Market Conditions and Non-price Terms in Contracts[*]

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and

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Introduction

Contract negotiations both create surplus and divide it between the parties. The received wisdom in law-and-economics contract scholarship holds that rational parties should agree to provisions that maximize the size of the surplus and then divide the surplus, usually through the price term. This prescription is invariant to different allocations of market or bargaining power that should affect only the surplus division. The basic argument can be found in an early work by Richard Posner, who argued that a profit-maximizing monopolist should offer product quality that efficiently meets consumer preferences, i.e., increasing quality until the incremental cost of further increase outweighs the value to the consumer.[1] Given that contract terms contribute to the value of the product, Posner's demonstration applies to them as well.

Accordingly, Alan Schwartz and George Priest applied the argument to rebut the judicial assertion, made in unconscionability opinions such as *Henningsen v. Bloomfield Motors*[2] and *Williams v. Walker-Thomas Furniture*,[3] that sellers of consumer products use their market power—specifically, their power to make take-it-or-leave-it offers—to impose inefficient terms on consumers.[4] Schwartz and Priest each made an empirical

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[1] Richard A. Posner, *Natural Monopoly and its Regulation*, 21 Stan. L. Rev. 548, 548-85 (1969).

[2] 161 A.2d 69 (N.J. 1960).

[3] 350 F.2d 445 (D.C.Cir. 1965). According to the Court, "unconscionability has generally been recognized to include an absence of meaningful choice on the part of one of the parties together with contract terms which are unreasonably favorable to the other party." Id. at 449. The former has been interpreted as "procedural" unconscionability and the latter as "substantive" unconscionability.

[4] George L. Priest, *A Theory of the Consumer Product Warranty*, 90 Yale L.J. 1297, 1320-1 (1981); Alan Schwartz, *A Re-Examination of Nonsubstantive Unconscionability*, 63 Va. L.Rev. 1053, 1071-6 (1977). See also Alan Schwartz, *Seller Unequal Bargaining Power and the Judicial Process*, 49 Indiana Law J. 367 (1974); Michael J. Trebilcock, *The Doctrine of Inequality of Bargaining Power: Post-Benthamite Economics in the House of Lords*, 26 U Toronto L.J. 359 (1976); Alan Schwartz, *Unconscionability and Imperfect Information: A Research Agenda*, 19 Can. Bus. L. J. 437 (1991); and Richard Craswell, Passing

observation that patterns of consumer and automobile warranties reflect little, if any, correlation between industry concentration and warranty duration. Moreover, they echoed Posner's argument that a firm with market power would offer the same quality contract terms as would exist in a competitive market, but at a super-competitive premium.[5]

The view that market power alone cannot lead to deviation from efficient non-price contract terms is now conventional view, at least among law and economics contract scholars.[6] In their contracts casebook, Robert Scott and Jody Kraus compare the cross-collateralization clause in *Walker-Thomas Furniture* to a hypothetical in which the monopolistic seller of stereos and furniture requires its buyers to also purchase a toaster. They reject the assertion that a profit maximizing monopolist would impose either form of undesirable (and inefficient) non-price term on its consumers.[7]

Despite its intuitive appeal, this conventional view of law-and-economics relies on assumptions that are unrealistic in many cases. In particular, the theory (implicitly) assumes that (1) the contracting parties are symmetrically informed over all relevant aspects of the bargain and (2) they have the freedom to tailor the terms of each contract. For instance, in order to provide efficient non-price terms (or efficient level of quality) to consumers, a monopolist must know how much *each* consumer values the terms and must be able to price or quality discriminate among consumers. Otherwise, the profit-maximizing monopolist may offer non-price terms that are inefficient.[8]

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on the Costs of Legal Rules: Efficiency and Distribution in Buyer-Seller Relationship, 43 Stan. L. Rev. 361 (1991). Priest identifies the classic proponent of the "exploitation theory" as Kessler, *Contracts of Adhesion – Some Thoughts about Freedom of Contract*, 43 Colum. L. Rev. 629 (1943) (Kessler's focus was standardized insurance contracts).

[5] Priest at 1320-1; Schwartz at 1072; and Craswell at 363. Indeed, Schwartz adds that "The incentive, however, appears to run in the opposite direction: a monopolist will have a greater incentive than a competitor to satisfy consumer preferences (with the exception of charging below the monopoly price), because a monopolist, unlike a competitor, can capture all of the gains that satisfying additional consumer preferences would create. Schwartz, *Seller Unequal Bargaining Power and the Judicial Process,* 49 IND. L.J. 367, 380-81 (1974). Id., at 1072 n39. Schwartz' analysis is premised on three assumptions that are discussed below in the text at notes –, infra.

[6] To be sure, non-price terms affect the division of the surplus, too. For instance, if a monopolist decides to supply inefficiently low quality which also lowers the cost of production, the amount of surplus captured by the consumers vis-à-vis the monopolist will change. The conventional claim, then, should be thought of as arguing that the non-price terms are an inefficient mechanism in dividing the surplus since they also affect the size of the contractual surplus.

[7] Robert E. Scott and Jody S. Kraus, *Contract Law and Theory* 62-3 (Rev. 3d Ed. 2003). The strong form of the law and economics critique of the unconscionability doctrine would thus suggest that even when the consumers had no "meaningful choice" in that they could only either accept or reject the proposed terms, a party with strong market power, would not impose inefficient (or substantively harsh) terms on them. Hence, inquiries into both the procedural aspect, so far as it delves into the issues of "meaningful choice" or "gross inequality in bargaining power" and the substantive aspect, whether the terms are unreasonably favorable to one party, are not very meaningful.

[8] This is a standard result in the industrial organizations literature. Unless certain restrictive assumptions, such as information symmetry (over the reservation values or preferences) or ability to price or quality discriminate, are satisfied, a monopolist may provide quality that may be either inefficiently high or inefficiently low. See Tirole, *The Theory of Industrial Organization* 100—106 (1988). The reason is that while the social planner cares about how much the average consumer cares about quality, a monopolist's is

The conventional law-and-economics theory is also at odds with the professional understanding of real-world contracting patterns. We noted above the concern among judges over the abuse of bargaining power in (allegedly) unconscionable contracts. Those cases, however, are also tainted with uneven information and sophistication.[9] Yet, even where sophisticated and well-represented parties are contracting, practitioners claim that shifts in market conditions, as well as market power, can cause profound changes in non-price terms. It is common to hear important non-price contract provisions being linked to the presence of a "seller's" or a "buyer's" market, or to a "lender's" or "borrower's" market.[10] As the market becomes more "lender-friendly," for instance, not only will the price terms, such as interest rate, shift in favor of the lenders, but even the non-price terms, such as business covenants or collateral, will become more lender-favorable.

Our goal in this paper is to take a few steps in reconciling theory and practice. Under conventional law and economics theory, non-price terms should stay constant regardless of who has more market or bargaining leverage. Under the industrial organizations theory, although the non-price terms will no longer stay constant as the market power shifts, it is uncertain that they will shift in favor of the party with more bargaining leverage. That is, as we move away from perfect competition towards a monopoly, the theory gives us no prediction as to whether or not the non-price terms will become less or more consumer-friendly. Hence, neither theory can explain how the non-price terms tend to correlate with one's market or bargaining leverage.

Our analysis provides an indirect explanation for why the shift in market (or bargaining) power might lead to changes in non-price terms in a predictable way. At this point, we do not take issue with the results from either the traditional law and economics or the industrial organizations analysis. We suggest, however, that the increase in price resulting from the exercise of one's market power will create conditions that change the

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concerned with the marginal consumer's willingness to pay for quality. Therefore, unless both happen to be the same, divergence will occur. A closely related issue is whether the monopolist will provide an optimum level of product differentiation (or product variety). Similar to the quality problem, monopoly may produce a level of product differentiation that may be either too high or too low. Id.

[9] The problem of inefficient or unconscionable terms in consumer contracts raises at least two issues even when consumers are rational: whether or not consumers, at cost, read and understand the terms, and even when they do so, whether the seller with market/bargaining power will impose inefficient terms on them. We will discuss this issue briefly when we deal with normative implications, but the conflation of these two problems, even under the assumption of rationality, makes the analysis more difficult and challenging. The main focus of the current paper is commercial contracts between sophisticated business entities. Hence, the issue of reading and understanding the terms is much less of a concern.

[10] We observe that practitioners refer to a collection of different economic conditions when they speak of changes in market power. This includes, but is not limited to, the economists' sense of market concentration, such as monopoly or monopsony. In particular, practitioners use changes in market power to describe markets in which supply has become more scarce or demand has increased greatly. Thus, for example, lenders are said to have greater "market power" not only when there are fewer lenders in the market but also when the lenders are demanding a higher rate of return from the borrowers even though the number of lenders in the market has not gone down. In this paper, we focus on this latter meaning to understand the effect of changed market conditions on non-price, as well as price terms.

efficient non-price terms. Our principal analysis concerns cases in which the non-price terms address information problems in the transaction, such as those of adverse selection or moral hazard. Our main claim is that as one party attempts to exercise more market power through price, the severity of the adverse selection or the moral hazard problem will change, thereby necessitating the concomitant changes in the non-price terms.

The paper is organized as follows. In section I, we provide a few, stylized real-world examples of contracting patterns, with a particular emphasis on the commercial debt market. We will show, relying on the existing empirical research and some anecdotal evidence, how the non-price terms tend to correlate with the distribution of market power. For instance, as the debt market becomes more lender (or borrower) friendly, certain non-price terms, e.g., debt covenants, become pro-lender (or pro-borrower). In section II, we present numerical examples that can explain such contracting pattern. We argue that how non-price terms change in favor of the party with more market power can be explained through the severity of the information problems. A more sophisticated model, from which the numerical examples are derived, is relegated to the appendix. In section III, we present some positive and normative implications. First, we show how our theory can be empirically tested. We also make some normative recommendations to the unconscionability doctrine with an emphasis that much more work need to be done in the area of consumer contracts.

I. Non-price Terms in Commercial Contracts

Under the conventional law-and-economics theory, the non-price terms in contracts should be independent of the respective bargaining powers of contracting parties. In contrast, the more sophisticated industrial organizations theory produces no predictions about how the non-price terms should change as the bargaining power shifts from one contracting party to the other: in some cases, quality is more than the efficient level, in others it is less. Thus, both theories are at odds with the empirical impression that the party with more bargaining leverage imposes non-price terms that are harsher against (i.e. are less valuable to) the weaker party.

To illustrate, consider three types of transactions: a commercial loan (debt), a corporate acquisition, and a home sale. First, under a loan (or a debt) contract, a borrower promises to repay the principal amount, along with interest and fees, and makes additional non-payment promises, such as a pledge of collateral and/or a set of covenants. The covenants may include promises to maintain a minimum ratio of current assets to liabilities and to refrain from future borrowing or asset distribution beyond a specified threshold. A violation of any of these covenants can lead to a default and acceleration, which would accelerate the maturity of the principal and accrued interest, so that the loan becomes payable immediately.

Covenants control the borrower's incentive to take inefficient actions that impair the lender's ability to recover, including excessive future borrowing, risk-taking or distributions to shareholders. In other words, they address the moral hazard (or agency conflict) of borrowing, increase the surplus from the loan, and reduce the borrower's cost

of capital. This is the conventional explanation for loan covenants.[11] Notably, moral hazard is an efficiency-driven concept that depends on conditions such as information and uncertainty, and not the division of the surplus. That is, to the extent that covenants reduce the moral hazard problem in lending, they are affecting the size of the surplus of the transaction.

Despite the dominance of the moral hazard explanation of covenants in finance and legal scholarship, practitioners comment that the extensiveness (or the breadth) of covenant restrictions varies with exogenous changes in the supply and demand conditions of credit markets. Thus, the tightening of credit or the expansion of demand for it, leads not only to higher interest rates but also more extensive covenants. Conversely, an increase of supply or drop in 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.[12] 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 higher interest rates or fees?

A second example comes from the market for corporate mergers and acquisitions. In many M&A deals, there is a substantial delay between the time of the agreement and closing the deal, usually to allow the parties to acquire approvals from regulatory agencies and/or the target shareholders and to allows the buyer to complete the due diligence investigation. During this period, the seller remains in control of the assets and may lack the inventive to take actions that maximize or preserve the value of the transaction to the buyer. The contract provisions typically address this problem of moral hazard in several ways, including closing conditions that, if not satisfied, allow the buyer to walk away from or renegotiate the deal. These conditions also serve as warranties that bridge the asymmetry of information concerning the financial state, operations, and prospects of the target.

One common closing condition is the absence of a material adverse event or change (MAE or MAC) clause between the dates of the contract and the scheduled closing of the deal.[13] The occurrence of such an event or change triggers the buyer's right to terminate the transaction. MAC definitions are often subject to a number of exclusions or "carve-outs" for material events or changes in the seller's industry, financial markets or the economy as a whole, unless these changes affect the target disproportionately. As recent empirical studies indicate, MAC carve-outs vary between

[11] E.g., Clifford W. Smith and Jerold Warner, *On Financial Contracting: An Analysis of Bond Covenants*, 7 J. Fin. Econ. 117 (1979). To some degree, they may also serve as signals of borrower quality, i.e., to address the adverse selection problem. Higher quality borrowers would be more willing to sign broader covenant restrictions than lower quality borrowers, holding everything else constant.

[12] Covenant-lite loans became very common during the years of easy credit several years ago. The credit crunch of 2007 not only reduced the supply of credit, but also greatly tightened and broadened the covenant patterns in new loans. [cites]

[13] For a more extensive analysis of MAC clauses, see our recent paper, *Strategic Vagueness in Contract Design: The Case of Corporate Acquisitions* (forthcoming Yale L. J. 2010).

deals and, more significantly, for the purposes of this paper, they vary substantially over time in the degree to which they are "seller-friendly" (extensive carve-outs) or "buyer-friendly" (limited carve-outs). The annual survey of MAC clauses conducted by Nixon Peabody after the onset of the credit crunch late in 2007 found that the MAC terms had become more buyer friendly, with a decrease in the number of carve-outs. The survey authors state that "[t]he current shift towards more buyer-friendly terms…is likely due at least in part to a lack or credit available to finance transactions, and sellers' understanding that they must decrease their expectations to get a deal done. Sellers are finding that in order to sell their business, they need to agree to additional concessions including the inclusion of fewer MAC exceptions."[14]

Further evidence of the effect of market power on these non-price terms can be found in client newsletters issued by law firms, which speak of pro-buyer and pro-seller MACs. This should be puzzling to those who subscribe to the conventional law-and-economics theory of the effect of bargaining power. Parties to large acquisition deals are represented by sophisticated legal counsel and investment bankers, all of whom are well versed in the varieties of MAC clauses. These practitioners appear to view MACs as a mechanism for allocating risks of large changes between the parties.[15] Elsewhere, we suggest a deeper explanation based on information asymmetries rather than simple risk allocation. In either case, these explanations suggest that the breadth of the MAC should depend only on factors such as relative risk preferences, informational advantages, and the severity of the seller's moral hazard. Why then do practitioners believe that the allocation of bargaining power might affect the allocation of risk? Would not sophisticated parties always choose to maximize the surplus from risk allocation, and then bargain over the division of the surplus by adjusting the acquisition price?

Our third example is from the real estate market boom and bust of this decade. Most residential home sale agreements include, in addition to the pricing and mortgage financing clauses, a clause that gives the buyer a limited period of time to inspect the house before being bound to close the deal. As with the MAC condition described above, the inspection clause gives the buyer the right to walk away if she finds a material defect in the course of the inspection. The inspection right is an important mechanism in partly addressing the buyer's concern about hidden defects and is thereby more likely to generate an offer to purchase and at less of a discount.[16] Moreover, the seller's willingness to grant an inspection right may also be a signal of her confidence in the quality of the house.

Inspection clauses have been severely curtailed and even eliminated from form documents in several hot markets earlier in the decade, where demand was seen to outstrip supply and houses were sold within a day at prices above asking. This happened

[14] Nixon Peabody's Seventh Annual MAC Survey.

[15] We argue elsewhere for a justification based on information asymmetries rather than simple risk allocation. After all, the parties tend to be large entities with easy access to market instruments of insurance. See Strategic Vagueness, supra note --.

[16] This is partly due to the fact that, under contract law, the seller often has very weak duty to (affirmatively) disclose any material information regarding the house. Cite Restatement (Second) of Contracts on non-disclosure and misrepresentation and cases.

even though there was no reason to believe that information asymmetries were narrower or that houses on the market were of higher quality. The example may be somewhat less useful compared to the others since, when a market is in a boom (or a bust), we may be observing behaviors that are off the equilibrium. The story is instructive nevertheless. To the extent that the inspection rights were there to facilitate trade (by reducing the problems of information asymmetry), the fact that they were being reduced implies that the pricing terms that govern division of the surplus and the non-price terms that affect the size of the surplus are somehow being fused together.

The three examples presented above pose some interesting issues. Why do non-price terms change as the market condition shifts in favor of one party to the other? How do we reconcile the divide between the theory that predicts that the (non-price) terms that affect the size of the surplus should be independent of the relative market powers with seemingly contrary real world observations? The purpose of this paper is to explore these puzzles by looking at the impact of bargaining power or underlying market conditions on non-price contract terms that address information problems, such as the examples given above.

Our insight is that, in the presence of informational asymmetry, price terms do more than simply divide the surplus—they affect incentives and thereby the size of the surplus. When a lender increases the interest rate charged to borrowers, for instance, the increase not only affects the division of the surplus for individual borrower but also may attract more risky borrowers, borrowers with perhaps even negative net present value projects, thereby reducing the size of the (expected) surplus the lender secures from the contract. To mitigate the adverse effect, the lender will have to adjust the non-price terms in the contract: changes in price may alter incentives in ways that call for corresponding adjustments in non-price terms. The changes in market conditions, then, affect the non-price terms by affecting the severity of the underlying informational problems. We demonstrate this process below in the context of a loan contract secured by collateral.

II. Adverse Selection and Moral Hazard Problems in Commercial Lending Market

Commercial lending relationship is a helpful one to examine for at least four reasons. The first is that the correlation between the breadth of the covenants and market conditions of supply and demand for credit, has been, compared to other areas, better documented and empirically studied. [17] Therefore, we need not rely solely on anecdotes. Second, to the extent that our focus is on large deals, executed by commercially sophisticated parties, our reliance on rational choice theory is justifiable. Third, as the motivating example demonstrates, typical lending agreements contain many non-price covenants that tend to be at the center stage of negotiation between a lender and a

[17] See, e.g., Michael Bradley and Michael R. Roberts, *The Structure and Pricing of Corporate Debt Covenants* (2004); Matthew T. Billett, Tao-Hsien Dolly King, and David C. Mauer, *Growth Opportunities, Choice of Leverage, Debt Maturity, and Covenants*, 62 Journal of Finance 697 (2007); and Zhipeng Zhang, *Recovery Rates and Macroeconomic Conditions: The Role of Loan Covenants* (2009).

borrower. Borrowers and lenders consider them important. Fourth, the lending relationship faces both adverse selection and moral hazard issues, and is therefore a useful prototype in analyzing the typical informational problems in contracts.[18]

Although non-price covenants play important roles in addressing information asymmetry, price terms do more than divide the surplus. Incidentally, they can have significant effects on these problems. In a lending relationship, when a lender cannot distinguish between high- and low-quality borrowers, raising the interest rate can backfire (reduce her expected return) by attracting lower quality (riskier) borrowers.[19] To address this adverse selection (lemons) problem, high-quality borrowers might turn to non-price terms, such as the amount of security interest or collateral, to signal its quality to the market or the lender.

Collateral can act as a separating device,[20] but like other signals, however, the granting of security interests is costly. For example, bargaining may impede renegotiation following default, so that the lender may seize assets whose value is highest to the borrower. This is a deadweight loss. Therefore, the more the parties need to rely on collateral as a signal, the greater the prospect of such ex post efficiency loss. This limits how much the pricing terms can be used as a surplus extraction device. Even if the lender has all the bargaining power, she may be reluctant to raise the interest rate too much because this would exacerbate adverse selection, increase the use of collateral as a signal and the corresponding deadweight loss, and thereby shrink the size of the surplus from the loan transaction. A similar analysis can be applied to the use of covenants as a signal. They are costly because they discipline borrower behavior only crudely: they restrict the ability of the borrower to make profitable decisions and this yields inefficiency if the parties cannot renegotiate.

The fact that the parties may deliberately use (seemingly) inefficient terms in the presence of informational issues is not something new. This is a fairly standard result in information economics.[21] What has not been fully explored, however, is how the magnitude of such inefficiency changes as the underlying market condition shifts from one party to the other. For instance, how will the amount of collateral (or the breadth of the covenants) required by the lender change as the market condition shifts so as to require the lender to demand a higher return from the borrower? Just as the key to explaining the seeming inefficiency in non-price terms resided in the informational

[18] See generally Jean Tirole, *The Theory of Corporate Finance* (2006) for various models of adverse selection and moral hazard in corporate finance.

[19] This adverse selection, in the absence of other screening or signaling mechanism such as collateral or covenant, can lead to credit rationing in which the market does not clear: that is, some borrowers cannot obtain credit at any interest rate. See Joseph E. Stiglitz and Andrew Weiss, *Credit Rationing in Markets with Imperfect Information*, 71 Am. Econ. Rev. 393 (1981); Hildegard C. Wette, *Collateral in Credit Rationing in Markets with Imperfect Information: Note*, 73 Am. Econ. Rev. 442 (1983); Helmut Bester, *Screening vs. Rationing in Credit Markets with Imperfect Information*, 75 Am. Econ. Rev. 850 (1985); and David Besanko and Anjan V. Thakor, *Collateral and Rationing: Sorting Equilibria in Monopolistic and Competitive Credit Markets*, 28 Int. Econ. Rev. 671 (1987).

[20] Id.

[21] See generally, Jean-Jacques Laffont and David Martimort, *The Theory of Incentives: The Principal-Agent Model* (2002) and Patrick Bolton and Mathia Dewatripont, *Contract Theory* (2005).

issues, we believe that the key to explaining the changes in the non-price terms (amount of pledged collateral and the breadth of covenants) reside in explaining how the underlying market conditions can change the severity of such informational problems.

A. Adverse Selection Problem in the Lending Market

We noted above that, as credit markets become tighter (lender-friendly) and the lenders demand higher payback amounts (either in principal or interest), the adverse selection problem worsens, forcing the 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 one. But, when the bank raises the target interest rate, i.e., 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 type more attractive for the riskier borrower, and to achieve separation and not to be pooled with the risky borrower, the less risky borrower has to offer more collateral than before.

To demonstrate this claim using a more concrete example, suppose there are a bank and a borrower. The borrower needs a loan of $100 from the bank to implement a project. The borrower can be either of safe or risky type 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 type. Let's assume that the safe borrower's probability of producing $200 cash flow is 90% while that of the risky borrower is 80%. In other words, the safe type has a 10% chance of defaulting on the loan while the risky type's defaulting probability is 20%. Suppose also that the lending conditions are borrower-friendly so that the bank is demanding an expected net return of 0% from the borrower. That is, the bank demands to receive, in expectation, $100 for the $100 loan. To make the example straightforward, let's assume that if the borrower produces $0 cash flow, the bank cannot collect anything from her.[22]

If the bank can identify the borrower's type, the bank can set the payback amount in accordance. From the safe type, the bank will demand the payment of (about) $111 and from the risky type, $125.[23] Since the safe type will generate the cash flow of $200 with 90% probability, the bank will be able to collect $111 from her with 90% probability, producing an expected return of $100 (≈$111×0.9). Similarly, the bank will

[22] This assumes that the bank cannot have an unsecured, deficiency claim against the borrower in case there is a shortfall. There are varying degrees of ease with which a bank can collect on its deficiency claim. For the sake of simplicity, we will assume that it is prohibitively costly for a bank to collect on its claim. For instance, the borrower could set up a limited liability organization, such as an LLC or a corporation, and let the organization borrow money from the bank. If the bank did not secure a personal guarantee from the borrower, which is similar to posting collateral, for the bank to collect personally from the borrower, the bank will have to make a successful corporate veil piercing claim, which may be difficult.

[23] We can divide the payment term into two parts: principal and interest. Principal can be set at the face value of the original loan ($100) while the rest will be considered interest. With respect to the safe type, the implicit interest rate is 11% while for the risky type, 25%. Throughout the example, we won't make this formal distinction and lump them together as "payback" amount.

receive $125 from the risky borrower with 80% probability, again producing an expected return of $100 (=$125×0.8). Not surprisingly, the bank is demanding a higher payback term from the risky type because it knows that there is a 20% chance, as opposed to 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 a menu of loan contracts, one consisting of $111 principal and the other with $125 for the loan of $100, it is clear that both types of borrower will choose the one with $111 principal. Since both types know that they won't 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 generate an expected 0% net return for the bank, the risky type will generate an expected net return of about −11.2% (=(0.8)×($111)/($100)−1). When both types of borrower simply choose the loan with the lower payback amount, the bank will offer one contract with a payback amount of $118 (=$100/(0.85)) to receive its expected net return of 0%.[24]

If the bank wanted to discriminate based on borrower type, the bank could demand some collateral from the borrower as a screening device.[25] Let's suppose that the borrower has some physical assets that she can post as collateral, which the bank can possess in case the borrower defaults on the loan obligation, i.e., when the borrower produces a $0 cash flow. Turning the collateral over to the bank is inefficient in that the borrower values the collateral more than the bank. To the extent that the collateral is a physical asset, the asset might be put to better use by the borrower than the bank. Let's assume that for every $1 of collateral, the bank values it at $0.60. 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.

How much collateral would the safe type borrower have to post in order to achieve separation? This depends on the incentive of the risky type borrower. That is, if the bank were to offer two types of loans, one with collateral and lower payback amount and the other with no collateral and higher payback amount, the risky type should prefer the latter over the former. In addition, the bank needs to be able to make its expected net return of 0% from both types. 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

[24] In this example, there is actually no efficiency loss from pooling. Separating equilibrium is the one with lower social welfare due to the deadweight loss imposed through the use of collateral. See Aghion and Hermalin. This is partly due to the fact that the return from project is invariant to the amount of investment. If we were to make the marginal rate of return depend on the size of the investment, pooling equilibrium will generate inefficiency. We assume away such complication to make the example simple and straightforward.

[25] This will be similar to receiving a personal guarantee from the sole (or controlling) shareholder of a corporation. In the example, it does not matter whether it is the bank who demands collateral or the borrower who (voluntarily) offers it.

collateral. The risky type will choose the former while the safe type will choose the latter.[26]

Compared to the case where the safe type were being pooled with the risky type and had to promise to payback $118 for a $100 loan, the safe type is better off when she could signal her attribute to the bank using collateral. Previously, under the loan with $118 payback terms but no collateral, the safe borrower was expecting to earn $73.8 (=(0.9)×($200−$118)). Now, by pledging $77 of collateral but with $106 payback terms, the safe borrower expects to earn $76.9 (=(0.9)×($200−$106)−(0.1)×($77)). Previously, when the bank could not identify borrower's type and had to demand payback based on the pooled recovery rate, the safe type was implicitly subsidizing the risky type's borrowing.[27] Now, although the safe borrower has to incur some cost by having to post collateral, the benefit of lower payback amount outweighs the cost.

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

Table 1: Loan Offers by the Bank with 0% Net Expected Return

Now suppose that the lending market tightens so that the bank demands a 10% net return from the borrower.[28] That is, the bank will demand, in expectation, $110 from the borrower for a $100 loan. For the risky type, the bank could simply raise the payback terms from $125 to $137.50 without demanding any collateral. For the safe type, however, merely raising the payback terms, without changing the collateral provision, will not be sufficient. To see this, suppose the bank were to raise the payback terms for the safe type from $106 to $117. When the safe type chooses this loan, the bank will make, in expectation, a net return of 10% from the safe type.

[26] It is fairly straightforward to see that these loan contracts satisfy the three conditions of (1) risky type preferring the one with no collateral; (2) safe type preferring the one with collateral; and (3) the bank making the 0% net expected return from both types. When the safe type chooses the loan with $77 collateral, the bank makes, in expectation, (0.9)×($106)+(0.1)×(0.6)×($77)−$100≈$0. For the risky type, if she were to choose the loan with no collateral, she will make (0.8)×($200−$125)=$60. If she were to choose the loan with $77 collateral, instead, she expects to make (0.8)×($200−$106)−(0.2)×($77)=$59.8. See the technical appendix for a more general model.

[27] When the bank was demanding a payback of $118 with no collateral, the risky borrower was expecting to get (0.8)×($200−$118)=$65.6. Under separation, the risky type earns (0.8)×($200−$125)=$60.

[28] The bank could be demanding a higher net return from the borrower either because it is attempting to exercise a stronger market power or because it is facing a higher opportunity cost of capital. We remain agnostic on this throughout the paper. In the case of bond financing, since the issuer-borrowers are more likely to be in charge of all the substantive terms when lending to (future) dispersed bondholders, the latter explanation is more likely. If the higher net return demanded from the bank is due to more market/bargaining power, one wonders why the bank, when it is the sole lender, doesn't attempt to extract all the surplus from the borrower. Setting aside the bond market, where borrowers "control" the terms, one important reason why the bank won't attempt to take all the surplus from the borrower is that doing so will make the bank the residual claimant and this will significantly reduce the after-tax return from the project since the borrower will no longer be able to take advantage of the favorable tax treatment on the interest expenses.

However, it is no longer in the risky type'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 expects to earn $50 (=(0.8)×($200−$137.5)). If she were to, instead, choose the loan with $117 payback and $77 collateral, her expected return is $51 (=(0.8)×($200–$117)–(0.2)×($77)). If the bank were to distinguish between safe and risky type borrower, the bank also has to raise the amount of collateral from $77 to $83. When 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 incentive to choose the latter.

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

Table 2: Loan Offers by the Bank with 10% Net Expected Return

Why does the amount of collateral demanded from the safe type go up as the bank demands a higher net expected return? The reason has to do with how the payback terms are changing with respect to each type of borrower. While the fact that the bank is demanding higher payback terms from both types—from $106 to $117 for the safe type and from $125 to $137.50 for the risky type—is not surprising, what is important is that as the bank's demanded rate rises, the payback terms for the risky type rises faster (in absolute terms) than that for the safe type. 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. Tighter lending market worsens the problem of adverse selection.

Since the collateral (or covenants) is being used mainly as the screening (signaling) device to distinguish among borrower types, when the adverse selection problem thus worsens, the bank will have to demand larger collateral (or more extensive covenants) to achieve separation. Conversely, as the credit condition relaxes, the amount of collateral (covenants) demanded by banks will go down principally because the collaterals (covenants) themselves impose some deadweight loss. Deadweight loss results either from the fact that the value of the collateral is higher in the borrower's hand than in the lender's or that the covenants can impose unnecessary restrictions on the borrower's business.

B. Problems of Borrower Moral Hazard in the Lending Market

Another use of collateral (and/or covenants) is to provide better incentive to the borrower to not undermine the lender's investment, i.e., to minimize the moral hazard problem. Once the lender has deposited the money into the borrower's account, the borrower can undertake many transactions that can seriously dilute her ability to pay back the lender. If the borrower has the protection of limited liability, she doesn't fully internalize that cost. To restore the incentive for the borrower to maintain her capacity to pay back, the lender can use non-price terms, such as covenants and collaterals.

In contrast to the adverse selection issue, the problem of moral hazard arises because the lender cannot perfectly monitor (and, therefore, cannot contractually stipulate) the borrower's post-borrowing behavior. For instance, suppose after borrowing $100, the borrower can choose among two different types of project: A or B. Project A produces a higher cash-flow and a higher combined return, but project B produces (more) private benefit for the borrower which cannot be shared with the lender. To make this concrete, 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%. On the other hand, project B confers a non-transferrable private benefit to the borrower in the cash-equivalent amount of $20. Hence, the expected total returns are $120 for project A (60% multiplied by $200) and $100 for project B (40% multiplied by $200 plus $20).

Although both the lender and the borrower may want to contractually require the borrower to choose A over B, because the borrower's choice is either not observable to the lender or not verifiable to the court, the contract will remain incomplete. Without some sort of a commitment device, the lender expects the borrower to choose 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. However, once the borrower takes the $100 loan, it is no longer in the borrower's interest to choose A. If she were to implement project A, her expected return is $19.8 (=(0.6)×($200−$167)). If she were to choose B, instead, her expected return is $33.2 (=(0.4)×($200−$167)+$20). The bank, knowing this, may demand the entire cash-flow of $200 in case of success, but that is still 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 will decline to lend and the parties fail to realize the potential surplus from trade.

Pledge of collateral (e.g., borrower's personal assets) can solve this commitment issue.[29] By promising to turn over her own assets in case the borrower 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 non-payment. So long as enough collateral has been pledged to neutralize the adverse incentive of the borrower, the lender receives the implicit promise from borrower not to embark on project B and can be assured of receiving the requisite payment to, at least, break even.

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, i.e., in case the cash-flow is $0. After taking out the $100 loan, now it is in the borrower's interest to implement project A over B. If she were to do so, her expected return is $12 (=(0.6)×($200–$148)–(0.4)×($48)). If she were to choose B, instead, 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 sufficient for

[29] Covenants also attempt to control borrower's behavior indirectly by imposing restrictions on amount of borrowing, sales and purchases, and business lines. Although they may be closer, compared to collaterals, in regulating the borrower's behavior, they are still indirect and prone to create inefficiencies, for instance, by preventing the borrower from undertaking positive net present value projects.

the borrower to choose the inefficient project. The bank, on the other hand, receives its expected return ((0.6)×($148)+(0.4)×(0.6)×($48)≈$100) and becomes willing to lend. Collateral (covenants) can be used to solve the moral hazard problem.

What happens when the bank demands, instead, a 10% net return from the borrower? It is fairly straightforward to see that merely raising the payback amount will not be sufficient. To see this, suppose the bank were to demand a payback of $165 (instead of $148) with the same collateral of $48 from the borrower. If the borrower to implement project A, the borrower's expected return is $1.80 (=(0.6)×($200–$165)–(0.4)×($48)). If she were to implement project B, instead, her expected return is $5.20 (=(0.4)×($200–$165)–(0.6)×($48)+$20). The borrower no longer has the incentive to choose the efficient project. To restore that incentive, the bank will have to raise both the payback amount and the collateral, payback amount from $148 to $160 and the collateral from $48 to $60.[30]

When the market condition tightens and the lender demands a higher (expected) payment from the borrower, the use of collateral in solving the moral hazard problem becomes more important. The reason is that when the payback amount gets larger, the borrower, as the residual claimant, is entitled to a smaller share of the pie. Since the private benefit is a return that is not shared with the lender, a larger payback amount makes project B even more attractive than before. To combat this heightened moral hazard problem, the lender will have to require the borrower to post a larger amount of collateral (or more extensive covenants). Conversely, as the lending conditions become more relaxed, to the extent that collaterals impose a deadweight loss, the lenders demand less collateral to solve the moral hazard problem.

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

Table 3: Loan Contracts to Address Moral Hazard Problem

Under both theories, the amount of collateral (or the extensiveness of the covenants) that the lender requires from borrowers rises or falls as the underlying lending market tightens or loosens. The reason has not to do with the changes in the relative market power per se but more to do with the severity of the moral hazard or the adverse selection issue. In the former, tighter lending market decreases the borrower's residual return, thereby worsening the commitment problem. In the latter, riskier borrower is more tempted to pool with the less risky type because her payback amount is (and should be) more sensitive to the underlying market conditions.

In the appendix, 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

[30] With this loan agreement, if the borrower to choose project A, she expects to earn $0 (=(0.6)×($200–$160)–(0.4)×($60)), whereas from project B, $0 (=(0.4)×($200–$160)–(0.6)×($60)+$20). The bank's expected net return is (0.6)×($160)+(0.4)×(0.6)×($60)–$100=$10.4.

subtle, deeper, implications, some of which we explore in the next section. The presentation of the intuition in the current section has also benefitted from looking at these models more closely.

III. Positive and Normative Implications

Our paper has, so far, been an attempt to describe and understand a stylized phenomenon in commercial contracts. How might we establish that the effect on non-price terms is mediated through the information problems described above, rather than the more direct impact articulated by practitioners, where the terms shift due to changes in relative market power? Both stories predict that as the market conditions change both the price and the non-price terms will move in favor of the party that attains more leverage. Similarity notwithstanding, the theories diverge on at least a few predictive dimensions which make them empirically distinguishable and testable.

A. Empirical Predictions

First, in our information story, although it is true that the average non-price terms move in favor of the party with more leverage as the market condition shifts, the change in market condition also affects the *variance* with which the parties use the non-price terms. In the credit market, for instance, the average amount of collateral (or the breadth of the covenants) will rise as the supply becomes tighter. At the same time, because the amount of collateral that the less risky borrower has to pledge goes up while that for the risky borrower stays (relatively) constant, the variance or the spread on the pledged collateral (or the covenant breadth) should also rise. Similarly, as the market rate rises, with respect to the firms that have relatively little equity, the amount of collateral requested by the lender will rise to combat the heightened moral hazard problem, while for those, with whom such concern is absent or minimal, the collateral would stay the same. Note that this is not true under the simple bargaining power story, because the lender with greater market power will demand more collateral from all types of borrower.

Second, in the information story, the presence of asymmetric information, either ex ante in case of adverse selection or ex post in case of moral hazard, is crucial. If, through some other mechanism, the credit market can ameliorate (or eliminate) the informational issues, the amount of collateral or the breadth of the covenants should decrease. For example, in the adverse selection story, if a company, through a reliable, third-party certification, can verify the nature of its project (or the firm) to the lender, since the lender will be much less concerned about lending to the wrong type, the lender will require much less collateral (or use a loan contract that is covenant-lite). In the moral hazard story, if the borrower's ex post behavior is more readily observable and verifiable, the use of (extensive) collateral or covenants will be unnecessary.

Under the bargain theory story, the lender with more bargaining leverage will be indifferent as to the third party certification or observability/verifiability of borrower's post-borrowing behavior, since the lender will be using the more onerous non-price terms as a surplus extraction mechanism. The information story also implies that the

companies that do not have any informational issues (due, for instance, to extensive analyst coverage or long history of default-free borrowing) will be much more immune to the changes in the market condition.[31]

Third, in our story, the informational problems are either exacerbated or relaxed through the changes in the rate demanded by the lender (or the lender's opportunity cost of capital). Without that change, the non-price terms (collateral or covenants) in lending agreements should remain constant. So, for instance, if the lending market, due to some exogenous change such as a sudden, unpredicted wave of intra-industry mergers, gets more concentrated without any corresponding change in the opportunity cost of capital, our story suggests that the non-price terms should remain relatively constant,[32] whereas the bargain power story predicts that the non-price terms will become more lender favorable.

B. Normative Suggestions

The paper also presents a few normative implications. Foremost, when drafting non-price terms (such as covenants in indentures or loan agreements and material adverse change clauses in mergers and acquisition agreements), the parties should be concerned more about addressing the underlying informational issues than dividing the contractual surplus. While the objective of maximizing the client's interest may tempt a drafter to use both price and non-price terms in achieving that goal, our paper suggests that, even if that were the proper objective, non-price terms are a poor mechanism in achieving that goal. By relying too heavily on non-price terms, such as covenants, the drafters may only reduce the total contractual surplus, thereby undermining their objective.

Second, there has been some disconnect in the unconscionability literature as to the existence and nature of unconscionable (and inefficient) terms. We have noted in the introduction that using the traditional law and economics analysis, some scholars have doubted whether sellers with strong market power will impose unconscionable/inefficient terms on their consumers. Non-law-and-economics scholars and courts, on the other hand, have been increasingly more willing to find substantively unconscionable terms and modify/reform them in consumer contracts.[33] Although we have focused primarily

[31] 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 very good credit rating or extensive analyst review.

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

[33] See, e.g., *Armendariz v. Foundation Health Psychcare Services, Inc.* 24 Cal.4th 83 (2000) (striking down a mandatory arbitration clause imposed on employees for, among other things, lacking mutuality), *Circuit City Stores v. Adams*, 532 U.S. 105 (2001), *Cooper v. MRM Investment*, 367 F.3d 493 (US Court of Appeals, Sixth Circuit 2004) and *Discover Bank v. Boehr*, 36 Cal.4th 148 (California Supreme Court 2005). See generally, Susan Randall, *Judicial Attitudes Toward Arbitration and the Resurgence of Unconscionability*, 52 Buffalo L. Rev. 185 (2004). We have to take the arbitration cases with some

on financing contracts between commercially sophisticated parties,[34] our analysis can spill over to the consumer context. Our paper suggests that, contrary to the traditional law and economics view, a monopolist (or a party with strong market power) attempting to maximize its return can and will impose inefficient terms that might be unfavorable to the consumers. That is, "unconscionable" terms can exist in equilibrium with rational agents in the market.[35]

At the same time, however, the possibility result does not necessarily imply that the courts should be more willing to strike down or reform such clauses using the doctrine of unconscionability. The reason is that the inefficient and anti-consumer non-price terms may be being employed by the sellers to address the problems of market failure and, therefore, modifying or banning them may not necessarily lead to a more efficient or even consumer-friendly outcome. From our example, if the courts were to eliminate the high collateral (or very broad covenant) requirement in the lending market, this may lead to a result where either the projects with negative net present value might be funded and/or positive net present value projects being not funded, reducing the overall welfare.[36]

Similarly, extensive collateral clauses in consumer lending or financing agreements[37] may be used by sellers to combat adverse selection or moral hazard concerns in the market. If the courts were to strike them down or modify them for being unconscionable, the result may be either that the consumers who previously had to pledge

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caution, however, since, in many cases, the plaintiffs might be attempting to use the unconscionability doctrine as a means of getting around the Federal Arbitration Act's preemption of state laws.

[34] Courts have been much less willing to apply the doctrine to protect the bargain struck by commercially sophisticated parties. The Ninth Circuit Court, for instance, stated that "it makes little sense in the context of two large, legally sophisticated companies to invoke the…unconscionability doctrine." Continental Airlines v. Goodyear Tire & Rubber Co., 819 F.2d 1319, 1527 (9th Cir. 1987). At the same time, the courts have been more willing to apply the doctrine for the benefit of commercial franchisees and dealers. See, e.g., *Shell Oil Co. v. Marinello*, 307 A.2d 598 (N.J. 1973) and *Gianni Sport Ltd. V. Gantos, Inc.*, 381 N.W.2d 760 (Mich. App. 1986).

[35] Another way of generating inefficient non-price terms in equilibrium is by imposing positive search/reading cost on the consumers. This creates a commitment problem for the sellers. See, e.g., Avery Katz, *Your Terms or Mine? The Duty to Read the Find Prints in Contracts*, 21 RAND J. of Econ. 518 (1990) and Yeon-Koo Che and Albert Choi, *Shrinkwraps: Who Should Bear the Burden of Communicating Mass-Market Contract Terms?* (2009). Unlike consumer contracts, it is difficult to argue that, in commercial lending relationships, there is a large "reading cost" that prevents the sophisticated borrowers from reading and understanding the covenant or collateral terms in the agreements. Even in consumer contracts, when consumers care about the terms differently, mandating pro-consumer terms—through the doctrine of substantive unconscionability, for example—can reduce consumer and total welfare. See *Shrinkwraps*.

[36] In technical parlance, equilibrium shifts from that of separation to that of pooling. In a pooling equilibrium with lower collateral requirement, although projects with negative net present value are being funded, the amount of dead-weight-loss producing collateral is lower. If the number of negative net present value projects is large, the overall welfare will decrease.

[37] For instance, the case of *Williams v. Walker-Thomas Furniture* was about whether cross-collateral clause was unconscionable. If the lender was using the cross-collateral term as a solution to either the moral hazard or the adverse selection concern and the court were to strike down such cross-collateral clause as being unconscionable, future consumers, in similar situation as Mrs. Williams, may either be unable to secure financing, or consumers with different risky profiles may be grouped together.

a large amount of collateral may no longer be able to participate in the market (as in the moral hazard story) or that the average financing rate for all consumers may inefficiently rise (as in the adverse selection story).

In analyzing such facially harsh terms, we suggest that the courts, while not ignoring whether the terms are "unreasonably favorable" to one party and/or whether the consumers had a "meaningful choice" over the terms, should give more weight to what efficiency objectives such terms could be serving. As a matter of fact, the traditional analysis suggests that whether or not the seller could make a take-it-or-leave-it offer to the consumers, i.e., whether the consumer had a "meaningful choice" over the terms, is not very relevant. What is more important is whether such "unreasonably harsh" terms are a result of an exercise of market power or due to an attempt to solve serious informational issues.

Conclusion

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 that has an uncertain outcome. The outcome of the project can be either success or failure. If the project succeeds, it produces a cash flow of R, whereas if it fails, it produces a cash flow of 0. The probability of producing a successful outcome depends on the borrower's "type." The borrower can be of two types: good or bad. Let's assume that the probability of producing a successful outcome, depending on the type, 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 lending have more market power). Although the good type borrower has a higher chance of producing a successful outcome, we assume that both types have a positive net present value project: $pR > qR > (1+r)I$.[38]

The timing of the game is as follows. In the first period ($t = 1$), Nature determines the borrower's type: good type is chosen 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 consist of the cash flow that the borrower promises to pay the lender in case the project is successful and the value of collateral (to the borrower) that the lender can take from the borrower in case the project fails: (R_i, C_i).[39] 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 whereas if the project is a failure, the lender acquires the collateral that is worth C_i to the borrower. To reflect the concern that the collateral (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 $1 > \beta > 0$.

Suppose both players observe the realized borrower's type. In this case, both types of borrower can implement their projects without having to pledge any collateral.

[38] 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-type while still requiring some collateral.

[39] For convenience, we can assume that the borrower proposes the contract and the lender either accepts or rejects it. However, it does not matter who proposes the contract in this model, partly due to the fact that the lender's expected return is tied down by the market conditions and the lender would want to use collateral as a screening device.

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 $R_b = \frac{(1+r)I}{q} > \frac{(1+r)I}{p} = R_g$. The lender demands a higher cash flow from the bad type 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 the social welfare by the net return from both projects, with both parties are informed of 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 efficient solution cannot be achieved. This is because the bad type strictly prefers the contract for the good type 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 type borrower with probability α, the lender can set the payment term $\overline{R}$, with $C = 0$ where $(\alpha p + (1-\alpha)q)\overline{R} = (1+r)I$. Compared to the efficient equilibrium, the good type borrower pays more and the bad type pays less: the good type subsidizes the bad type.

Another possibility is for the good type to signal to the lending market by pledging collateral to separate itself from the bad type. Suppose the good type 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 types, the bad type will not have any incentive to pledge collateral, i.e., $C_b = 0$. So, while the good type offers a contract $(R_g, C_g > 0)$ to the market, the bad type 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 (lender's participation condition). The two weak inequalities (borrower's incentive compatibility conditions) achieve separation: good type prefers the contract with collateral while the bad type prefers the contract with no collateral.

In models like this, it typically is the case that, in addition to the lender's participation condition(s), the bad type's incentive compatibility condition is the one that binds. In other words, we need to make sure that the bad type does not want to pretend to be a good type rather than the other way around. This produces three equalities: the first two break even conditions for the market and the bad type'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 type offers a positive amount of collateral to the lender as a signal of high quality and, partly in return, 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 good type'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 types, will rise as the lender's opportunity cost of capital rises: $\frac{\partial R_i}{\partial r} > 0$.[40] What is interesting is that the good type borrower has to put up more collateral to credibly signal its type to the market: $\frac{\partial C_g}{\partial r} > 0$.

Why does the market demand more collateral from the good type borrower when the market tightens? The reason has to do with the fact that, not only does the bad type

[40] Change in r is interpreted as a change in opportunity cost of capital, but it can also reflect a bigger investment required for the project or the amount of project surplus the lender captures, i.e., change in the lender's relative bargaining power. We remain agnostic over different interpretations while suggesting that the change must be stemming from changes in the "market conditions."

need to guarantee a higher cash flow in case of success compared to the good type ($R_b > R_g$), when the lender's opportunity cost rises, the amount of cash flow the bad type needs to guarantee to the lender rises faster compared to the amount of cash flow the good type needs to guarantee $\left(\frac{\partial R_b}{\partial r} > \frac{\partial R_g}{\partial r}\right)$. In other words, the bad type'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 type becomes more attractive for the bad type, and in order to achieve separation, the good type needs to pledge an even more collateral to the market.

This can be more easily seen from the bad type's incentive compatibility condition. In equilibrium, we know that the bad type'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', will imply that the bad type's interest rate will have to rise proportionally: $R_b' \approx R_b + \frac{I}{q}$. If the good type's interest rate is also rising proportional to its true risk characteristics, $R_g' \approx R_g + \frac{I}{p}$, then the bad type's incentive not to mimic the good type will be destroyed: $q(R-R_b') < q(R-R_g') - (1-q)C_g$. To achieve separation, therefore, the good type has to rely more on costly collateral and less by 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 type'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 (or its bargaining power rises), there will be a higher dispersion of interest rates, i.e., $R_b - R_g$ rises, and at the same time, the lender will require more costly collateral from the good type borrower, i.e., the contract term becomes more inefficient.

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

In the current model, there still are only two risk-neutral players, a borrower and a lender, but the borrower has only one type. Instead, the borrower has a choice over projects: good or bad. The outcome of both projects can be either success or failure and, 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 chances of being successful than the bad project in that if we let p and q be the respective probabilities of success, we assume that $1 > p > q > 0$. The bad project, on the other had 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 will treat the rise in the lender's demanded rate of return as a tighter lending market. Unlike the previous model, we assume that only the good project has a positive net cash-flow, $pR > (1+r)I > qR$, and that despite the private benefit, 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 signs a lending agreement, which consist of the cash-flow that the borrower promises to pay the lender in case the project is successful and the value of collateral (to the borrower) that the lender can take from the borrower in case the project is a failure: (R_s, 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 whereas if the project is a failure, the lender acquires the collateral that is worth C to the borrower. To reflect the concern that the collateral (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 projects, 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 will 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 can neutralize the perverse incentive that was created through the positive private benefit from the bad project. In order 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 inequality (borrower's incentive compatibility condition) requires the borrower's private return from implementing the good project to be higher than that from the bad project.

In equilibrium, the lender will demand the 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 demands a higher expected net return from the borrower, i.e., lending market tightens, both the payback and the collateral amounts demanded by the bank 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 the bad project.