MARKET CONDITIONS AND CONTRACT DESIGN: VARIATIONS IN DEBT CONTRACTING

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Scholars have catalogued rigidities in contract design. Some have observed that boilerplate provisions are remarkably resistant to change, even in the face of shocks such as adverse judicial interpretations. Empirical studies of debt contracts and collateral, in contrast, suggest that covenant and collateral terms are customized to the characteristics of the borrower and evolve in response to changes in market conditions, such as expansion and contraction in credit supply. Building on the adverse selection and moral hazard theories of covenants and collateral, we demonstrate that an expansion (contraction) of credit will lead not only to a decrease (increase) in the interest rate but also a reduction (expansion) of covenants and collateral through lessening (worsening) adverse selection and moral hazard problems. We conclude with some empirical implications of this analysis.

INTRODUCTION

The phenomenon of rigidity in contract design has received considerable attention in legal scholarship. One scholarly strand suggests that the learning and network benefits of standardization can impede customization and innovation in contract terms.[1] Contracting parties are reluctant to take the risk of departing from provisions that have been interpreted and enforced by the courts.[2] Moreover, institutional features of the legal profession and of law firms in particular encourage the repeated use of standard terms, or "boilerplate."[3]

Yet, many contract provisions—particularly, the non-boilerplate provisions—do vary significantly across parties and across time.[4] While, for example, provisions in sovereign debt contracts might be rigid even in the face of undesirable judicial interpretation,[5] covenants in commercial debt contracts vary considerably in their scope, intensity, and tightness across borrowers with different characteristics. There is clearly a significant degree of customization and malleability in covenant patterns over time.

Financial economists have advanced theories to explain customization and have tested them empirically against samples of private and public debt contracts. Most prominently, these theories focus on the tailoring of debt covenants to address the information

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[1] *See, e.g.*, Charles J. Goetz & Robert E. Scott, *The Limits of Expanded Choice: An Analysis of the Interactions Between Express and Implied Terms*, 73 CALIF. L. REV. 261, 286–92 (1985) (describing the cost savings and other incentives favoring standardization, courts' institutional bias for conventional formulations in contracts, and innovating parties' inability to capture fully the benefits of innovation because of free-rider problems); Marcel Kahan & Michael Klausner, *Standardization and Innovation in Corporate Contracting (or "The Economics of Boilerplate")*, 83 VA. L. REV. 713, 718–36 (1997) (discussing how learning and network benefits can lead to suboptimal contracting results).

[2] Kahan & Klausner, *supra* note 1, at 722 (noting that judicial opinions reduce uncertainty in a contract term's interpretation or enforceability and hence the costs to contracting parties).

[3] *See generally* MITU GULATI & ROBERT E. SCOTT, THE THREE AND A HALF MINUTE TRANSACTION: BOILERPLATE AND THE LIMITS OF CONTRACT DESIGN (2013).

[4] *See, e.g.*, W. Scott Frame & Lawrence J. White, *Empirical Studies of Financial Innovation: Lots of Talk, Little Action?*, 42 J. ECON. LITERATURE 116, 126, 131–32 (2004) (discussing studies of clawback provisions, poison put options, and other financial innovations); Florencia Marotta-Wurgler & Robert Taylor, *Set in Stone? Change and Innovation in Consumer Standard-Form Contracts*, 88 N.Y.U. L. REV. 240 (examining innovation in end user license agreements).

[5] *See generally* Stephen J. Choi & G. Mitu Gulati, *Innovation in Boilerplate Contracts: An Empirical Examination of Sovereign Bonds*, 53 EMORY L.J. 929 (2004) (finding evidence that, even in the face of interpretive shock, contract terms in sovereign debt contracts were initially resistant to change and innovation).

problems of adverse selection and moral hazard.[6] The severity of these problems and the cost of addressing them with covenants depend on the characteristics of borrower and lender in each contract. It is now well established in both finance and law scholarship that the parties do customize their covenants according to firm-specific characteristics.[7]

A distinct set of questions concerns whether and how covenant patterns evolve over time in response to changes in macroeconomic and market conditions. Although these associations have received less attention, the studies to date suggest that GDP growth, interest rates, and market competitiveness affect the choice of covenants. Debt contracts swing over time between "covenant-lite" versions that impose minimal restrictions on borrowers and versions that impose more expansive covenant restrictions. Market participants generally understand the role of moral hazard and adverse selection in the design of covenants, yet their explanations for this phenomenon seem incomplete.

Practitioners label different formulations of covenants as "lender-friendly" or "borrower-friendly." Practitioners explain the choice between these two poles in terms of the allocation of bargaining or market power. The source of such power appears to be imbalances in market demand and supply. For example, a market is "lender-friendly" when demand for credit exceeds supply and thereby puts upward pressure on interest rates. Practitioners suggest that these conditions also yield "lender-friendly" covenants.

Covenant-lite deals became increasingly common through the 2000s until the onset of the financial crisis in 2007. Market observers

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[6] Adverse selection and moral hazard are two costly consequences of asymmetric information between contracting parties. *See* ANDREU MAS-COLELL ET AL., MICROECONOMIC THEORY 477 (1995). They are sometimes mentioned together in economics literature as the principal-agent problem. *Id*. Adverse selection (also "hidden information") stems from the fact that one party has better information about relevant factors existing at the time of contracting. *Id*. at 436–50. Moral hazard (also "hidden action") refers to one party's inability to observe the actions of the other after entering into the contract. *Id*. at 445, 448, 477. The term moral hazard originates in scholarship analyzing insurance but arises similarly in a lending relationship, particularly when there is limited liability or other impediments to collection. *Id*. at 477 n.1. A lender typically cannot observe at the time of contracting all the relevant factors affecting the likelihood of repayment and cannot observe all the post-contract actions of the borrower that may subsequently impair the prospect of repayment. *See id*. at 477 & n.1, 478 (discussing difficulties of informational asymmetry in a variety of contexts, including between banks and borrowers). For a more detailed discussion, see generally *id.* at 436–510.

[7] *See infra* Part I (discussing the customization of contracts through use of covenants and collateral).

attributed this to an excess supply of credit.[8] The market for covenant-lite loans collapsed in the second half of 2007. A period of tighter and more extensive covenants followed until 2009. Reports suggested that covenant-lite deals then resurfaced, at least for higher-grade borrowers, because of an excess supply of investment funds.[9] The following recent explanation by a partner at the law firm Paul Weiss is typical:

> Covenant-lite (cov-lite) loans became widespread at the top of the last credit cycle before the 2007 credit crunch. During the credit crunch, however, new cov-lite loans largely disappeared from the market because lenders had *greater market power* to reject these types of borrower-friendly deals . . . . [S]tarting in 2010, cov-lite loans began reappearing in the syndicated loan market. Borrowers can obtain cov-lite loans because of market dynamics. At the top of the last credit cycle, there was an *oversupply of capital*, and *lenders competed* for deals from private equity sponsors and borrowers. Because there was a *greater supply* of capital than there was demand to borrow capital, borrowers had *more leverage* to

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[8] In a report by Standard & Poor's on the eve of the financial crisis in mid-2007, the ratings agency observed:

> Strong loan market liquidity and the continued pace of private equity sponsored LBOs [leveraged buyouts] are driving a record volume of leveraged loans in 2007. Such favorable market factors, combined with growing investor demand from structured finance vehicles and hedge funds, have allowed bank facilities with weakened 'covenant-lite' loan structures to emerge as the instruments of choice for many issuers. As the volume of leveraged loans reaches an all-time high, the proportion of covenant-lite facilities has increased tremendously. . . . It remains to be seen whether leveraged loans will revert to more traditional structures when the credit cycle turns . . . . There has already been some pushback so far this year as market conditions begin to soften, with certain transactions unable to get through syndication without a robust covenant package.

ANA LAI & STEVEN M. BAVARIA, STANDARD & POOR'S, THE LEVERAGING OF AMERICA: COVENANT-LITE LOAN STRUCTURES DIMINISH RECOVERY PROSPECTS 2 (2007).

[9] *See, e.g.*, Michael Aneiro, *Aleris Debt Sale: 'Covenant-Lite'*, WALL ST. J., Feb. 7, 2011, at C3 ("[D]emand has pushed the average junk-bond yield down to 7.01% . . . and has allowed issuers to water down investor protections, or covenants, that govern new offerings."); Michelle Sierra Laffitte, *IFR-Covenant-Lite Buyout Loans Return to U.S. Loan Market*, REUTERS.COM (Jan. 31, 2011), http://www.reuters.com/article/2011/01/31/loans-covenant-lite-idUSLDE70U0T520110131 ("As the market gets hotter, companies are expected to try to reduce spreads and slash covenants in deals that were completed recently."); Kate Laughlin, *Covenant-Lite Loans Are Back but Investors Hope To Limit Mistakes of the Past*, FINANCIALTIMES.COM, (Nov. 24, 2010, 9:54 PM), http://www.ft.com/cms/s/2/a242e5d0-f812-11df-8d91-00144feab49a.html ("[T]oday's loan market is for the most part a seller's environment, where investors are flush with cash they need to put to work . . . . [S]ome investors buying the covenant-lite deals are not solely loan investors, so in their hunt for high-yielding paper, covenant concerns are a low priority . . . .").

negotiate looser and more favorable terms, including cov-lite structures.[10]

Such accounts of the effect of bargaining or market power on covenants are oversimplified, yet common. Commentators in other industries invoke similar explanations for changes over time in a variety of other significant contract provisions.[11] These explanations suggest that bargaining power independently affects the choice of price (interest rate) and nonprice (covenant) terms. These explanations also beg the question, however, of why borrowers (or lenders) would not exploit their power more profitably by demanding lower (or higher) interest rates, instead of spending their bargaining power on more favorable covenant packages. In this Article, we suggest that the link between bargaining power and lender- or borrower-friendly covenants is more complicated. We show that there may be an intermediate step: Market conditions change price, which in turn catalyzes change in covenant or collateral provisions. The key to our analysis is that price changes do not simply alter the division of the gains from trade. When adverse selection or moral hazard issues are present, changes in price affect the severity of these problems and thereby have a significant bearing on optimal covenant or collateral design.

Consider the effect of a higher interest rate—induced by lender-friendly market conditions—on the problem of adverse selection. As Stiglitz and Weiss demonstrate, an increase in the interest rate attracts a riskier pool of borrowers, including, perhaps, some borrowers who

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[10] Eric Goodison, *Covenant-Lite Loans: Traits and Trends*, Prac. L.J., Sept. 2011, at 36–37 (emphases added), *available at* www.paulweiss.com/media/105718/plj_sep11.pdf.

[11] We have observed elsewhere similar explanations provided for representations and warranties and closing conditions (e.g., material adverse conditions) in corporate acquisition agreements. *See* Albert Choi & George Triantis, *The Effect of Bargaining Power on Contract Design*, 98 Va. L. Rev. 1665, 1693 & n.68 (2012) (describing lawyers' and business analysts' observations that the financial crisis shifted bargaining power to buyers and led to more "buyer-friendly" contract provisions with fewer carve-outs); *see, e.g.*, Paul A. Gompers & Josh Lerner, The Venture Capital Cycle 31–32, 45–71 (1999) (noting the restrictions imposed by investors on activities of venture capitalists); Nixon Peabody, Seventh Annual MAC Survey 4 (2008), *available at* http://www.nixonpeabody.com/linked_media/publications/MAC_survey_2008.pdf (describing how the number and scope of exceptions to the definition of "material adverse change" varied with bargaining power shifts created by changes in the supply of credit in 2007); Omri Ben-Shahar & James J. White, *Boilerplate and Economic Power in Auto Manufacturing Contracts*, 104 Mich. L. Rev. 953, 971 (2006) (noting that warranties and termination rights vary with relative bargaining power). *But see* George G. Triantis, *Financial Contract Design in the World of Venture Capital*, 68 U. Chi. L. Rev. 305, 319–21 (2001) (suggesting that sophisticated investors would respond to increased inflow of capital by "applying their bargaining power to capture a larger share of the monetary returns" rather than by "extract[ing] their rents in the form of private benefits").

wish to finance projects with negative net present value.[12] Thus, the rise in price can reduce the size of the expected surplus from the loan. The lender may be inclined to mitigate this adverse effect by adjusting the nonprice terms—specifically, by strengthening the collateral or covenant provisions—to better differentiate less risky borrowers from the riskier ones. A riskier borrower is more likely to trigger default of a covenant and lose collateral assets to the lender. Therefore, the riskier borrowers are less willing to agree to broad or intense covenants or to pledge assets as collateral. As the interest rate rises, the adverse selection problem worsens, attracting even riskier borrowers and motivating the lender to further strengthen the collateral and covenant provisions.

Changing interest rates can also affect the borrower's post-borrowing behavior; in other words, it can affect the severity of the moral hazard problem. As the interest rate rises, the borrower's claim on the residual cash-flow from projects decreases. When the lender cannot directly control the borrower's behavior by contract, the decrease in the residual cash-flow increases the borrower's incentive to invest in projects with higher private benefits but with potentially negative net present value. To combat this heightened moral hazard problem and the corresponding reduction in contractual surplus, the lender must adjust the covenant and collateral provisions to re-align the borrower's incentive.[13] Conversely, when the interest rate falls, the borrower's claim on the cash-flow rises—reducing moral hazard and making broad covenants or large collateral correspondingly less valuable.

In Part I, we review some of the theory and empirical results concerning customization of covenant and collateral provisions and their adjustment to macroeconomic and market changes. In Parts II and III, we offer theoretical explanations for the empirical finding associating higher interest rates with more extensive and tighter covenant and collateral provisions. We present numerical examples showing that a higher (lower) interest rate increases (decreases) the severity of the adverse selection or moral hazard problems, leading to more (less) extensive covenant and collateral requirements. The Appendix contains a more technical model, from which the numerical examples are

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[12] *See* Joseph E. Stiglitz & Andrew Weiss, *Credit Rationing in Markets with Imperfect Information*, 71 Am. Econ. Rev. 393, 393 (1981) (observing that individuals who are "willing to borrow at high interest rates . . . perceive their probability of repaying the loan to be low").

[13] *See* Arnoud W.A. Boot, Anjan V. Thakor & Gregory F. Udell, *Secured Lending and Default Risk: Equilibrium Analysis, Policy Implications and Empirical Results*, 101 Econ. J. 458, 465 (1991).

derived. Finally, in Part IV, we suggest empirical implications of our analysis.

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I

Explaining Variations in Debt Contracts

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The simple presence of the risk of borrower default and insolvency does not explain the existence of covenants and collateral. Information problems do. In particular, lenders cannot perfectly discern a borrower's true financial condition. Lenders are also apprehensive of a borrower's post-borrowing behavior that could undermine its ability to pay. As non-payment promises, covenants address these problems of adverse selection and moral hazard. By awarding priority and quasi-property rights to the lender, security interests in collateral can also mitigate these problems. In this Part, we briefly review covenants' theoretical underpinnings and the empirical observations that document how they correlate with borrower characteristics and credit market conditions.

A. *Firm-Specific Determinants and Customization*

Debt covenants are promises whose breach triggers default, acceleration of principal and matured interest, and the right of the lender to enforce its claim to the accelerated debt against the borrower's assets. Most covenants fall into two categories: (1) promises to take or refrain from taking specified actions (such as insuring assets, selling assets, making distributions, or borrowing) and (2) thresholds, or tripwires, whose violation triggers default (such as debt-to-equity or other financial ratios, or initiation of litigation or regulatory action against the borrower). Covenants in the first category deter behavior that compromises the lender's expectation of repayment. Covenants in the second category set conditions under which the lender has the right to some control over the borrower's assets.[14] The flexibility in designing covenants is significant: Restrictive covenants may be more or less extensive, and tripwire ratios may be set more or less tightly, relative to the actual financial condition of the borrower at the time of contracting.[15]

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[14] *See* Philipe Aghion & Patrick Bolton, *An Incomplete Contracts Approach to Financial Contracting*, 59 Rev. Econ. Stud. 473, 486–90 (1992) (discussing ex ante restrictions such as debt covenants and restrictive clauses in corporate charters); Mathias Dewatripont & Jean Tirole, *A Theory of Debt and Equity: Diversity of Securities and Manager-Shareholder Congruence*, 109 Q.J. Econ. 1027, 1049–50 (1994) (explaining that debt holders, unlike equity holders, have an active interest in control of a firm and "in bad times" can exercise this control "through partial sales of assets or reduction in activities").

[15] Some of the finance scholarship uses the measures of "intensity" (in relation to the restrictiveness of covenants) and "tightness" introduced by Michael Bradley & Michael R.

Covenants yield benefits by addressing problems arising from the private information held by the borrower. First, restrictive covenants constrain various forms of post-borrowing moral hazard, such as the inefficient risk-taking incentive of the borrower.[16] Securing debt with collateral also constrains the borrower's ability to misbehave in this manner.[17] Second, a borrower may agree to covenants in order to credibly convey private information about its prospects and future opportunities.[18] Similarly, a lender may require covenants in some of its agreements to screen its borrowers. Collateral can serve a similar signaling function.[19] Third, covenants specify the conditions for transferring control from shareholders (and their agents) to the lenders when the lenders are likely to have superior, albeit imperfect, decisionmaking incentives.[20] Once a covenant violation is triggered, security interests in collateral can speed the transfer of control.[21]

These benefits vary with the characteristics of borrowers in many respects. Stricter covenants and collateral requirements are more

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Roberts, The Structure and Pricing of Corporate Debt Covenants (May 13, 2004) (unpublished manuscript) (on file with the *New York University Law Review*), *available at* http://ssrn.com/abstract=466240.

[16] *See* Clifford W. Smith, Jr. & Jerold B. Warner, *On Financial Contracting: An Analysis of Bond Covenants*, 7 J. FIN. ECON. 117 (1979) (describing how debt covenants lower the agency cost of debt).

[17] George G. Triantis, Commentary, *A Free-Cash-Flow Theory of Secured Debt and Creditor Priorities*, 80 VA. L. REV. 2155 (1994).

[18] *See, e.g.*, Cem Demiroglu & Christopher M. James, *The Information Content of Bank Loan Covenants*, 23 REV. FIN. STUD. 3700, 3705 (2010) (noting the larger stock price reaction to announcements of loans with tight covenants); Nicolae Gârleanu & Jeffrey Zwiebel, *Design and Renegotiation of Debt Covenants*, 22 REV. FIN. STUD. 749 (2009) (noting that restrictive covenants signal fewer risk-shifting opportunities).

[19] For a discussion of collateral as a signal of quality, see Alan Schwartz, *Security Interests and Bankruptcy Priorities: A Review of Current Theories*, 10 J. LEGAL STUD. 1, 14–21 (1981), and George G. Triantis, *Secured Debt Under Conditions of Imperfect Information*, 21 J. LEGAL STUD. 225, 252–58 (1992). Building on the Stiglitz and Weiss theory of credit rationing, Helmut Bester, *Screening vs. Rationing in Credit Markets with Imperfect Information*, 75 AM. ECON. REV. 850, 850, 854 (1985), shows that rationing could disappear if banks were able to require different amounts of collateral as a screening device. David Besanko & Anjan V. Thakor, *Collateral and Rationing: Sorting Equilibria in Monopolistic and Competitive Credit Markets*, 28 INT'L ECON. REV. 671 (1987), on the other hand, shows that whether banks will use collateral or rationing as a screening device depends on the market structure: Monopolists will ration credit while collateral will be used in a perfectly competitive market. *See also* Hildegard C. Wette, *Collateral in Credit Rationing in Markets with Imperfect Information: Note*, 73 AM. ECON. REV. 442, 445 (1983) (illustrating how lenders "may not be willing to use collateral requirements as a rationing device even when borrowers are risk neutral, because increases in collateral can lead to adverse selection effects that decrease the lender's expected return on loans").

[20] Aghion & Bolton, *supra* note 14, at 487–92 (explaining that specifying ex ante debt-contingent control for an investor may best protect his or her interests by limiting an entrepreneur's ability to engage in opportunistic behavior).

[21] Triantis, *supra* note 19, at 246.

likely when there is greater information asymmetry (for example, when the borrower does not have an extensive track record).[22] Stricter covenants and collateral requirements are also more likely when there is a greater concern about moral hazard. For example, the moral hazard problem is more severe when a borrower has high leverage, a low credit rating, and significant latitude in decision making.[23] In addition, covenants are more valuable when the lender is skilled at monitoring the borrower's behavior.[24]

While beneficial, covenants impose three types of offsetting costs. First, the covenant restrictions may be over-inclusive and constrain the borrower's flexibility to take good, as well as bad, actions. Second, the transfer of control to the lender upon default may destroy going-concern value because of the lender's inefficient incentives to forego risky but profitable projects and to liquidate the borrower's assets. Third, although the parties may avoid this inefficiency by renegotiation, the renegotiation process can be costly. Indeed, financial thresholds are commonly tripped, even in the absence of financial distress, so that renegotiation is often necessary.[25] Similarly, collateral imposes two types of costs. First, it raises the cost of future borrowing and may impede the financing of profitable projects.[26] Second, the secured lender's enforcement against the collateral may threaten to destroy synergies and going-concern value, or necessitate costly renegotiation.

Like the benefits of covenants, the costs vary across contexts and determine customization choices among covenants and collateral. All else being equal, a covenant is more desirable when the likelihood of violation and the cost of renegotiation are lower. When the borrower is a growth firm, for example, its contracts are less likely to restrict capital expenditures and may rely instead on financial ratio

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[22] *See, e.g.*, Gabriel Jiménez et al., *Determinants of Collateral*, 81 J. Fin. Econ. 255, 279 (2006) (noting, in a sample of bank loans to Spanish firms from 1984–2002, a negative association between collateral and borrower's risk, where the borrower's risk was private information).

[23] *See* Greg Nini et al., *Creditor Control Rights and Firm Investment Policy*, 92 J. Fin. Econ. 400, 401 (2009) (noting that capital expenditure restriction becomes more likely as a borrower's credit quality deteriorates).

[24] *See* Raghuram Rajan & Andrew Winton, *Covenants and Collateral as Incentives to Monitor*, 50 J. Fin. 1113, 1114 (1995) (arguing that covenants are used to encourage monitoring).

[25] *See* Ilia D. Dichev & Douglas J. Skinner, *Large-Sample Evidence on the Debt Covenant Hypothesis*, 40 J. Acct. Res. 1091, 1093 (2002) (finding that covenant violations occur frequently and often do not indicate financial distress); Michael R. Roberts & Amir Sufi, *Control Rights and Capital Structure: An Empirical Investigation*, 64 J. Fin. 1657, 1658 (2009) (noting a high incidence of covenant violations among publicly listed firms).

[26] Triantis, *supra* note 17, at 2160–64.

tripwires.[27] Similarly, debt is less likely to be secured by growth firms than borrowers in declining industries.[28] Extensive and tight covenants (like security interests) are more common when the debt is private and held by a small number of institutional investors rather than when it is public, because renegotiation is easier in the former situation. They are also more common when the interests of the lender and the borrower are likely to converge in the event of default, thereby avoiding the agency costs of lender control.[29]

B. Market and Macroeconomic Determinants

Covenant and collateral patterns vary over time—empirical studies show that they vary with GDP growth, the risk-free rate of interest, and the concentration of lending markets.[30] Protective covenants are, for example, more likely during recessions than in boom periods.[31]

For our purposes, the significant finding is that covenant patterns become more extensive and tighter as the risk-free rate of interest

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[27] *See* Matthew T. Billett et al., *Growth Opportunities and the Choice of Leverage, Debt Maturity, and Covenants*, 62 J. FIN. 697, 726 (2007) (showing that high growth firms are unlikely to accept restrictions on future investment and financing flexibility unless faced with financial distress).

[28] Triantis, *supra* note 17, at 2167–68; George G. Triantis, *Financial Slack Policy and the Laws of Secured Transactions*, 29 J. LEGAL STUD. 35, 41 (2000).

[29] *See id.* at 699 (suggesting that covenants are used to mitigate the agency costs of debt for high growth firms); Sudheer Chava & Michael R. Roberts, *How Does Financing Impact Investment? The Role of Debt Covenants*, 63 J. FIN. 2085, 2087–88 (2008) (presenting evidence suggesting that covenants are strictly enforced when agency problems are particularly severe); Demiroglu & James, *supra* note 18, at 3705 (finding that riskier borrowers and borrowers with fewer investment opportunities are more likely to face tighter covenants).

[30] *See, e.g.*, Besanko & Thakor, *supra* note 19, at 677 (showing that competitive markets provide greater incentives for the use of collateral relative to monopolistic markets); David Besanko & Anjan V. Thakor, *Competitive Equilibrium in the Credit Market Under Asymmetric Information*, 42 J. ECON. THEORY 167, 174 (1987) (theorizing that, in a competitive market with totally asymmetric information, low-risk borrowers require greater collateralization than high-risk borrowers); Jiménez et al., *supra* note 22, at 279 (noting that concentrated credit markets reduce the use of collateral).

[31] *See* Bradley & Roberts, *supra* note 15, at 21 (finding that the number of covenants per loan is significantly greater for debt issued during recessionary years). *But see* Nini et al., *supra* note 23, at 411–13 (noting that, after controlling for firm performance and credit quality, the incidence of capital expenditure restriction covenants does not vary significantly across time). A closely related issue is why lending standards tend to relax when there is a boom. One theory posits that a sudden increase in demand for loans from new borrowers can lessen the concern each bank has about whether a loan application is from a new borrower or from a borrower that was rejected by another bank. As the likelihood increases that a loan application comes from a new borrower, the banks, in perfect competition, are more likely to drop or lower the collateral requirement. *See* Giovanni Dell'Ariccia & Robert Marquez, *Lending Booms and Lending Standards*, 61 J. FIN. 2511, 2511–12 (2006).

rises. This relationship is relatively well documented empirically.[32] A similar association is observed between the interest rate and the amount of collateral pledged by the borrower.[33] As noted in the introduction, practitioners attribute changes in the breadth or tightness of covenants and in the collateral requirements to swings in the relative bargaining or market power caused by changing supply and demand conditions of credit markets. For instance, the tightening of credit, or the expanded demand for it, leads not only to higher interest rates but also to more extensive covenants. Conversely, increased credit supply or decreased demand leads to looser covenants, known in the trade as "covenant-lite" agreements. Finance practitioners find this unremarkable: When more lenders are chasing fewer deals, they are compelled to accept lighter covenant protections.[34] The unanswered question, however, is why they would not prefer a contract with a lower interest rate and the same covenant protection. The opposite question may be posed in the context of a tighter credit market: Why do lenders ask for stronger covenants rather than even higher interest rates or fees?

We refine the practitioners' understanding by beginning with the standard financial economics explanation for covenants and collateral: They are second-best mechanisms for mitigating the problems of adverse selection and moral hazard.[35] The next Part demonstrates how fluctuations in the interest rate can exacerbate or reduce these problems and thereby change the optimal covenant or collateral patterns.

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[32] *See, e.g.*, Billett et al., *supra* note 27, at 708 (finding that restrictive covenants are more likely in below-grade and unrated debt issues); Nini et al., *supra* note 23, at 408 (noting the positive relationship between interest rate and covenant breadth); Bradley & Roberts, *supra* note 15, at 21 (observing a positive relationship between the presence of covenants and the prevailing credit spread); Zhipeng Zhang, Recovery Rates and Macroeconomic Conditions: The Role of Loan Covenants 2 (Sept. 2, 2009) (unpublished manuscript) (on file with the *New York University Law Review*), *available at* http://ssrn.com/abstract=1346163 (same).

[33] *See* Boot et al., *supra* note 13, at 471 (demonstrating the positive associations between interest rates in the economy, equilibrium loan interest rates, and equilibrium collateral requirements). Jiménez et al., *supra* note 22, at 274–75, find that the likelihood of collateral being granted is lower during periods of tight monetary policy or higher interest rates than during periods of loose monetary policy, but if granted, the amount of collateral pledged increases when interest rates are higher.

[34] *See supra* note 10 and accompanying text.

[35] *See generally* Patrick Bolton & Mathias Dewatripont, Contract Theory (2005) (examining the theoretical basis for modifying contracts to combat problems of adverse selection and moral hazard); Jean-Jacques Laffont & David Martimort, The Theory of Incentives: The Principal-Agent Model (2002) (same).

II

INTEREST RATE CHANGES AND ADVERSE SELECTION

We noted previously that as credit markets become tighter and increasingly lender-friendly and lenders demand higher payback amounts, the adverse selection problem worsens, forcing borrowers to offer more collateral or a broader set of covenants. When the lender wants to achieve a target rate of return, it is generally true that she will demand a larger payback amount from the riskier borrower than from the less risky borrower. But, when the lender raises the target interest rate as the market becomes more lender-friendly, the payback terms that the lender must impose on the riskier borrower rise faster than those for the less risky borrower. This, in turn, makes the terms intended for the less risky borrower more attractive to the riskier borrower. To achieve separation and avoid being pooled with the risky borrower, the less risky borrower must offer more collateral or covenant protection than before.

A. The Signaling Role of Covenants or Collateral

To illustrate the point, suppose a borrower needs a loan of $100 from a bank to implement a project. The bank's information is limited to the fact that the borrower might be either safe or risky with equal probabilities. While both types can generate a verifiable "cash flow" of either $200 or $0, the safe borrower is more likely to generate the $200 cash flow than the risky borrower. Let's assume that the safe borrower's probability of producing $200 cash flow is 90% while that of the risky borrower is 80%.[36] In other words, the safe borrower has a 10% chance of defaulting on the loan while the risky borrower's defaulting probability is 20%. Suppose also that the credit market is competitive so that the bank is demanding an expected net return of 0% from the borrower. That is, the bank demands an expected return of $100 for the $100 loan. To make this example straightforward, let's also assume that if the borrower does not produce any cash flow, the bank cannot collect anything from her. This may be the case, for example, because state law enforcement remedies entail delays that enable debtors to abscond or squander their assets.

If the bank could identify the borrower's type at the outset, the bank would set the payback amount accordingly. The bank would demand the payment of (about) $111 from the safe borrower and $125 from the risky borrower. Since the safe borrower will generate a $200

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[36] The surplus from contract, therefore, is $80 and $60, respectively, when the lender's opportunity cost of capital is 0%. When the lender's opportunity cost of capital rises to 10%, the surplus reduces to $70 and $50, respectively.

cash flow with 90% probability, the bank would collect $111 from the borrower with 90% probability. This will produce an expected return of $100 ($\approx$ $111 $\times$ 0.9). Similarly, the bank would receive $125 from the risky borrower with 80% probability, again producing an expected return of $100 (= $125 $\times$ 0.8). Not surprisingly, the bank would demand a higher payback term (interest rate) from the risky borrower because it knows that there is a 20% chance, as opposed to a 10% chance, that it will not be able to recoup anything from her.

What happens if the bank cannot identify the borrower's type? If the bank were to offer the foregoing menu of contracts, one requiring a $111 payback and the other requiring a $125 payback, it is clear that both risky and safe borrowers will choose the one with the $111 payback rate. Since both types of borrowers know that they will not have to pay the bank back anything when the cash flow is $0, they would strictly prefer any loan with a lower payback amount. When both types choose the $111 loan, the bank will no longer make the 0% net return in expectation. While the safe type will still generate an expected 0% net return for the bank, the risky type will generate an expected net return of about -11.2% (= 0.8 $\times$ $111 / $100 - 1). When the bank cannot identify the borrower's type, instead of offering a menu of contracts, the bank will offer one contract with a payback amount of $118 (= $100 / 0.85) to receive its expected net return of 0%.[37]

Under the bank's single-contract offer described above, the safe borrower cross-subsidizes the risky borrower. The safe borrower, therefore, would want to increase her surplus from the financed project by separating herself from the high-risk borrowers. Alternatively, if the bank has market power so as to capture the surplus from contracting, the bank itself will be motivated to discriminate between the two groups. Either the safe borrower or the bank, as the case may be, might use contract design to signal or screen in order to achieve the desired separation.

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[37] In this example, there is actually no efficiency loss from pooling. In fact, the separating equilibrium is the one with lower social welfare due to the deadweight loss imposed through the use of collateral. *See* Philippe Aghion & Benjamin Hermalin, *Legal Restrictions on Private Contracts Can Enhance Efficiency*, 6 J.L. Econ. & Org. 381, 381–82, 400–01 (1990) (arguing that information asymmetries can yield signaling, for example through a borrower promising to make "an inefficiently large transfer to the uninformed party if she fails," and that, therefore, prohibiting signaling may promote efficiency). This is partly due to the fact that the return from the project is invariant to the amount of investment. If the marginal rate of return were to depend on the size of the investment, the pooling equilibrium would generate inefficiency. We assume away such complications to make the example simple and straightforward.

The key property of a screening or signaling provision is that it imposes more severe costs on the higher-risk borrower. A provision that inflicts a sanction on the borrower in the bad ($0 cash flow) state of the world would impose higher expected costs on the risky borrower. For example, one such sanction is a loss of assets. A broad covenant correlated with the bad state would be more likely to remove assets from the risky borrower than from the safe borrower. Moreover, broader covenant provisions could remove more assets from the borrower more quickly.

Screening or signaling between types of borrowers may produce inefficiency ex post if, for example, the assets are more valuable in the borrower's business than when foreclosed and resold by the lender. Of course, the parties may renegotiate to avoid this inefficiency, but the costs of renegotiation would then provide the sanction that drives the necessary wedge between safe and risky borrowers.

We return to our example to demonstrate the screening or signaling role of covenants and collateral. The parties can adjust the amount of assets offered as collateral, for instance, to achieve the desired separation between types of borrowers. However, in this example, screening leads to inefficiency ex post because assets are worth more in the going concern of the borrower than removed under foreclosure proceedings. This example could be adapted to the use of covenants (restrictive or tripwire), in which case the variable would be the number and probability of states of the world in which the lender could seize control of the borrower's assets instead of the amount of assets offered as collateral. Please note that we do not address here the important role of security interests in allocating priority among creditors.[38] We assume that only the bank in our example can be a secured creditor and we focus only on the enforcement rights of a secured creditor to seize the collateral quickly and, providing it does not breach the peace, without resort to judicial process. When the priority feature is set aside, the analyses of collateral requirements and of covenant breadth and tightness are similar: Broader or tighter covenants increase the states of the world in which the debtor loses its

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[38] The significant benefits of the priority feature of security interests is the focus of a large body of literature in commercial law, including important contributions by our discussant in this symposium. *E.g.*, Alan Schwartz, *Priority Contracts and Priority in Bankruptcy*, 82 CORNELL L. REV. 1396, 1397–98 (1997) (arguing that secured debt efficiently addresses borrowers' inability to make credible covenants to refrain from issuing subsequent secured debt); *see also* Triantis, *supra* note 17, at 2156–58 (arguing that the pattern of first-in-time and later-in-time priority rules of security interests reduce agency costs).

collateral. We use collateral rather than covenants in the rest of the analysis simply for ease of exposition.

Suppose that the borrower can pledge some of its assets as collateral, which the bank can possess immediately if the borrower defaults—that is, when the borrower produces a $0 cash flow. Turning the collateral over to the bank is inefficient ex post because the borrower likely values the collateral more than the bank. In other words, there is a significant probability that the collateral assets are worth more as part of the borrower's going concern than as sold to third parties. Specifically, we assume that the bank values the collateral at $0.60 for every $1 in expected worth under the borrower's control. Despite the inefficiency, the safe borrower would be willing to post collateral to signal its type to the bank and, in return, receive a loan with lower payback terms. If the borrower were to use covenants to do so, it would agree to widen the states of the world in which the bank could seize the collateral, in order to benefit from lower payback terms. This is the well-known problem of excessive screening (or signaling).

The amount of collateral that the safe borrower must post in order to achieve separation must satisfy three conditions: (1) the risky borrower prefers to borrow without that amount of collateral, (2) the safe borrower prefers the loan with that amount of collateral, and (3) the bank receives at least a net expected return of $0 from both types of borrowers.[39] In equilibrium the bank will offer two loan contracts: one with $125 of payback and $0 of collateral and the other with $106 payback and $77 of collateral. The risky borrower will choose the former loan and the safe borrower will choose the latter. If the risky borrower were to choose the loan with no collateral, she would make $60 (= 0.8 × ($200 - $125)). If she were to choose the loan with $77 collateral, she instead would expect to make $59.80 (= 0.8 × ($200 - $106) - 0.2 × $77). Hence, the loan with no collateral is more attractive for the risky borrower.

TABLE 1:

LOAN OFFERS BY THE BANK WITH 0% NET EXPECTED RETURN

	Payback Terms	*Collateral*
Safe Borrower	$106	$77
Risky Borrower	$125	$0

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[39] For a general model, see Technical Appendix A.

For the safe borrower, compared to the case in which the safe borrower was pooled with the risky borrower and had to promise to pay back $118 for a $100 loan, the safe borrower is better off when it can signal its type to the bank using collateral. Previously, under the loan with $118 payback terms but no collateral, the safe borrower expected to earn $73.80 (= 0.9 × ($200 - $118)). Now, by pledging $77 of collateral but with a $106 payback term, the safe borrower expects to earn $76.90 (= 0.9 × ($200 - $106) - 0.1 × $77). Previously, when the bank could not identify the borrower's type and had to demand payback based on the pooled recovery rate, the safe borrower was implicitly subsidizing the risky type's borrowing.[40] Now, although the safe borrower must incur some cost in posting collateral, the benefit of a lower payback amount outweighs this cost. Finally, in expectation, the bank makes at least zero in net payoffs.[41]

B.   *The Effect of an Interest Rate Increase on Covenant and Collateral Choices Under Adverse Selection*

In this subpart, we examine how a change in the interest rate, caused by an exogenous change in market conditions, affects the separating equilibrium. Suppose that the supply of credit tightens so that the bank now demands a 10% net return from the borrower to meet its higher opportunity cost of capital. That is, the bank will demand, in expectation, $110 from the borrower for a $100 loan. Again, if the bank could identify the borrower type at the outset, it would charge different interest rates depending on the type, without having to resort to a collateral provision. From the risky borrower, the bank would impose the payback term of $137.50. For the safe borrower, the payback term would rise to about $122.22. Regardless of the market conditions that affect the size of the surplus, the nonprice terms such as the lack of collateral stay constant to maximize the surplus. In this case, only the price terms shift to reflect the changes in market conditions or market power.

If the bank cannot identify the borrower type, the bank will resort to a collateral provision as a screening mechanism. For the risky borrower, the bank could simply raise the payback terms from $125 to $137.50 without demanding any collateral. For the safe borrower, however, merely raising the payback terms, without changing the

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[40] When the bank was demanding a payback of $118 with no collateral, the risky borrower was expecting to get $65.60 (= 0.8 × ($200 - $118)). When the types of borrowers are separated, the risky borrower earns only $60 (= 0.8 × ($200 - $125)).

[41] When the risky borrower chooses the loan with no collateral, the bank receives a net payoff of $0 (= 0.8 × $125 − $100). When the safe borrower chooses the loan with $77 collateral, the bank makes, in expectation, $0 (= 0.9 × $106 + 0.1 × 0.6 × $77 - $100).

collateral provision, is not sufficient because it will not separate out the risky borrowers.

Suppose the bank were to raise the payback terms for the safe borrower from $106 to $117. When the safe borrower chooses this loan, the bank makes, in expectation, a net return of 10%. However, it is no longer in the risky borrower's interest to stay with the loan with no collateral. If she were to choose the loan with $137.50 payback and $0 collateral, she would expect to earn $50 (= 0.8 × ($200 - $137.50)). If she were to choose the loan with $117 payback and $77 collateral instead, her expected return would be $51 (= 0.8 × ($200 - $117) - 0.2 × $77). Therefore, for the bank to distinguish between safe and risky borrowers, it would also have to raise the amount of collateral from $77 to $83. If the bank offers two loans, one with $137.50 payback with $0 collateral and the other with $117 payback and $83 collateral, it is no longer in the risky borrower's interest to choose the latter loan type. Thus, the bank has successfully separated the two types of borrowers.

TABLE 2:
LOAN OFFERS BY THE BANK WITH 10% NET EXPECTED RETURN

	Payback Terms	*Collateral*
Safe Borrower	$117	$83
Risky Borrower	$137.50	$0

Why does the bank demand more collateral from the safe borrower when the market return rises? The reason lies in the manner in which the payback terms change with respect to each type of borrower. The fact that the bank demands higher payback terms from both types—from $106 to $117 for the safe borrower and from $125 to $137.50 for the risky borrower—is not surprising. However, it is important to observe that as the bank's demanded rate rises, the payback terms rise more quickly (in absolute terms) for the risky borrower than for the safe borrower. Holding everything else constant (including the collateral), the loan offer with a lower payback amount now becomes even more attractive for the risky borrower than before. In other words, a tighter lending market exacerbates the problem of adverse selection.

Since the collateral (or covenant) is serving mainly as the screening device, the bank demands more collateral (or more extensive or tighter covenants) to achieve separation when the adverse selection problem worsens. Conversely, as credit conditions relax or as the bank's opportunity cost of capital falls, the amount of collateral

(or the breadth of the covenant) shrinks because the information problems are less severe. These terms themselves create ex post efficiency losses. The following Part demonstrates that exogenous changes in market conditions can also affect the severity of the moral hazard problem and, consequently, the value and incidence of covenants and collateral.

III
INTEREST RATE CHANGES AND BORROWER MORAL HAZARD

The root of the moral hazard problem is the incentive of the borrower to take self-interested actions that jeopardize the lender's prospect of repayment. This stems from the fact that the borrower does not fully internalize the cost of failure because, generally, her liability is limited. Law and finance scholarship refer to these actions in various terms, including risk substitution and the extraction of private benefits. Moral hazard is a contracting challenge because the lender cannot perfectly monitor or enforce contractual obligations and therefore cannot specifically constrain the borrower's post-contract behavior. Moral hazard becomes more severe as the interest rate rises because the borrower keeps less of the upside from successful outcomes. Therefore, all else equal, a higher interest rate means that the misbehaving borrower internalizes even less of the consequent loss in upside payoffs.

A. *The Incentivizing Effect of Covenants and Collateral*

As noted in Part I, corporate finance scholarship shows that covenants and collateral can mitigate the problems of moral hazard. Consider the following example. After borrowing $100, the borrower can choose between two different projects. Project A produces a higher cash flow and a higher combined return, but project B produces greater private benefit for the borrower that cannot be shared with the lender. Suppose, as before, that both projects have two possible cash flows: $200 or $0. Project A has a 60% chance of producing $200 while project B's chance is only 40%. However, project B also confers a nontransferrable private benefit to the borrower in the cash-equivalent amount of $20, while project A produces no such benefit. Hence, the expected total returns are $120 for project A (= $0.6 \times \$200$) and $100 for project B (= $0.4 \times \$200 + \$20$).

Although both the lender and the borrower may want the borrower to commit contractually to project A over B, they cannot do so in a complete contract because the borrower's choice is either not

observable to the lender or not verifiable by the court. Unless the borrower can commit, the lender expects the borrower to choose project B and will, therefore, decline to lend. To see this, suppose the bank demands to earn, in net, 0% and lends the borrower $100 with a payback term of $167. Once the borrower takes the $100 loan, it is no longer in her best interest to choose project A. If she implements project A, her expected return is $19.80 (= 0.6 × ($200 - $167)). If she instead chooses project B, her expected return is $33.20 (= 0.4 × ($200 - $167) + $20). The bank, knowing this, may demand the entire cash flow of $200 in case of success, but that would still be insufficient for the 0% net expected return: 0.4 × $200 - $100 = -$20. Once the bank knows that the borrower will choose project B, the bank declines to lend and the parties fail to realize the potential surplus from trade.

A pledge of collateral (for example, of the borrower's personal assets) can solve this commitment issue. By promising to turn over her own assets if she defaults on the payment promise, the borrower can pre-commit not to undermine her ability to pay back the lender. Collateral can impose a serious penalty against the borrower for nonpayment. So long as enough collateral has been pledged to neutralize the adverse incentive of the borrower, the lender receives the implicit promise from the borrower not to embark on project B and can be assured of receiving the requisite payment to at least break even. As in our analysis of adverse selection, the significant feature of collateral is the property right of the secured party to seize the collateral assets without judicial process. As also indicated in the previous Part, nonpayment covenants play a similar role because they broaden the states of the world in which the bank may take the collateral from the debtor, with the attending loss in value.

To see how this works in our numerical example, suppose the bank demands a payback term of $148 with a collateral of (slightly above) $48 in case the borrower defaults, that is, in case the cash flow is $0. After taking out the $100 loan, it is now in the borrower's interest to implement project A over B. With project A, her expected return is $12 (= 0.6 × ($200 - $148) - 0.4 × $48). If she instead chooses project B, her expected return is $12 (= 0.4 × ($200 - $148) - 0.6 × $48 + $20). Hence, when the collateral is slightly more than $48, the $20 of certain private benefit is not a sufficient incentive for the borrower to choose the inefficient project. Therefore, the bank will receive its expected return (0.6 × $148 + 0.4 × 0.6 × $48 ≈ $100) and will be willing to lend on these terms. As in the adverse selection example, this function of collateral is well known in the literature (as is the similar function of covenants).

We now turn to analyzing the effect of an increase in interest rate caused by a market change on the balance of supply and demand for credit. Suppose that the supply of credit tightens so that the cost of funds rises to 10%. Merely raising the payback amount will not yield a sufficient return. Suppose that the bank demands a payback of $165 (instead of $148) with the same collateral of $48 from the borrower. If the borrower implements project A, the borrower's expected return is $1.80 (= 0.6 × ($200 - $165) - 0.4 × $48). If she implements project B instead, her expected return is $5.20 (= 0.4 × ($200 - $165) - 0.6 × $48 + $20). The borrower no longer has an incentive to choose the efficient project. To restore that incentive, the bank will have to raise both the payback amount and the collateral. Specifically, it must increase the payback amount from $148 to $160 and the collateral from $48 to $60.[42]

B. *The Effect of an Interest Rate Increase on Covenant and Collateral Choices Under Borrower Moral Hazard*

When the market conditions tighten and the lender demands a higher expected payment from the borrower, the use of collateral becomes more important in solving the moral hazard problem. The borrower continues to capture the full private benefit from project B. However, as the amount due to the lender increases, the borrower—as the residual claimant—is entitled to a smaller share of the remaining project payoff. To combat this heightened moral hazard problem, the lender requires the borrower to post more collateral (or agree to more extensive covenants). Conversely, as the lending conditions become more relaxed, to the extent that collateral imposes a deadweight loss, the lenders demand less collateral to solve the moral hazard problem.

TABLE 3:
LOAN CONTRACTS TO ADDRESS THE MORAL HAZARD PROBLEM

Bank's Net Return	Payback Terms	Collateral
0%	$148	$48
10%	$160	$60

Under both adverse selection and moral hazard theories, the amount of collateral (or the extensiveness of the covenants) that the

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[42] With this loan agreement, if the borrower chooses project A, she expects to earn $0 (= 0.6 × ($200 - $160) - 0.4 × $60), whereas from project B, she expects to earn $0 (= 0.4 × ($200 - $160) - 0.6 × $60 + $20). The bank's expected net return is $10.40 (= 0.6 × $160 + 0.4 × 0.6 × $60 - $100).

lender requires rises or falls as the underlying lending market tightens or loosens. The reason is not simply the redistribution of market or bargaining power, as indicated by some practitioners.[43] It stems from the effect of the consequent changes in price on the severity of the moral hazard or the adverse selection problems. With respect to the moral hazard problem, a tighter lending market decreases the borrower's residual return, thereby worsening the commitment problem. With respect to the adverse selection problem, a riskier borrower is more tempted to pool with the less risky borrower because her payback amount is—and should be—more sensitive to underlying market conditions.

In the Appendices, we make our arguments more concrete by presenting simple, game theoretic models of adverse selection and moral hazard in the commercial lending market. Although the basic intuitions have been laid out already, the models reveal some deeper, more subtle implications. We explore a few of these implications in the next Part.

IV
IMPLICATIONS

This Article seeks to understand and describe a stylized phenomenon in commercial loan and debt contracts—variability in covenant and collateral provisions. In contrast to the impact articulated by practitioners, where shifts in relative market or bargaining power directly cause changes in contract terms, we establish how contract design is mediated by the information problems described above. Both stories predict that as the market conditions change, both the price (interest) and the nonprice (covenant and collateral) contract terms will move in favor of the party that attains more leverage. Despite this similarity, the theories diverge on at least a few predictive dimensions, making them empirically distinguishable and therefore testable.

First, in addition to acknowledging that the average covenant terms move in favor of the party with more "leverage" as market conditions shift, our information story recognizes that the change in market conditions also affects the *variance* with which the parties use covenants. In the credit market, the average amount of collateral or the breadth of the covenants rises as the supply of credit tightens. At the same time, because the amount of collateral that the less risky borrower must pledge increases while the amount of collateral that

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[43] *See supra* notes 8–11 and accompanying text (outlining the common view that the breadth of covenants or the amount of collateral required is directly related to the market for loans).

the risky borrower must pledge stays relatively constant, the variance on the pledged collateral (or the covenant breadth) should also rise. Similarly, as the market interest rate rises, the collateral needed to address the heightened moral hazard problem increases for the leveraged borrower (with a higher risk of misbehavior), but stays relatively constant for the borrower with a greater equity stake. The simple bargaining power story does not predict this increase in variance because the lender with greater market power will demand more collateral or a more extensive set of covenants from all borrowers.

Second, our information story suggests that the presence of asymmetric information is crucial in the adverse selection analysis and that the problem of incomplete contracting must be considered in the moral hazard analysis. If these problems are addressed through other market or governance mechanisms, covenants and collateral are less valuable and less susceptible to the influence of changes in market demand and supply (in other words, bargaining power). The information story also implies that the covenant and collateral patterns of companies with mild informational asymmetries (due, for instance, to extensive analyst coverage or a long history of default-free borrowing) will be much more immune to changes in the market condition.[44] In contrast, the simple bargaining power story is unaffected by the presence or absence of these mechanisms because the lender—by hypothesis—uses the more onerous nonprice terms as a surplus extraction mechanism.

Third, we explain how informational problems are either exacerbated or relaxed through changes in the lender's opportunity cost of capital. Without these changes, the nonprice terms (collateral or covenants) in lending agreements should remain constant. Thus, for instance, if an exogenous change such as a sudden, unpredicted wave of intra-industry mergers increases the concentration of lending markets without any corresponding change in the opportunity cost of capital, our story suggests that the nonprice terms should remain relatively constant.[45] In contrast, the bargaining power story predicts that the nonprice terms will become more lender-friendly.

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[44] Even under the bargain theory story, one may argue that the highest credit rating companies also have more bargaining power against the lending market. The distinction might, therefore, be more relevant for smaller companies with a very good credit rating or extensive analyst review.

[45] This assumes that the amount of capital available for lending will not change after the mergers. If, for some reason, the mergers also decrease capital availability, the opportunity cost of capital can increase, regardless of the increase in the lender's market power. We also need to be careful in recognizing and controlling for the fact that intra-industry mergers are sometimes caused by external shocks such as the general shift in the market opportunity cost of capital.

CONCLUSION

Debt covenants and collateral in both public and private debt agreements vary over time in their breadth and intensity. Practitioners attribute many of these changes to market shifts in demand and supply, which they often refer to as shifts in bargaining power. We present the theoretical mechanism by which these market changes might lead to adjustments in patterns of covenants and collateral as a result of their effect on interest rates. This has broader implications across many other types of contracts, in that price terms have efficiency as well as distributional consequences. Price terms affect selection biases and incentives and are thereby important factors in the design of nonprice terms. Although finance scholarship has identified several factors that drive contract innovation in capital markets—such as shocks from new regulation or the emergence of new risks in the economic environment—we suggest the addition of what might otherwise appear to be relatively innocuous shifts in demand and supply conditions.

TECHNICAL APPENDIX A:
AN ADVERSE SELECTION MODEL OF COLLATERAL IN LENDING

Suppose there are two players, a borrower and a lender, who are both risk-neutral. The borrower borrows money from the lender to implement a project, which can result in either success or failure. If the project succeeds, it produces a cash flow of R. If it fails, it produces a cash flow of \$0. The probability of producing a successful outcome depends on whether the borrower is "good" (with probability p of success) or "bad" (with probability q of success). Assume that the probability of producing a successful outcome, depending on the type of borrower, is given by $1 > p > q > 0$.

The project requires an initial investment of I and the lender demands a net rate of return of r, which means that the lender is demanding to receive, in expectation, $(1 + r)I$. We will treat the rise in the lender's demanded interest rate as a tighter lending market (or as the lender having more market power). Although the good-type borrower has a higher chance of producing a successful outcome, we assume that both borrower types have a positive net present value project: $pR > qR > (1 + r)I$.[46]

The timing of the game is as follows. In the first period ($t = 1$), nature determines the borrower's type: A good borrower occurs with probability α, where $1 > \alpha > 0$. The realized type is observed by the borrower but not the lender. In the second period ($t = 2$), the borrower and the lender sign a contract, which contains the amount of cash flow that the borrower promises to pay the lender in case the project is successful (R_i) and the value of collateral (to the borrower) that the lender can take from the borrower in case the project fails (C_i).[47] After signing the contract, the lender lends the money and the borrower implements the project.

In the third period ($t = 3$), the cash flow is realized. If the project is a success, the lender receives the contractually promised payment of R_i. If the project is a failure, the lender acquires the collateral that is worth C_i to the borrower. To reflect the fact that the collateral (for

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[46] The assumption that both projects have positive net present value is not important. If the bad project has a negative net present value, in a socially optimal equilibrium, the lender should lend only to the good borrower while still requiring some collateral so as to prevent the bad borrower from participating in the market.

[47] For convenience, we can assume that the borrower proposes the contract and the lender either accepts or rejects the offer. However, due to the assumption that the lender's expected return is tied down by the market conditions, it does not matter who proposes the contract. Even if the lender were to make a take-it-or-leave-it offer to the borrower, the lender would still want to use collateral as a screening device.

example, working capital) often loses its going-concern value when transferred to the lender, we assume that the collateral is worth only βC_i to the lender, where $1 > \beta > 0$.

Now suppose that both players observe the borrower's realized type. In this case, both types of borrower can implement their projects without having to pledge any collateral. For each type, the lender will demand R_i, such that $pR_g = (1 + r)I$, $qR_b = (1 + r)I$ and $C_i = 0$, which implies that:

$$R_b = \frac{(1 + r)I}{q} > \frac{(1 + r)I}{p} = R_g$$

The lender demands a higher cash flow from the bad borrower to reflect the higher chance of failure. This is also efficient, since the borrower's collateral does not lose its going-concern value. If we measure social welfare by the net return from both projects, where both parties observe the borrower's type, the equilibrium social welfare is $\alpha(pR - (1 + r)I) + (1 - \alpha)(qR - (1 + r)I)$.

If the lender does not observe the borrower's type, the first best solution cannot be achieved. This is because the bad borrower strictly prefers the contract the lender would offer to the good borrower, since it demands a lower cash flow payment in case of success: $R_b > R_g$. One possible equilibrium—a pooling equilibrium—is for the lender to charge an average rate for both types. Given that the lender faces the good borrower with probability α, the lender can set the payment term $\bar{R}$, with $C = 0$ (zero collateral) where $(\alpha p + (1 - \alpha)q)\bar{R} = (1 + r)I$. Compared to the efficient equilibrium, the good borrower pays more and the bad borrower pays less: The good borrower subsidizes the bad.

A second possible equilibrium—a separating equilibrium—is for the good borrower to signal to the lending market by pledging collateral to separate itself from the bad borrower. Suppose the good borrower pledges $C_g > 0$ as collateral, which the lender can possess in case the project produces zero cash flow. In a separating equilibrium, since the market will be able to distinguish between the borrower types, the bad type will not have any incentive to pledge collateral: $C_b = 0$. So, while the good borrower offers a contract $(R_g, C_g > 0)$ to the market, the bad borrower offers $(R_b, C_b = 0)$.

To achieve separation in a competitive lending market, the contracts need to satisfy four conditions:

$$pR_g + (1 - p)\beta C_g = (1 + r)I)$$

$$qR_b = (1 + r)I$$

$$p(R - R_g) - (1 - p)C_g \geq p(R - R_b)$$

$$q(R - R_b) \geq q(R - R_g) - (1 - q)C_g$$

The first two equalities guarantee that the lender will break even with respect to both types of borrowers, thus satisfying the lender's participation condition. The two weak inequalities represent the borrower's incentive compatibility conditions and achieve separation: The good borrower prefers the contract with collateral, while the bad borrower prefers the contract with no collateral.

Models like this are typically bound by the bad borrower's incentive compatibility condition, in addition to the lender's participation conditions. In other words, we must ensure that the bad borrower does not want to pretend to be a good borrower rather than the other way around. This produces three equalities: The first two are the break-even conditions for the lender and the last is the bad borrower's incentive compatibility condition. Since there are three unknowns (with $C_b = 0$), we can solve the system of equations. In equilibrium, we get:

$$C_b = 0$$

$$R_b = \frac{(1 + r)I}{q}$$

$$C_g = \frac{(p - q)(1 + r)I}{p(1 - q) - q(1 - p)\beta}$$

$$R_g = \frac{(1 + r)I}{p} - \frac{(1 - p)\beta}{p} \cdot \frac{(p - q)(1 + r)I}{p(1 - q) - q(1 - p)\beta}$$

Note that, in equilibrium, the good borrower offers a positive amount of collateral to the lender as a signal of high quality. Partly in return, the good borrower receives a (substantially) lower interest rate:

$$R_g < \frac{(1 + r)I}{p} < \frac{(1 + r)I}{q} = R_b$$

The equilibrium social welfare is given by $\alpha(pR - (1 - p)(1 - \beta)C_g - (1 + r)I) + (1 - \alpha)(qR - (1 + r)I)$, which is lower when compared to the case with symmetric information due to the good borrower's (potential) loss of going-concern value on its collateral.

What happens to the contract terms when the lending market tightens? From the equilibrium contract terms, we get:

$$\frac{\partial C_b}{\partial r} = 0$$

$$\frac{\partial R_b}{\partial r} = \frac{I}{q} > 0$$

$$\frac{\partial C_g}{\partial r} = \frac{(p - q)I}{p(1 - q) - q(1 - p)\beta} > 0$$

$$\frac{\partial R_g}{\partial r} = \frac{I}{p} \left(\frac{p(1 - q) - p(1 - p)\beta}{p(1 - q) - q(1 - p)\beta} \right) > 0$$

Not surprisingly, the cash flow demanded in case of success, for both borrowers, will rise as the lender's opportunity cost of capital rises:

$$\frac{\partial R_i}{\partial r} > 0$$

What is interesting is that the good borrower has to put up more collateral to credibly signal its goodness to the market:

$$\frac{\partial C_g}{\partial r} > 0$$

Why does the market demand more collateral from the good borrower when the market tightens? Not only must the bad borrower guarantee a higher cash flow in case of success compared to the good borrower ($R_b > R_g$), but additionally, when the lender's opportunity cost rises, the amount of cash flow the bad borrower needs to commit to the lender rises faster compared to the amount of cash flow the good one needs to commit:

$$\frac{\partial R_b}{\partial r} > \frac{\partial R_g}{\partial r}$$

In other words, the bad borrower's promised cash flow is more sensitive to the lender's opportunity cost of capital. As the difference between the respective cash flows rises, the contract for the good borrower becomes more attractive for the bad one, and, in order to achieve separation, the good borrower needs to pledge more collateral.

This can be seen more easily from the bad borrower's incentive compatibility condition. In equilibrium, we know that the bad borrower's incentive compatibility condition binds: $q(R - R_b) = q(R - R_g) - (1 - q)C_g$. We also know that because the lending market just breaks even,

$$R_b = \frac{(1 + r)I}{q},$$

a small increase in the lender's opportunity cost of capital, from r to r', implies that the bad borrower's interest rate will rise proportionally,

$$R'_g \approx R_g + \frac{I}{q}.$$

If the good borrower's interest rate also rises proportionally to its true risk characteristics,

$$R'_g \approx R_g + \frac{I}{p},$$

then the bad borrower's incentive not to mimic the good one will be destroyed: $q(R - R'_b) < q(R - R'_g - (1 - q)C_g)$. To achieve separation, therefore, the good borrower has to rely more on costly collateral and less on adjusting its interest rate. In fact, from the equilibrium conditions, we see that:

$$\frac{\partial R_g}{\partial r} = \frac{I}{p} \left(\frac{p(1 - q) - p(1 - p)\beta}{p(1 - q) - q(1 - p)\beta} \right) < \frac{I}{p}$$

That is, the good borrower's interest rate is less sensitive to the rise in the lender's opportunity cost of capital than its true characteristic dictates.

In sum, when the lending market tightens because the lender's opportunity cost of capital rises, there will be a higher dispersion of interest rates: $R_b - R_g$ rises. At the same time, the lender will require more costly collateral from the good borrower—the contract term becomes more inefficient.

Technical Appendix B:
A Moral Hazard Model of Collateral in Lending

In the moral hazard model, there are still only two risk-neutral players, a borrower and a lender. There is only one type of borrower, but the borrower has a choice over projects: good or bad. The outcome of each project can be either success or failure. As before, if the project succeeds, it produces a cash flow of R, whereas if it fails, it produces a cash flow of $0. The good project has a higher chance of being successful than the bad project—such that if we let p and q be the respective probabilities of success, we assume that $1 > p > q > 0$. The bad project, however, produces a certain private benefit of $B > 0$ for the borrower.

Both projects require an initial investment of I, and the lender demands an expected rate of return of r, which means that for the loan of I, the lender must receive, in expectation, $(1 + r)I$. As before, we treat the rise in the lender's demanded rate of return as a tighter lending market. Unlike the previous model, however, we assume that only the good project has a positive net cash flow, $pR > (1 + r)I > qR$. We also assume that despite the private benefit of the bad project, the good project is more efficient: $pR > qR + B$.

The timing of the game is as follows. In the first period ($t = 1$), the borrower and the lender sign a lending agreement, which consists of the cash flow that the borrower promises to pay to the lender in case the project is successful (R_s) and the value of collateral (to the borrower) that the lender can take from the borrower in case the project is a failure (C). The agreement cannot condition payment on either the realization (or size) of the private benefit (B) or the type of project the borrower has chosen: The contract is incomplete. After signing the contract, in the second period ($t = 2$), the borrower chooses among the projects to implement.

In the third period ($t = 3$), the verifiable cash flow is realized. If the project is a success, the lender receives the contractually promised payment of R_s. If the project is a failure, the lender acquires the collateral that is worth C to the borrower. To reflect the fact that the collateral (for example, working capital) often loses its going-concern value when transferred to the lender, we assume, as in the adverse selection model, that the collateral is worth only βC to the lender, where $1 > \beta > 0$.

If the parties can choose and enforce which project to implement, the contract will require the borrower to implement the good project with no collateral and R_s will be chosen so as to satisfy the lender's demanded expected return: $pR_s^* = (1 + r)I$. Suppose the parties use

the same contract but without the choice-of-project clause. The borrower's returns, from choosing either the good or the bad project, are $p(R - R_s^*)$ and $B + q(R - R_s^*)$, respectively. To make the problem interesting, let us assume that $B + q(R - R_s^*) > p(R - R_s^*)$, so that the borrower will always prefer the bad project. Clearly, if the lender were to offer $(R_s, C) = (R_s^*, 0)$ without the choice-of-project clause, the lender would not receive its expected return.

   If the choice of project cannot be stipulated, one way of inducing the borrower to implement the good project is by requiring the borrower to post collateral. Because the borrower suffers a loss when the project is a failure, this collateral requirement can neutralize the perverse incentive that was created through the positive private benefit from the bad project. For the borrower to choose the good project while the lender breaks even, we need:

$$pR_s + (1 - p)\beta C = (1 + r)I$$

$$p(R - R_s) - (1 - p)C \geq q(R - R_s) - (1 - q)C + B$$

The first condition is the lender's expected return condition. The second condition is the borrower's incentive compatibility condition, which requires the borrower's private return from implementing the good project to be (at least weakly) higher than that from the bad project.

   In equilibrium, the lender will demand just enough collateral for the borrower's incentive condition to be satisfied with equality.

$$pR_s + (1 - p)\beta C = (1 + r)I$$

$$p(R - R_s) - (1 - p)C = q(R - R_s) - (1 - q)C + B$$

When we solve for the optimal contract, we get:

$$R_s = \frac{(1 + r)I}{p} - \frac{(1 - p)\beta}{(1 - p)\beta + p} \left\{ \frac{B}{p - q} + \frac{(1 + r)I}{p} - R \right\}$$

$$C = \frac{p}{(1 - p)\beta + p} \left\{ \frac{B}{p - q} + \frac{(1 + r)I}{p} - R \right\}$$

   From the expressions, it is clear that:

$$\frac{\partial R_s}{\partial r} = \frac{\partial C}{\partial r} > 0$$

That is, as the lending market tightens and the lender demands a higher expected net return from the borrower, both the payback and the collateral amounts demanded by the lender rise.

The higher expected return required by the lender is not being satisfied through higher payback amount alone. The reason can be seen directly from the borrower's incentive compatibility condition. From the optimal solution that satisfies

$$p(R - R_s) - (1 - p)C = q(R - R_s) - (1 - q)C + B$$

when the lender attempts to raise R_s to satisfy the higher expected return condition, because $p > q$, the left-hand side of the condition falls at a faster rate than the right-hand side, leading the borrower to choose the bad project. In other words, it becomes more difficult for the lender to provide the right incentive to the borrower: The moral hazard problem worsens. To restore the original incentive, the lender must also raise C, because requiring more collateral has a smaller negative effect on the good project than on the bad project.