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Default, Foreclosure, and
Strategic Renegotiation

Charles M. Kahn
Gur Huberman



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Default, Foreclosure, and Strategic Renegotiation

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DEFAULT, FORECLOSURE, AND STRATEGIC RENEGOTIATION

by Charles Kahn and Gur Huberman*

Prepared for the conference on Economics of Contract Law

Duke University

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Abstract:

In this paper we characterize the terms of secured loan contracts not as directly specifying efficient allocations of assets, but as positioning parties optimally for subsequent strategic renegotiation. We develop an imperfect information model in which a secured loan contract with renegotiation will achieve efficient outcomes while no other simple contract can. We use our structure to analyze and compare the efficiency of various rules for foreclosure of mortgages.

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DEFAULT, FORECLOSURE, AND STRATEGIC RENEGOTIATION

Introduction

What determines the terms that parties include in a contract? At the most fundamental level, a contract is a reassignment of property rights. If parties voluntarily enter such a reassignment, it must be the case that the reassignment is moving property towards the party who places the higher value upon it. Thus if A contracts to sell B a car for \$5000, A must value the car at no more than \$5000 and B must value it at no less than \$5000. Similarly, this view would explain all clauses of contracts reassigning property rights on the basis of economic efficiency: If the contract states that the purchaser of the house receives the window screens or the seller of the appliance bears the risk of malfunction for thirty days, we would be content to understand those clauses as part of an optimal reallocation.¹

To be sure, the economic claim is in fact only that rights will be used by those with the highest valuation for them. A retailer contracts for purchase of a load of clothing, not because his own valuation of the goods is higher than the price, but because he anticipates the finding of further purchasers for whom the value is high. Similarly, the typical purchaser of a commodity futures contract does not anticipate using the commodity himself.

Although the claim in strict form only predicts ultimate disposition of property rights, we would still expect that there is a tendency in any transaction for rights to move to their higher valued users. For in general, establishing an exchange is a costly procedure. Bargaining is time-consuming. The lawyers, secretaries, and other specialized staff necessary to establish an agreement are costly. Should an agreement send

goods to the party placing a lower value on them, then further agreements will be necessary to reallocate the goods correctly. The costs of contracting are minimized by getting the allocation right in the first place.

On the other hand, when there is uncertainty there is an opposing tendency not to get the agreement correct to begin with. In any complex arrangement, many of the provisions will depend on contingencies which may arise. Normally, the buyer of the house may wish to purchase the fixtures, as well, but perhaps he unexpectedly finds himself in circumstances in which he will find it necessary to carry out extensive interior alterations, so that the current fixtures are suddenly of no use to him. Meanwhile, perhaps the seller learns his new house lacks the fixtures or has a special attachment to some of them. When decisions are interrelated in complex ways, the correct ultimate allocation may include a complex set of contingencies. Rather than getting these right initially, contracting parties will prefer to wait until the uncertainty is resolved and only then establish the specific bundle of rights to be transferred.

Thus the decision as to which clauses to incorporate in a contract at any time will always involve the tradeoff between increased accuracy of the array of contingent arrangements so not to have to rewrite the contract, and increased simplicity, including only the terms for contingencies likely to arise.

According to this point of view, there remains a tendency for contracts to assign property rights to those for whom the property has the highest value -- only now the tendency becomes a probabilistic prediction. At any round of contract formulation, the contract will tend to provide that assets be assigned to the party who will most likely have the highest valuation for them. If contingencies work out in their most likely resolutions, no

further reassignment is necessary. If surprises arise, so that the allocation initially agreed upon is sub-optimal then renegotiation occurs.

This view of renegotiation -- as restoring the allocation of property to its expected optimum in the event that surprises render previously established allocations sub-optimal -- is that behind many descriptions of contract formulation and renegotiation in economics. A typical example is the model of Dye², which posits a cost to the detail which is specified in a contract, and then assumes that contracts are written so as not to cover every detail. Many of the contracting models used in macroeconomics³ have behind them similar assumptions. Several models of renegotiation⁴ assume the permitted contracts are in a limited set, and as the circumstances vary the current contract becomes sufficiently suboptimal that a new choice becomes necessary.

All of these structures thus yield the understanding that the terms of a contract are specified to minimize future renegotiation. As a consequence, these structures predict that the terms specified in the contract are the terms most likely to be carried out in practice.

However, there are important situations which do not appear to conform to this structure or this prediction. A common example of a clause which does not conform is the provision of security for a loan.

When a bank makes a loan to a firm or home purchaser, the agreement may stipulate that the asset purchased serve as security for the loan. In other words, the bank stipulates that the asset can be seized should the borrower not repay. It would be expected that banks are typically less efficient as managers of assets than are the borrowers. And in fact, when the borrower ends up short, loans are renegotiated. It is rare for the threatened seizure of assets to take place. Why then go through the ritual of including such a provision?

In this paper, we show that contract terms may have other purposes than simply specifying efficient outcomes. Some clauses in a contract may be designed to place one party or the other in a strong position in the event of any renegotiation of the contract. We demonstrate that such pre-positioning can serve a useful purpose. We develop an imperfect information model in which a secured loan contract with renegotiation will achieve efficient outcomes while no other simple contract can. We use our structure to analyze and compare the efficiency of various rules for foreclosure of mortgages.

In previous papers⁵ we explore this use of renegotiation for strategic purposes, rather than as a remedy in the event of surprises. In those papers, the distinction between the two explanations of renegotiation is highlighted by examination of situations in which there is no uncertainty, (and therefore no possibility of surprise). In this paper, uncertainty is integral to the model we develop; thus the renegotiation we observe has both strategic and surprise aspects to it.

A Model of Secured Loans

An entrepreneur has an idea for a project. The project may be initiated at a cost of K dollars. This amount is greater than the entrepreneur's resources. Therefore, a loan is necessary if the project is to be realized. (For simplicity, we treat the entrepreneur as having no resources of his own).

The project's value is

$$w \times y (a + 1)$$

where the parameters are interpreted as follows:

The variable w is a pre-investment signal of the quality of the project. It is observed only by the entrepreneur and his bank. If (and only if) it is high enough, the project is worth undertaking. We study the contractual arrangement between the bank and the entrepreneur assuming that w is sufficient for the investment to be desirable. By assuming w is known only to the bank and the entrepreneur, we model a situation in which the two parties enjoy a special relation, and the entrepreneur cannot replace his current lender by another. Given this justification of the special relation, the specific value of w is inessential. Therefore, in the sequel we assume that $w = 1$ and that this value is sufficiently high to justify the exclusive relation between the bank and the entrepreneur and do not consider w further.

Once the investment is made, y is realized and becomes known to the entrepreneur and to the bank. Thus we can regard y as a post-investment signal of the profitability of the project. Let the distribution of y be denoted $F(y)$; $F(y) = 0$ for $y < 0$.

The variable a is an effort level which is subsequently chosen by the entrepreneur. For concreteness, we suppose the variable takes on only one of two values: $\{0, 1\}$. Positive effort costs the entrepreneur an amount C .

The choice of ownership is denoted by x : $x = 2$ if the entrepreneur owns the project, and it is 1 otherwise.

"Ownership" deserves an explanation. In general we expect the rights to goods to be held by those who value them most. It is easy to imagine in some cases that the same good could yield different values depending on who holds it. Housing services are a natural example; one way of modeling the situation is to describe the output (housing services) as a joint product of the physical asset (housing) and particular capacities embodied in the

person dwelling in the house -- so that the housing yields greater services when combined with one dweller than with another.

Similar effects can be had in the case of entrepreneurial investments: The outcome of the project may depend on the physical investments and the skills of the entrepreneur in charge. For example, whoever is in possession of the asset may thereby be privy to information possessed by no one else. The entrepreneur uses such information to enhance the value of the asset. Different people have different abilities, and, in the situation we are modeling, we assume the original entrepreneur has more ability than anybody else. That the project is worth more if the entrepreneur owns it implies that on efficiency grounds alone, ownership should rest with the entrepreneur.⁶

There is a second, natural aspect to ownership of an investment project: The owner is the residual claimant of any values associated with the project.

We assume that the entrepreneur and the lender are both risk neutral. The bank borrows or lends money at the risk free market rate of interest. Therefore whenever we describe the costs or benefits to the bank of future receipts or disbursements of money, we automatically translate these streams of payment into their present discounted values. The entrepreneur has limited access to the capital market. That is to say, he can lend to third parties at the risk free rate, but if he borrows on the outside market, he will pay a premium over the amounts the bank pays to get funds from other sources. (We could in turn justify this imperfection in the capital market on further informational grounds, but we do not pursue this possibility here).

This difference in ability to borrow or lend on capital markets implies that there are gains to be had by the two parties entering into some

agreement. Equivalent results could be generated by using a model with risk aversion, and positing different degrees of risk aversion for entrepreneur and bank. Another possibility would be to start by incorporating limited liability into the analysis; the resultant behavior would be similar to that induced by differences in abilities to borrow. However, we have preferred to avoid beginning with an appeal to limited liability. Otherwise we would have to address the question of whether the need to incorporate renegotiation into contracts stemmed from the existence of limited liability itself. By using this formulation we show that it does not.

As we have noted, the values of the signals w and y , and the effort level are not known by any third parties. The only variables observable by third parties are the ownership of the asset, and any payments made.

It is useful to begin analysis of this problem by examining the efficient allocation in the case of full information. The efficient allocation is characterized by the following considerations:

1. The ownership of the asset should always be vested in the entrepreneur.
2. The entrepreneur should invest effort in the production process whenever

$$w \cdot 2 \cdot 2 \cdot y - C > w \cdot 2 \cdot 1 \cdot y$$

That is, whenever

$$y > C/(2w)$$

3. Payments made by the entrepreneur to the bank should never be

greater than

$$w_2 a y - C a$$

which is the net benefit of the project in a realization.

4. Finally, the project should be undertaken at all if and only if the expectation of the net benefit of the project is greater than K :

$$\int \max(2wy, 4wy - C) dF(y) > K$$

Contracts

Next we consider various contracts which could be offered in this environment. Recall that contracts cannot directly depend on realizations of y, w or a .

The simplest contract merely specifies who owns the project and what monetary payment, if any, is to be made. The next simplest contract is one which gives one party the option to transfer the ownership to the other for a specified price. Such contracts can take many forms, but one commonly used regards the good as security for the loan: At his option, the borrower either pays the specified repayment of the loan, or gives up the security to the lender. We will concentrate on this form of the contract. We will examine the security contract which gives zero expected profits to the lender. (To justify concentrating on the zero profits contract, assume that at the outset there are a large number of banks each potentially possessing the ability to enter the special relationship with the entrepreneur, and therefore competing away their expected profits from the arrangement.)

To evaluate contracts in the presence of possible renegotiation

requires a theory of the outcomes of negotiations. We assume that negotiations work as follows: If parties are already committed to an outcome which is Pareto efficient, then there is no further negotiation. If, however, previously signed contracts commit the parties to an inefficient outcome, such that both sides could gain from a renegotiation then negotiation will occur. We assume that the outcome that the parties move to as a result of the renegotiation is an efficient outcome in which the gains from the move are split evenly. Given the risk neutrality of both parties, this assumption implies the choice of the Nash bargaining solution.⁷

In the case of a contract in which one party has the right to exercise an option, renegotiation works as follows: If the party owning the option prefers the alternative which is Pareto optimal, no renegotiation occurs, and the party carries out his preferred alternative. Suppose on the other hand that the party owning the option personally prefers the alternative which is Pareto inferior -- that is, the other party would be willing to offer a side payment large enough to induce the party owning the option to switch away from his preferred alternative. In this case renegotiation will occur. The assumption of equal division of the gains determines the size of the resultant side payment.

We consider the following secured loan arrangement: The entrepreneur agrees to repay T to the lender. If the entrepreneur fails to repay, then the lender receives the assets in the project.

How does such an agreement work in the presence of renegotiation? Consider the point at which the entrepreneur has the option of handing over the asset or of paying up. If the value of the asset to the entrepreneur is greater than T , he prefers to pay and retain the asset. If the value of the asset is less than T , he prefers to threaten to hand over the asset to the bank. Given this threat, which is credible unless the contract is

renegotiated, the bank prefers to renegotiate the initial loan.

The value to the bank of the unrenegotiated loan is

$$w y (a+1)$$

The value to the entrepreneur of the unrenegotiated loan is

$$- aC$$

The social value of leaving the asset in the entrepreneur's hands is

$$2 w y (a+1) - aC.$$

According to our bargaining theory, each party will receive half of the difference; thus the payment by the entrepreneur to the bank is

$$1.5 * w y (a+1)$$

The net benefit to the entrepreneur is

$$\max (.5 w y (a+1) - aC, 2 w y (a+1) - aC - T)$$

and the net benefit to the bank is

$$\min (1.5 * w y (a+1), T)$$

Next we consider the decisions the entrepreneur will make regarding the effort he will expend under a secured loan contract, given his awareness of

the outcomes of the subsequent bargaining as described above. The entrepreneur prefers to choose $a = 1$ if and only if y is above some critical level. He chooses a to solve the following problem:

$$\max_a \{ \max \{ (.5 w y (a-1) - aC), (2 w y (a+1) - aC - T) \} \}$$

Straightforward calculation demonstrates that it is optimal to set a equal to zero if

$$(1.5 wy > T \quad \text{and} \quad 2 wy > 4 wy - C)$$

or if

$$(1.5 wy < T < 3 wy \quad \text{and} \quad .5 wy > 4wy - T - C)$$

or if

$$(3 wy < T \quad \text{and} \quad .5 wy > 2 wy - C)$$

Otherwise, it is optimal to set a equal to one.

Thus if

$$.75 C > T, \tag{1}$$

a is chosen efficiently.

Provided (1) holds, T is defined by the requirement that the lender make zero expected profits. In other words,

$$\int \min (1.5 w y , T) dF(y) = K$$

(This simplified version of the profits formula is valid because when (1) holds, the entrepreneur chooses a equal to zero whenever T exceeds the project's value.) Note that T is therefore greater than K, the difference representing the default premium. Thus provided

$$\int \min (1.5 w y, .75 C) dF(y) > K$$

the efficient solution is generated by this security contract. It can be verified that in these cases the value of the project does indeed exceed the cost of it.

Next we consider alternative simple contracts and demonstrate that none of these alternatives would be successful.

1. The simplest contract to consider would be one which requires the debtor unconditionally to pay the creditor an amount K. In effect we could describe such a contract as holding the debtor personally liable for the debt. In this context, we could interpret such liability as court-enforced repayment even in circumstances where the debtor must obtain funds beyond those generated by the project. (Imagine for example, a garnishment of wages in another job). In fact such a requirement would be complicated by the costs of enforcing the contract if the debtor attempts to default. We will consider the complications of court costs below, but for now, note that even if the enforcement costs were zero, this contract would not be as desirable as the security contract, for it would inefficiently allocate the risk of repayment. Note the following, related, undesirable effect of such a contract: it would, for certain values of y, cause over-investment in effort as the debtor attempts to avoid being required to obtain outside

funds to repay his debts.

2. A second possibility would be for the bank to own the project and, at its discretion hand it over to the entrepreneur for a consideration. This will also be inefficient relative to the security contract: Since the bank will share in the gains made as a result of the investment by the entrepreneur, the entrepreneur will tend to underinvest in effort.⁸

3. In a world in which renegotiation were not permitted, no simple contract would be efficient. If the contract specified that in some circumstances the asset were to end up in the wrong hands, it would be inefficient. But the only alternative for an unrenegotiated contract is one in which the asset remains in the same hands in all realizations. If this is the case, the only incentive compatible contract is one in which the payment does not vary with the realization of y .

In summary: We have established a simple economic structure in which a security contract with renegotiation dominates any other simple contract. The security contract allows the payment from the entrepreneur to the bank to be in effect contingent on the realization of the outcome of the project, even though this amount is not stated in the contract and cannot be stated effectively since it is not observable to any third party.

This observation by itself would be enough to make renegotiation a useful tool in a contract, but without the further consideration that the asset has different values in different hands, it would not be the case that it mattered in the contract who had initial control over the asset.

Because the owner gets residual claims to the benefits of the asset, we want the ownership of the asset to be in the hands of the entrepreneur in any state in which it is worthwhile for him to make additional effort investments. On the other hand, we want the asset in the hands of the bank in states (low productivity states) in which this is not a consideration,

in order to enable the bank to obtain some value from the project through bargaining in those states. We do not want the bank to have the right to personal liability of the entrepreneur for the debt, since that would eliminate the proper risk sharing in the agreement.

Rules for Enforcement and Costs of Enforcement

Thus far we have made extremely simple assumptions about the enforcement of the right of the lender to take over the asset in the case of default. Effectively we have assumed that in the event of a default, the banker can appropriate the project costlessly and at his own discretion. It is this threat which gives him residual bargaining power in the renegotiation.

This procedure comes closest to describing the most primitive version of foreclosure, namely strict foreclosure. In the U.S., strict foreclosure remains permissible in only a handful of states. In most states it has been supplanted by judicial foreclosure. Under judicial foreclosure, the assets of the defaulting borrower are taken over and sold by the court. If their value exceeds the amount of the debt, the balance is given to the debtor. If their value is less than the amount of the debt, then a deficiency judgement is rendered against the debtor for the balance. The court's actions provide procedural safeguards for the debtor, and is generally more costly than would be the direct takeover of the assets by the creditor.⁹

In response to the rise in judicial foreclosure, parties to contracts resorted to including terms for foreclosure as part of their contracts. In some respects, this non-judicial foreclosure is a return to the older terms of strict foreclosure.

In this section we will compare the effectiveness of strict and

judicial foreclosure in determining whether secured loan contracts can lead to efficient outcomes. To the model of the previous section we add one simple assumption: the costs of a court-administered foreclosure are a constant p .

Case I: Court Protection of Debtors

Imagine that the court enforces a rule that the lender can recover an amount no greater than the face value of the debt (plus court costs); any excess value will be returned to the borrower. (This rule is often enforced by the court holding a public auction of the property.) How will such a rule affect the efficiency of secured loans?

So long as the value of the asset to the entrepreneur is greater than the value to any third party buyer, the value of the asset when sold will never exceed the value to the entrepreneur. Thus the main effect of the new rule arises through the imposition of extra court costs. In the case of default, the new rule implies that the bank will receive a reduced value from the assets:

$$wy(a + 1) - p$$

The net social gain from avoiding a default and leaving the asset in the entrepreneur's hands is therefore

$$wy(a + 1) + p$$

-- that is to say, the avoidance of court costs becomes an extra gain in renegotiating away from default. The gain is split evenly between the parties, so that the entrepreneur now receives

$$\max \{ .5 wy (a + 1) + .5 p - aC , \quad 2wy (a + 1) - aC - T \} \quad (2)$$

and the bank receives

$$\min \{ 1.5 wy (a + 1) - .5 p , \quad T \}$$

How does this change affect the entrepreneur's incentives to invest? The entrepreneur picks a to maximize (2); calculations analogous to those in the previous section show that the entrepreneur will pick the efficient level of effort provided

$$.75 C > T + .5 p$$

(To see this, note that the entrepreneur's objective function is the same as the objective function in the previous section, with $T + .5p$ substituted for T . Furthermore, the efficient choice of a is independent of the cost p , provided that renegotiation will allow the avoidance of court appearances).

The zero-profits level of T is defined by the expression

$$\int \min \{ 1.5 wy - .5 p, \quad T \} dF(y) = K$$

so that efficient outcomes are achievable with the secured loan contract, provided that

$$\int \min (1.5 wy, \quad .75C) dF(y) > K + .5 p$$

Note therefore that the presence of court costs decreases the

likelihood of achieving the efficient outcome with a secured loan contract, even though the court is never actually used -- that is to say, even though in practice the parties always renegotiate rather than submit to judicial foreclosure. The reason that the court costs become important is that they impose an extra burden on the lender, reducing his power in any renegotiation away from an inefficient outcome.

Case II: Court Protection of Creditors

Now imagine that the court enforces deficiency judgements: if the value of the asset falls short of the debt, the court will assess the debtor for the balance. Unlike the previous case, deficiency judgements destroy the usefulness of the secured loan contract entirely -- even if the debtor is not assessed court costs.

To see this, consider the debtor's choices of whether or not to default in a regime with deficiency judgements. If the debtor wishes to avoid foreclosure and the asset is not worth the value of the indebtedness, then the debtor will have to obtain costly funds. However, if the debtor does default, since the asset is worth less on the open market than it is to the debtor, the debtor will be forced to obtain even a greater amount of costly funds. Thus the debtor never threatens bankruptcy and contracts are never renegotiated. In effect, a regime with deficiency judgements is equivalent to a regime in which renegotiation is prohibited.¹⁰

Remaining Issues: Non-Judicial Foreclosure

Given the restrictions inherent in the process of judicial foreclosure, it is not surprising that the procedure has in fact largely been supplanted

by non-judicial foreclosure, that is, the inclusion of terms in the loan contract specifying the circumstances and procedures by which the lender will obtain assets from the borrower in the event of default. Non-judicial foreclosure is in effect a form of liquidated damages, a statement by the parties as to the remedies to be applied in the event of breach of the contract. Although it is not surprising that non-judicial foreclosure would dominate a court-mandated foreclosure procedure, it is perhaps surprising to learn which of the aspects of judicial foreclosure are the most disadvantageous. Our preceding analysis indicates that it is the use of deficiency judgements even more than the costliness of the litigation itself which leads to the avoidance of judicial foreclosure.

If this conclusion is correct, it implies two interesting classes of predictions. The first involves the terms of observed contracts. Our description of secured loan contracts predicts a tendency for such contracts to specify that in the event of default, the debtor's liability will be limited to the surrender of the secured property.¹¹

The second class of predictions involves legislative responses to and interpretations of secured loan contracts. In particular several states have instituted various forms of legislation to limit deficiency judgements.¹² While these actions can be understood simply as sympathetic responses to debtors' plights, our analysis shows that they can also be interpreted as guaranteeing that mortgages act as limited liability instruments, and thereby guarantee that this form of secured loan yield the advantages we have described in this paper.

Finally, this analysis is of relevance to the question of revision of contractual duty in contract law. When a lender agrees to a reduction in the payment required, in what sense is this renegotiated agreement an enforceable contract? Can the lender subsequently demand the original

amounts based on the pre-existing duty rule? In the case of "matured and liquidated" money debts, courts have had to find a modification of the terms of the payment -- even in the most minute detail of location of payment or person to be paid -- to serve as the consideration for the revised contract.¹³ In the absence of strategic considerations, there would be no economic justification for allowing the revision of a liquidated money debt: one party's loss would be the other's gain, and the foreknowledge of the possibility of being held up would reduce the parties' willingness to enter into contracts.¹⁴ Our analysis shows that revisions of money debts can serve a socially useful purpose. It also suggests that in the case of secured loans we should treat the borrower's decision to forego default as the consideration in the revised contract.

NOTES

¹A. Kronman and R. Posner, The Economics of Contract Law 1-2 (1979).

²Dye, "Costly Contract Contingencies," 26 International Economic Review 233-250 (1985). For other models incorporating renegotiation for remedying incompleteness of contracts, see Shavell, "The Design of Contracts and Remedies for Breach" 99 Quarterly Journal of Economics, 121-148 (1984) and Rogerson, "Efficient Reliance and Damage Measures for Breach of Contracts" 15 Rand Journal of Economics, 39-53 (1984).

³Gray, "Wage Indexation: A Macroeconomic Approach" Journal of Monetary Economics, 221-236 (1976) and Taylor "Aggregate Dynamics and Staggered Contracts" 88, Journal of Political Economy 1-23, (1980).

⁴Dye, "Optimal Length of Labor Contracts," 26, International Economic Review, 251-270 (1985), Harris, and Holmstrom "On the Duration of Agreements," 28 International Economic Review, 389-406, (1987). See also Gray, "On Indexation and Contract Length," 86 Journal of Political Economy 1-18 (1978).

⁵Huberman and Kahn, "Limited Contract Enforcement and Strategic Renegotiation," 78 American Economic Review 471-484 (1988) and Huberman and Kahn "Strategic Renegotiation and Contractual Simplicity" unpublished Hoover Institution Working Paper in Economics E-87-31, Stanford University July 1987.

⁶The separation between ownership and control has always been a puzzle for economics. Recently the theoretical literature has re-examined situations in which the value of assets depends on who controls decisions about their use. For papers in this vein see Hart and Moore "Incomplete contracts and Renegotiation" 56 Econometrica, 755-786, (1988); Aghion and Bolton "An 'Incomplete Contract' Approach to Bankruptcy and the Financial Structure of the firm " MIT Department of Economics unpublished working paper March 1988 no 484; Grossman and Hart."The costs and benefits of ownership: A theory of vertical and lateral integration" 94 Journal of Political Economy 691-719 (1986)

⁷The literature on bargaining and predicted outcomes of bargaining is voluminous. An important non-cooperative model is Rubinstein 50, Econometrica "Perfect Equilibrium In a Bargaining Model" 97-110 (1982). For cooperative game theoretic approaches, of which equal division and Nash bargaining solutions are notable see Luce R. and Raiffa H. Games and Decisions: Introduction and Critical Survey New York John Wiley 1958.

⁸This is a specific example of the "holdup problem." For the development of firms as a response to the holdup problem, see O. Williamson The Economic Institutions of Capitalism (1985), Klein, Crawford, and Alchian "Vertical Integration, Appropriable Rents and the Competitive Contracting Process" 21 Journal of Law and Economics 297-326 (1978).

⁹Goldstein, Real Property 443 (1984)

¹⁰This result is complicated by the fact that deficiency judgements themselves may not always be effective. Despite receiving the judgement, the creditor may not collect if, for example, the debtor declares bankruptcy or skips town. If the creditor predicts that a deficiency judgement will not actually result in any payment, then the problem reduces to that of the previous section. To the extent that deficiency judgements are successful, they neutralize the value of foreclosure as an element in strategic renegotiation.

¹¹There is a major limitation to the applicability of this prediction: namely that in the case of multiple lenders to a single firm, secured loans will be used to make favored lenders more senior in the event of bankruptcy. The interpretation of secured loans in such circumstances requires a much more complex analysis. Investigations making the competition among creditors the center of the analysis of bankruptcy are Jackson, "Translating Assets and Liabilities to the Bankruptcy Forum," 14 Journal of Legal Studies, 73-113 (1985); Baird, "The Uneasy Case for Corporate Reorganizations," 15 Journal of Legal Studies 127-147, (1986). A formal economic analysis explicitly based on the inability of certain classes of creditors to renegotiate (because of the transactions costs involved in getting together) is White "Public Policy Toward Bankruptcy: Me-First and other Priority rules" Bell Journal of Economics 550 (1980).

¹²Goldstein, 444-445. outlines some of the responses. Some states, for example California, have instituted legislation prohibiting deficiency judgements outright in certain circumstances, and limiting the sums obtainable in other circumstances. Since this rule could be evaded by a mortgagee who took action first against the mortgagor personally and only subsequently against the property for the balance of the amount due, some states have enacted "one-action" rules, which require the mortgagee to proceed against the property first, effectively limiting him to only one remedy.

¹³Dawson, Harvey and Henderson Contracts: Cases and Comments Fourth Edition 523 (1982).

¹⁴Dawson 537. suggests that even "unforeseen circumstances" does not serve as a solid theoretical justification for making exceptions to the rule of pre-existing duty.

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