winsorized at the 1st and 99th percentiles. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	D_Secured			
	(1)	(2)	(3)	(4)
Reform High Movable Assets*	0.079**	0.068***	0.096***	0.093***
	(0.032)	(0.012)	(0.016)	(0.016)
Reform	0.004			
	(0.026)			
Firm controls:				
Log(Assets)			-0.011	-0.006
			(0.019)	(0.018)
Log(Age)			-0.003	0.002
			(0.025)	(0.026)
Market to Book			-0.003	-0.003
			(0.003)	(0.003)
Leverage			0.220**	0.188*
			(0.093)	(0.098)
ROA			-0.290*	-0.355**
			(0.151)	(0.159)
Cash			0.213*	0.205
			(0.123)	(0.123)
PPE			0.004	-0.025
			(0.068)	(0.073)
R&D			-0.903	-1.061
			(1.148)	(1.129)
D_RD Missing			0.021	0.023
			(0.048)	(0.039)
Z-score			0.028***	0.028***
			(0.009)	(0.009)
Closely Held			-0.104*	-0.100*
			(0.052)	(0.058)
Industry Q			0.041	0.034
			(0.082)	(0.087)
Loan controls:				
Log(Maturity)				0.079***
				(0.018)
Log(Loan Size)				-0.024***
				(0.006)
Performance Pricing				0.034
				(0.044)
Loan Type	Yes	Yes	Yes	Yes
Loan Purpose	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

Year FE	Yes			
Country by Year FE		Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes
Obs.	5,564	5,564	4,426	4,334
Adj. R2	0.573	0.612	0.635	0.642

Table 3 Collateral Law Reform and Loan Spread: Baseline

The table reports the results of DID regressions that examine whether the collateral law reform affects loan spreads. We focus on a [-10, +10] window around the reform years. The dependent variable is the natural logarithm of loan spreads. *Reform* is a dummy variable equal to 1 after the year in which a country adopts the laws and 0 otherwise. *High Movable Assets* equals 1 if the movability score of an industry is above the sample median. We start from column (1) for the specification with stand-alone terms, and then we add country-by-year FE in the following columns. We also gradually add firm- and loan-level controls. In columns (5) and (6), we sub-group our whole sample by the loan type. All regressions are estimated using OLS. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	Log(Loan Spread)					
	(1)	(2)	(3)	(4)	(5)	(6)
					Revolver	Term Loan
Reform High Movable Assets*	0.137***	0.153***	0.073***	0.134***	0.066***	0.337**
	(0.043)	(0.009)	(0.026)	(0.026)	(0.014)	(0.144)
Reform	-0.142					
	(0.087)					
Firm controls:						
Log(Assets)			-0.152***	-0.125***	-0.160***	-0.129***
			(0.036)	(0.031)	(0.017)	(0.045)
Log(Age)			0.011	0.018	-0.028**	-0.036
			(0.064)	(0.067)	(0.011)	(0.042)
Market to Book			-0.003*	-0.002	-0.004**	-0.004
			(0.002)	(0.001)	(0.002)	(0.004)
Leverage			0.498**	0.574***	0.811***	0.296
			(0.203)	(0.204)	(0.139)	(0.347)
ROA			-1.094***	-1.111***	-1.495***	-0.572
			(0.329)	(0.359)	(0.237)	(0.376)
Cash			0.419	0.358	0.902***	-0.163
			(0.415)	(0.390)	(0.291)	(0.529)
PPE			0.035	0.008	-0.116**	0.164
			(0.087)	(0.097)	(0.043)	(0.116)
R&D			0.461	0.429	-0.412	0.619
			(1.301)	(1.249)	(0.754)	(2.754)
D_RD Missing			0.014	0.018	0.064	0.010
			(0.048)	(0.051)	(0.058)	(0.116)
Z-score			-0.012	-0.007	-0.040**	0.016
			(0.018)	(0.018)	(0.017)	(0.049)
Closely Held			0.015	-0.030	-0.083	-0.137**
			(0.084)	(0.098)	(0.081)	(0.065)
Industry Q			0.045	0.036	-0.086	0.056
			(0.047)	(0.053)	(0.062)	(0.048)
Loan controls:						
Log(Maturity)				0.087***	-0.102***	0.171***
				(0.018)	(0.030)	(0.036)
Log(Loan Size)				-0.061***	-0.111***	-0.040**
				(0.015)	(0.026)	(0.016)
Performance Pricing				0.027	0.071	-0.101**
				(0.027)	(0.058)	(0.048)
Loan Type	Yes	Yes	Yes	Yes	Yes	Yes

Loan Purpose	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes					
Country by Year FE		Yes	Yes	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	5,564	5,564	4,426	4,334	2,519	1,815
Adj. R2	0.785	0.824	0.836	0.839	0.800	0.797

Table 4 Collateral Law Reform and Loan Spread: Robustness

The table reports the robustness tests on the treatment effect of the collateral law reform on loan spreads. Panel A is for additional controls. From columns (1) to (4), we add the IVOL of stock return as one confounding factor, additional macro-level variables, lender FE, and loan secured FE, respectively. Panel B considers alternative samples. In column (1), we screen our sample to the firms that have loan issuance both in pre- and post-reform periods. In column (2), we drop the observations from the UK because it represents a large proportion of our whole sample. Column (3) focuses on a [-5, +5] window. Column (4) reports the cohort-specific estimates from stacked regressions, for which we cohort each dataset over a [-10, +10] window around the reform year. Countries without legal reforms during this 20-year window are served as comparison units. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Additional Controls

Dep. Var	Log(Loan Spread)			
	(1)	(2)	(3)	(4)
	Ivol_return	Macro var.	Lender FE	Secured FE
Reform High Movable Assets*	0.159***	0.088**	0.144***	0.104***
	(0.025)	(0.035)	(0.023)	(0.020)
Firm controls:				
Log(Assets)	-0.117***	-0.132***	-0.110**	-0.123***
	(0.032)	(0.028)	(0.047)	(0.027)
Log(Age)	0.025	0.007	0.025	0.018
	(0.067)	(0.065)	(0.074)	(0.063)
Market to Book	-0.003**	-0.002	0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.565**	0.578**	0.518**	0.513***
	(0.205)	(0.209)	(0.228)	(0.180)
ROA	-1.062***	-1.133***	-1.186**	-0.996***
	(0.359)	(0.361)	(0.432)	(0.295)
Cash	0.335	0.314	0.471	0.291
	(0.368)	(0.408)	(0.449)	(0.369)
PPE	-0.003	0.005	0.006	0.016
	(0.096)	(0.099)	(0.120)	(0.090)
R&D	0.325	0.161	1.461	0.772
	(1.245)	(1.226)	(1.628)	(1.468)
D_RD Missing	0.018	0.012	0.061	0.010
	(0.055)	(0.049)	(0.041)	(0.046)
Z-score	-0.003	-0.006	-0.009	-0.016
	(0.020)	(0.019)	(0.022)	(0.015)
Closely Held	-0.028	-0.034	-0.048	0.002
	(0.095)	(0.089)	(0.120)	(0.104)
Industry Q	0.020	0.030	0.034	0.025
	(0.055)	(0.050)	(0.094)	(0.067)
Ivol_Stock Return	8.222***			
	(2.708)			
Macro controls:				
Log(GDP) High Movable Assets*		-0.209		
		(1.009)		
*Log(GDP per capita) * High Movable Assets*		1.386		
		(1.171)		
GDP Growth High Movable Assets*		-0.034*		
		(0.017)		

FDI High Movable Assets*		0.005*		
		(0.003)		
Government Effectiveness High Movable Assets*		0.127		
		(0.176)		
Loan Controls	Yes	Yes	Yes	Yes
Loan Type	Yes	Yes	Yes	Yes
Loan Purpose	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Country by Year FE	Yes	Yes	Yes	Yes
Lender FE	Yes		Yes	
Secured FE				Yes
Cluster at Country	Yes	Yes	Yes	Yes
Obs.	4,334	4,334	4,334	4,334
Adj. R2	0.840	0.840	0.846	0.847

Panel B: Alternative Samples

Dep. Var	Log(Loan Spread)			
	(1)	(2)	(3)	(4)
	Pre-&Post-Loan issuance	Drop UK obs.	[-5, +5] window	Stacked DID
Reform High Movable Assets*	0.122***	0.111***	0.145***	0.123***
	(0.028)	(0.022)	(0.050)	(0.031)
Firm controls:				
Log(Assets)	-0.126***	-0.105*	-0.099***	-0.099***
	(0.035)	(0.057)	(0.030)	(0.015)
Log(Age)	0.015	0.035	0.019	0.057**
	(0.067)	(0.128)	(0.068)	(0.024)
Market to Book	-0.002	-0.002	-0.002	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)
Leverage	0.527**	0.827***	0.446***	0.467***
	(0.187)	(0.220)	(0.145)	(0.065)
ROA	-1.197***	-1.403**	-1.093***	-0.803***
	(0.418)	(0.584)	(0.347)	(0.110)
Cash	0.497	-0.249	0.608**	0.568***
	(0.324)	(0.369)	(0.277)	(0.137)
PPE	-0.010	-0.022	-0.009	-0.025
	(0.108)	(0.151)	(0.105)	(0.041)
R&D	0.429	-0.686	0.854	1.276*
	(1.316)	(1.705)	(1.330)	(0.698)
D_RD Missing	0.005	-0.045	0.033	0.073**
	(0.063)	(0.046)	(0.051)	(0.028)
Z-score	-0.006	0.022	-0.013	-0.019***
	(0.019)	(0.022)	(0.014)	(0.006)
Closely Held	-0.023	-0.069	0.034	0.017
	(0.103)	(0.087)	(0.082)	(0.035)
Industry Q	0.024	-0.032	0.068	0.069***
	(0.066)	(0.051)	(0.044)	(0.026)
Loan Controls	Yes	Yes	Yes	(Cohort-)Yes
Loan Type	Yes	Yes	Yes	(Cohort-)Yes
Loan Purpose	Yes	Yes	Yes	(Cohort-)Yes
Firm FE	Yes	Yes	Yes	(Cohort-)Yes
Country by Year FE	Yes	Yes	Yes	(Cohort-)Yes
Cluster at Country	Yes	Yes	Yes	(Cohort-)Yes
Obs.	3,936	2,923	4,048	22,200
Adj. R2	0.840	0.839	0.844	0.856

Table 5 Identification Validity

This table tests the identification validity for our main specifications. Panel A reports the estimation results of whether pre-existing country-level loan activities predict the timing in which a country adopts the collateral laws, using a hazard model with a Weibull distribution of the hazard rate. The analysis is at the country-year level. The dependent variable is the natural logarithm of the expected time to the law change (i.e., survival time). A country-year drops out after the country enacts the laws. Panel B examines the dynamic effect of law enforcement on loan spreads. *Reform −-2*, *Reform −1*, *Reform 0*, *Reform +1*, and *Reform 2+* are equal to 1 if a country will enforce the laws in two years, will enforce the laws in one year, enforced the laws, enforced the laws one year ago, and enforced the laws at least two years ago, respectively, and 0 otherwise. We set the years when a country adopts the laws before two years as the base. Column (3) reports the results of the randomization (placebo) test. *Pseudo-Reform* equals 1 when the year is after the reform year in this randomization test. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Collateral Law Timing: Hazard Model

	Survival time	
	(1)	(2)
Ave_ Log(Loan Spread)	0.060	0.402
	(0.392)	(0.451)
Ave_Log(Loan Size)		0.693
		(0.451)
Ave_Log(Maturity)		-1.931
		(1.514)
Aggregated firm-level variables:		
Ave_Log(Assets)	1.113***	1.166*
	(0.410)	(0.602)
Ave_Log(Age)	-1.719***	-1.559
	(0.627)	(1.335)
Ave_Market to Book	0.000	0.030
	(0.011)	(0.048)
Ave_Leverage	15.137***	11.438*
	(5.785)	(6.573)
Ave_ROA	-0.081	0.112
	(0.230)	(0.121)
Ave_Cash	10.753*	7.231
	(5.761)	(8.827)
Ave_PPE	-0.938	-1.822
	(0.730)	(1.157)
Ave_R&D	0.006	0.006
	(0.013)	(0.013)
Ave_Z-score	0.256	0.036
	(0.197)	(0.119)
Ave_Closely Held	5.005	5.035
	(4.012)	(3.345)
Ave_ Industry Q	-11.808*	-12.350**
	(6.045)	(5.304)
Macro-level variables:		
Log(GDP)	-0.352	-0.602*
	(0.276)	(0.309)
Log(GDP per capita)	2.521***	2.711***
	(0.682)	(0.984)
GDP Growth	0.242*	0.281**
	(0.145)	(0.127)

FDI	0.098***	0.135**
	(0.031)	(0.068)
Government Effectiveness	1.633	0.853
	(1.207)	(0.880)
Obs.	462	462

Panel B: Dynamic Effect and Placebo Test

Dep. Var	Log(Loan Spread)	
	(1)	(2)
Reform -2 High Movable Assets*	-0.013	
	(0.086)	
Reform -1 High Movable Assets*	-0.014	
	(0.045)	
Reform 0 High Movable Assets*	0.146***	
	(0.029)	
Reform +1 High Movable Assets*	0.147**	
	(0.066)	
Reform 2+ High Movable Assets*	0.121***	
	(0.019)	
Pseudo-Reform High Movable Assets*		0.025
		(0.129)
Firm controls:		
Log(Assets)	-0.125***	-0.104***
	(0.031)	(0.032)
Log(Age)	0.018	0.014
	(0.068)	(0.072)
Market to Book	-0.002	-0.004*
	(0.001)	(0.002)
Leverage	0.574***	0.829***
	(0.205)	(0.280)
ROA	-1.112***	-1.105***
	(0.364)	(0.358)
Cash	0.358	0.325
	(0.391)	(0.500)
PPE	0.008	-0.023
	(0.098)	(0.118)
R&D	0.421	0.629
	(1.275)	(1.132)
D_RD Missing	0.018	0.015
	(0.052)	(0.045)
Z-score	-0.007	0.006
	(0.019)	(0.021)
Closely Held	-0.029	-0.009
	(0.096)	(0.096)
Industry Q	0.035	0.082***
	(0.054)	(0.028)
Loan controls:		
Log(Maturity)	0.087***	0.065***
	(0.018)	(0.020)
Log(Loan Size)	-0.061***	-0.065***
	(0.014)	(0.019)

Performance Pricing	0.027	0.024
	(0.027)	(0.034)
Loan Type	Yes	Yes
Loan Purpose	Yes	Yes
Firm FE	Yes	Yes
Country by Year FE	Yes	Yes
Cluster at Country	Yes	Yes
Reform-2*High +Reform-1*High =0 (P-value)	0.833	
Reform0*High+Reform1*High+Reform2*High =0 (P-value)	0.000	
Obs.	4,334	4,334
Adj. R2	0.839	0.820

Table 6 Heterogeneous Test by Growth Opportunities

The table reports the results of DID regressions that examine the heterogeneous effects of the law's enforcement in terms of firms' growth opportunity level, which is gauged by the industry-specific market-to-book ratios. Higher ratios indicate higher growth opportunities. We re-run the regressions on the sub-samples of firms with above- or below-median index scores. The dependent variable is the natural logarithm of loan spread. *Reform* is equal to 1 after the year in which a country adopts the laws. *High Movable Assets* equals 1 if the movability score of an industry is above the sample median. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	Log(Loan Spread)	
	Low MTB	High MTB
	(1)	(2)
Reform High Movable Assets*	0.414***	0.023
	(0.097)	(0.035)
Firm controls:		
Log(Assets)	0.000	-0.128*
	(0.067)	(0.064)
Log(Age)	0.026	-0.065
	(0.129)	(0.073)
Market to Book	-0.006*	0.013*
	(0.003)	(0.007)
Leverage	0.512	0.276
	(0.330)	(0.352)
ROA	-1.217	-1.491***
	(1.066)	(0.387)
Cash	1.629**	0.224
	(0.662)	(0.319)
PPE	-0.050	0.325*
	(0.087)	(0.161)
R&D	-1.470	0.057
	(5.508)	(1.806)
D_RD Missing	0.085	-0.012
	(0.093)	(0.068)
Z-score	0.028	-0.022
	(0.072)	(0.015)
Closely Held	0.170	0.173*
	(0.225)	(0.086)
Industry Q	-0.112	0.195
	(0.096)	(0.128)
Loan Controls	Yes	Yes
Loan Type	Yes	Yes
Loan Purpose	Yes	Yes
Firm FE	Yes	Yes
Country by Year FE	Yes	Yes
Cluster at Country	Yes	Yes
Obs.	1,959	2,375
Adj. R2	0.865	0.867
Diff test	P-value: 0.000	

Table 7 Heterogeneous Test by the Distance to Default

The table reports the results of DID regressions that examine the heterogeneous distance to default effects of the laws' enforcement. We use firm-level (Altman's) Z-Score to gauge a firm's distance to default. Higher scores indicate less risk of default. Each column reports results on the sub-samples of loans with above- or below-median firm average Z-score over the whole sample. The dependent variable is the natural logarithm of loan spread. *Reform* is a dummy variable equal to 1 after the year in which a country adopts the laws and 0 otherwise. *High Movable Assets* is from Campello and Larrain (2016) and equals 1 if the movability score of an industry is above the sample median. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	Log(Loan Spread)	
	Less Stable	Stable
	(1)	(2)
Reform High Movable Assets*	0.476***	-0.264***
	(0.079)	(0.023)
Firm controls:		
Log(Assets)	-0.106**	-0.077**
	(0.040)	(0.031)
Log(Age)	0.003	0.040
	(0.086)	(0.032)
Market to Book	0.003	-0.003
	(0.002)	(0.003)
Leverage	0.554***	0.465*
	(0.127)	(0.233)
ROA	-1.446*	-0.652***
	(0.714)	(0.181)
Cash	-0.308	0.410
	(0.293)	(0.424)
PPE	0.165	-0.131
	(0.155)	(0.087)
R&D	2.075	0.186
	(3.543)	(2.839)
D_RD Missing	-0.052	0.146**
	(0.051)	(0.066)
Z-score	0.039	0.001
	(0.030)	(0.012)
Closely Held	-0.034	0.084
	(0.156)	(0.131)
Industry Q	-0.102	0.077
	(0.135)	(0.099)
Loan Controls	Yes	Yes
Loan Type	Yes	Yes
Loan Purpose	Yes	Yes
Firm FE	Yes	Yes
Country by Year FE	Yes	Yes
Cluster at Country	Yes	Yes
Obs.	1,872	2,462
Adj. R2	0.854	0.865
Diff test	P-value: 0.000	

Table 8 Heterogeneous Test by Strength of Legal Enforcement

The table reports the results of DID regressions that examine the heterogeneous effects of the laws' enforcement in terms of legal rights strength. We turn to the World Bank's Doing Business dataset for the country-level strength of the legal rights index; the measure ranges from 0 to 12 for the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders. Thus, a higher index means lower monitoring costs. To measure differences across countries in the strength of laws, we run our regressions for the weak-law group and strong-law group, respectively. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	Log(Loan Spread)	
	Weak Law	Strong Law
	(1)	(2)
Reform High Movable Assets*	0.104***	-0.990***
	(0.023)	(0.045)
Firm controls:		
Log(Assets)	-0.103	-0.157***
	(0.062)	(0.003)
Log(Age)	0.074	-0.018**
	(0.132)	(0.007)
Market to Book	-0.003	-0.007**
	(0.004)	(0.002)
Leverage	0.744***	0.519***
	(0.232)	(0.066)
ROA	-1.704**	-1.078***
	(0.620)	(0.154)
Cash	-0.087	1.045***
	(0.408)	(0.149)
PPE	0.019	-0.045**
	(0.162)	(0.014)
R&D	0.266	-0.046
	(1.492)	(1.309)
D_RD Missing	-0.037	0.101***
	(0.048)	(0.023)
Z-score	0.025	-0.068***
	(0.024)	(0.007)
Closely Held	-0.035	-0.115***
	(0.095)	(0.034)
Industry Q	-0.085*	0.069
	(0.047)	(0.062)
Loan Controls	Yes	Yes
Loan Type	Yes	Yes
Loan Purpose	Yes	Yes
Firm FE	Yes	Yes
Country by Year FE	Yes	Yes
Cluster at Country	Yes	Yes
Obs.	2,340	1,994
Adj. R2	0.839	0.689
Diff test	P-value: 0.000	

Table 9 Additional Tests: Covenant Law Reform and Covenants

The table reports additional tests for the effect of the law reform on loan covenants. We aggregate loan-level data to the package level. Specifically, in column (1), we test the effect on the total number of all covenants, and then in columns (2) to (4), we categorize the covenants into three types: related to financing restrictions, investment restrictions, or restrictions on cash flows, proceeds, and payout. We construct deal-level controls: *Log(Deal Size)* is the natural logarithm of deal amount; *Log(Average Maturity)* is the average maturity month across facilities in a same deal. *Reform* is equal to 1 after the year in which a country adopts the laws. *High Movable Assets* equals 1 if the movability sore of an industry is above the sample median. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	Log(1+# of Cov)	Log(1+# of Cov_Fin)	Log(1+# of Cov_Invest)	Log(1+# of Cov_Gen)
	(1)	(2)	(4)	(3)
Reform High Movable Assets*	0.134***	0.078***	-0.003	0.051***
	(0.021)	(0.010)	(0.005)	(0.017)
Firm controls:				
Log(Assets)	-0.073*	-0.043**	-0.027***	-0.014
	(0.041)	(0.021)	(0.007)	(0.017)
Log(Age)	-0.003**	0.001	-0.002***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Market to Book	0.141*	0.075	0.023*	0.066
	(0.070)	(0.046)	(0.013)	(0.039)
Leverage	0.275*	0.088***	-0.030	0.194***
	(0.138)	(0.024)	(0.022)	(0.057)
ROA	-0.271	0.066	0.076	0.196
	(0.249)	(0.064)	(0.047)	(0.181)
Cash	0.827***	0.336***	0.152***	0.307**
	(0.197)	(0.092)	(0.051)	(0.114)
PPE	-0.215**	-0.088**	0.009	-0.078
	(0.103)	(0.037)	(0.040)	(0.066)
R&D	2.913	1.683**	-0.339	1.391
	(2.030)	(0.796)	(0.307)	(1.583)
D_RD Missing	0.118**	0.048**	0.016**	0.097***
	(0.048)	(0.019)	(0.007)	(0.023)
Z-score	0.001	-0.014***	-0.015**	-0.006
	(0.011)	(0.003)	(0.005)	(0.008)
Closely Held	-0.163	-0.070	-0.028**	-0.110***
	(0.139)	(0.042)	(0.011)	(0.038)

Industry Q	-0.367**	-0.251**	-0.050	-0.023
	(0.140)	(0.097)	(0.039)	(0.044)
Deal controls:				
Log(Average Maturity)	0.052*	0.015	0.008	-0.021
	(0.029)	(0.016)	(0.007)	(0.023)
Log(Deal Size)	0.018	0.017*	0.001	0.014*
	(0.015)	(0.009)	(0.001)	(0.007)
Deal Purpose	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Country by Year FE	Yes	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes	Yes
Obs.	2,909	2,909	2,909	2,909
Adj. R2	0.758	0.299	0.291	0.216

Appendix

Table A1 Variable Definitions

This table provides detailed descriptions and data sources of the variables used in this paper.

Variable	Definitions	Source
Panel A: Law Reform and Debt Financing		
Log(Loan Spread)	The natural logarithm of loan spread for a loan facility, reported as an all-in spread drawn in the DealScan database. It accounts for the amount that the borrower pays over LIBOR/LIBOR equivalent for each dollar drawn down in basis points.	DealScan
D_Secured	An indicator for a secured loan facility.	DealScan
Reform	An indicator variable that equals 1 for a country in years after the reform of the collateral law and 0 otherwise.	
High Movable Asset	An indicator variable that equals 1 if an industry has a movable index score over the sample median. For each firm-year, we compute the ratio of movable assets to total assets, in which movable assets are equal to the sum of machinery and equipment and total inventory. Next, then, for each country-industry-year, we take the average value of MTB ratio across firms as the industrial index. A higher index value indicates more intensive use of movables in production processes.	Worldscope
Panel B: Loan Level Variables		
Log(Maturity)	Natural logarithm of the number of months to maturity for a facility.	DealScan
Log(Loan Size)	Natural logarithm of the loan facility amount in millions of dollars for a facility.	DealScan
Performance Pricing	An indicator that equals 1 for performance pricing grids in a loan.	DealScan
Panel C: Firm Level Variables		
Log(Assets)	Natural logarithm of assets (item 7230).	Worldscope
Log(Age)	Natural logarithm of firm years since the incorporation date (item 18273). We replace it with the first year in which it appeared in the Worldscope if the incorporation date is unavailable.	Worldscope
Market to Book	The market capitalization over book value of equity (item 8002/item 3501).	Worldscope
Leverage	The ratio of the book value of total debts to the market value of total assets (item 3255/item 2999).	Worldscope
ROA	Net operating income scaled by the book value of total assets (item7250/ item7230).	Worldscope
Cash	Cash flow scaled by total assets (item 2003/item 2999).	Worldscope
PPE	The ratio of property, plant, and equipment to total assets (item 2301/item 2999).	Worldscope
R&D	R&D expenditure to total assets (item 1201/item 2999).	Worldscope
D_RD Missing	Indicator for the missing R&D variable.	Worldscope

Z-score	Altman's Z score: 1.2*(working capital/ total assets) + 1.4*(retained earnings/ total assets) + 3.3*(EBIT/ total assets) + 0.6*(market value of equity/ total liabilities) + 1.0*(sales/ total assets)	Worldscope
Closely Held	The fraction of closely held shares of a firm in a year (item 8021).	Worldscope
Industry Q	The median Tobin's Q value for firms in a same industry-year.	Worldscope
Panel D: Macro Level Variables		
Log(GDP)	The natural logarithm of gross domestic production for a country-year.	World Bank-WDI
Log(GDP per capita)	The logarithm of gross domestic production per capita for a country-year.	World Bank-WDI
GDP Growth	The growth rate of gross domestic production for a country-year.	World Bank-WDI
FDI	Foreign direct investment inflow for a country-year.	World Bank-WDI
Government Effectiveness	Index that captures perceptions of the quality of public services, the quality of the civil service, the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Bank-WDI
Panel E: Deal Level Variables		
Log(1+# of Cov)	The natural logarithm of one plus the total number of covenants in a package.	DealScan
Log(1+# of Cov_Fin)	The natural logarithm of one plus the total number of financing restriction covenants in a package.	DealScan
Log(1+# of Cov_Gen)	The natural logarithm of one plus the total number of general covenants in a package.	DealScan
Log(1+# of Cov_Invest)	The natural logarithm of one plus the total number of investment restriction covenants in a package.	DealScan
Log(Average Maturity)	The natural logarithm of the deal amount for a package.	DealScan
Log(Deal Size)	The natural logarithm of the average loan maturity across all facilities in a same package.	DealScan

Table A2 Collateral Law Reforms

This table provides the collateral law reform years of European countries in our sample. The reform years are effective years of collateral legal reforms. For countries (Croatia, France, Hungary) whose effective years cannot be found, we use the enaction year as the reform year.

Country	Reform Year
Austria	Unreformed
Belgium	2018
Croatia	2006
Czech Republic	Unreformed
Denmark	Unreformed
Finland	Unreformed
France	2006
Germany	Unreformed
Greece	Unreformed
Hungary	1996
Iceland	Unreformed
Ireland	Unreformed
Italy	2016
Luxembourg	Unreformed
Malta	Unreformed
Netherlands	Unreformed
Norway	Unreformed
Poland	1998
Portugal	Unreformed
Romania	2000
Russia	Unreformed
Slovakia	2003
Slovenia	Unreformed
Spain	Unreformed
Sweden	Unreformed
Switzerland	Unreformed
Ukraine	2004
United Kingdom	Unreformed

Table A3 The Integrated Effects of Collateral Law Reform on Loan Spread

This table presents the aggregate effects of collateral law reforms on debt financing costs without differentiating industries by the reliance on movable assets. We focus on a [-10, +10] window around the reform years. The dependent variable is the natural logarithm of loan spreads. *Reform* is a dummy variable equal to 1 after the year in which a country adopts the laws and 0 otherwise. Standard errors are adjusted for country-level clustering and reported in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Var	Log(Loan Spread)		
	(1)	(2)	(3)
Reform	-0.067	-0.133	-0.123
	(0.088)	(0.085)	(0.084)
Firm controls:			
Log(Assets)			-0.126**
			(0.050)
Log(Age)			-0.073
			(0.115)
Market to Book			0.000
			(0.001)
Leverage			0.699***
			(0.234)
ROA			-1.128***
			(0.370)
Cash			0.552
			(0.490)
PPE			0.027
			(0.116)
R&D			-0.204
			(1.389)
D_RD Missing			-0.025
			(0.064)
Z-score			-0.006
			(0.022)
Closely Held			0.033
			(0.091)
Industry Q			0.003
			(0.082)
Loan controls:			
Log(Maturity)			0.059***
			(0.021)
Log(Loan Size)			-0.065***
			(0.017)
Performance Pricing			0.039
			(0.037)
Loan Type	Yes	Yes	Yes
Loan Purpose	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Cluster at Country	Yes	Yes	Yes
Obs.	5,564	4,334	4,334
Adj. R2	0.785	0.781	0.798

Table A4 The Distribution of Observations by Country

This table presents the sample distribution across countries in our sample.

Country	Freq.	Percent
Austria	18	0.32
Belgium	50	0.9
Croatia	2	0.04
Czech Republic	37	0.66
Denmark	65	1.17
Finland	100	1.8
France	815	14.65
Germany	556	9.99
Greece	102	1.83
Hungary	21	0.38
Iceland	31	0.56
Ireland	159	2.86
Italy	155	2.79
Luxembourg	76	1.37
Malta	2	0.04
Netherlands	324	5.82
Norway	199	3.58
Poland	37	0.66
Portugal	43	0.77
Romania	5	0.09
Russia	282	5.07
Slovakia	7	0.13
Slovenia	14	0.25
Spain	517	9.29
Sweden	173	3.11
Switzerland	148	2.66
Ukraine	15	0.27
United Kingdom	1,611	28.95