The Value of Equitable Redemption in Commercial Mortgage Contracting

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Abstract

Equitable redemption is a feature of all common law mortgages that allows a borrower a chance to “redeem” the real estate in the event of default. What is puzzling is that equitable redemption is universally enforced in all mortgages, including commercial mortgages. The purpose of this study is to understand if there might be conditions under which the universal enforcement of equitable redemption could be an efficient legal doctrine. We build a model of asymmetric information where the cash flows from the investment are known to the borrower but not to the lender. We show that there exists a separating equilibrium where high-risk borrowers choose to include equitable redemption (and pay a higher interest rate) while low-risk borrowers choose not to (and pay a lower interest rate). We then show that there exist conditions under which a universal enforcement of equitable redemption results in a higher total surplus than this separating equilibrium.

Equitable Redemption and the Doctrine Against Clogging

Equitable redemption is a feature of real estate finance law in the U.S. that allows a borrower a chance to "redeem" the real estate pledged as security to a debt in the event of default. In particular, the mortgagor has the right "to perform his obligation under the mortgage and have the title to his property restored free and clear of the mortgage" (Nelson and Whitman 1994, p. 467). Therefore, the equitable right of redemption imposes a delay between default and the loss of all mortgagor claims to the mortgaged real estate. The doctrine against *clogging* is a corollary to the mortgagor's right of equitable redemption in which courts do not allow a mortgagor to transfer the equitable right of redemption to the mortgagee at the inception of the mortgage. That is, equitable redemption is universally enforced in all mortgages regardless of the actions or intent of the borrower and lender. The apparent abrogation of the freedom to contract between sophisticated parties makes the survival of the doctrine against clogging particularly puzzling in the case of commercial mortgages (Tracht 1999), and in this study we attempt to identify the conditions under which the prohibition of clogging could be an efficient legal doctrine.

By way of explaining the origins of equitable redemption and the doctrine against clogging, consider the fact that the original common law mortgage used a form of conditional conveyance of title to real estate to provide security for a loan. If the mortgagor failed to repay the mortgage, the mortgagee became the unconditional owner of the real estate as soon as the borrower defaulted. No foreclosure process or other legal actions were necessary since the nature of the original conveyance of title made the lender the absolute owner of the asset in the event of a borrower default, and the courts

routinely enforced this ownership claim. By creating equitable redemption and the doctrine against clogging, the courts of equity effectively modified the governance structure of the mortgage by not allowing mortgagor default to trigger an automatic vesting of title in the mortgagee despite the language of the original conveyance. Under the new governance system, the lender had to petition the courts to *foreclose* the borrower's right of equitable redemption and effectively extinguish the borrower's remaining rights to the real estate if no repayment was made during the additional period. Initially, the lender became the absolute owner of the real estate, just as before, once the period of equitable redemption was declared to be over (so-called strict foreclosure), but by the early 1800s in the U.S. the lender was normally required to sell the real estate at public sale (Wechsler 1985).

Covenants or waivers by mortgagors not to exercise their right to equitable redemption, deeds placed in escrow to be handed to the lender in the event of default, and lender options to purchase the real estate in default for a price based on the face value of debt are unenforceable in modern mortgages as a result of the doctrine against clogging (Nelson and Whitman 1994). In short, the courts hold that "once a mortgage, always a mortgage" and require that all mortgagors be entitled to the right to redeem. Mortgagors have the ability to renegotiate the mortgage *ex post*, however, and may voluntarily agree during renegotiation of the mortgage to resolutions like a deed in lieu of foreclosure. However, the courts will not enforce a similar agreement at the inception of the mortgage in which the title automatically transfers to the mortgagee upon default.

In general, the application of the doctrine against clogging to modern commercial real estate mortgages is puzzling. When parties to a contract are sophisticated, they are

expected to include terms in these contracts that are efficient, and it is not obvious why courts should possess a superior ability to write such terms for them. A potential cost of the doctrine against clogging is that it may inhibit innovation in financial contracting with respect to real estate because the courts may scrutinize other types of financial contracts related to real estate and deem them "mortgage substitutes." Contracts such as sale and leasebacks, synthetic leases, options to purchase, and various forms of mezzanine financing may be re-characterized as mortgages and compelled to respect a period of equitable redemption and the associated delays in resolving a default.

Therefore, the purpose of this research is to identify conditions under which the universal enforcement of equitable redemption is or is not warranted. To do so, we focus on how alternate governance structures affect the borrower's investment decisions during the life of the loan. Our work is related to research by Riddiough and Wyatt (1994a, 1994b), Sirmans and Harding (2002), Ambrose and Buttimer (2000) and Ambrose et. al. (1997) that considers the (strategic) renegotiation and default resolution of commercial and residential mortgages. However, our work differs from these papers in that while they only consider cases in which the value of the asset has fallen below the face value of the loan, we examine the case where stochastic events constrain the mortgagor's ability to make both the mortgage payment and an additional, valuable investment.

We model a stylized mortgage contract in which a borrower is faced with an opportunity to invest cash flows from the project in another investment. It is sometimes the case that the borrower can make a timely repayment of the mortgage or use his cash to reinvest, but not both. In this sense, the borrower faces liquidity constraints, but default is not eminent. If the underwriting criteria of the mortgage bind, the borrower

cannot convince the lender to renegotiate the terms of repayment and because default is costly, the borrower chooses to forgo the investment opportunity and repay the lender. We show that in these circumstances, a mortgage covenant included *ex ante* that provides the borrower a right to delay repayment at some future period may be socially valuable by improving the likelihood of investment by the mortgagor during the life of the mortgage. If individuals should voluntarily include this feature of the mortgage, why do the courts require its inclusion?

In the literature on law and economics, Hermalin and Katz (1994) and Aghion and Hermalin (1993) suggest that court intervention may be valuable in the presence of asymmetric information at the time of contract inception if parties have incentives to use contractual terms to signal their type to a lender. If incentives to signal exist, parties may choose contracts or covenants within contracts that are not socially optimal in order to differentiate themselves from other consumers. Basu (2003) examines bans against sexual harassment as a restriction on labor contracts. He characterizes labor contracts with and without a ban and argues effectively that a world without the ban is not Pareto superior to a world with a ban on harassment.[1]

[1] There is other literature that contemplates the right to freely contract in real estate markets, and in particular, focuses on the tension between real property law and contract law. Jaffe and Sharpe (1996) investigate foreclosure moratoria in which the courts interfere with private contracts. While they cannot find a compelling argument in the theory of contracts to warrant such interference, they acknowledge that the institutions of property are different from contracts. Rose (2004) explores whether the famous decision in Shelley v. Kraemer which deemed racial covenants unenforceable was an interference with the freedom of contracting. She concludes that the courts do in fact treat real property conveyances as different from contracts between individuals. Because restrictive covenants in real property deeds may bind future purchasers, Rose asserts that the courts have a duty to review covenants to determine if subsequent purchasers would expect and agree to such restrictions.

We provide a model of asymmetric information with two types of borrowers, low risks and high risks. Low risks have better expected cash flows from the investment than high risks, and a borrower's risk type is private information to that borrower. Both borrower types face the same probability of a valuable investment opportunity during the mortgage contract term. We show that there are parameter conditions under which a separating equilibrium exists where low risk borrowers choose to signal their quality to lenders by *not* including a period of equitable redemption in the mortgage, even though it would be valuable to do so if the parties had perfect information. Furthermore, we show that the total surplus under this separating equilibrium is smaller than that of a pooling outcome imposed by the courts where a period of equitable redemption is required to be a part of every mortgage contract. Thus, we are able to offer a rationale for the clogging doctrine when mortgagors have valuable investments opportunities and borrowers and lenders have asymmetric information when writing mortgages.

Additional Background and Literature

It should be noted that the equitable right of redemption is distinct from a statutory right of redemption provided to mortgagors in some states (Hurwitz 2004). Baker, Miceli and Sirmans (2004) assert that 17 states have statutory rights of redemption which allow mortgagors between 1 month and 1 year *following* a foreclosure sale to redeem real estate. To be clear, the equitable right of redemption that is recognized in 49 U.S. states at common law exists *prior* to a foreclosure sale and is in fact extinguished by foreclosure.

Not unlike a statutory requirement, however, no matter the language of the instrument used to create the debt secured by real estate, courts may enforce a period of

equitable redemption and the foreclosure process regardless of their express intentions of parties to the original contract. Legal review articles like "Clogging Revisited" (Murray 1998), "To pay or not to pay: Claiming damages for recharacterization of sale leaseback transactions under owner's title insurance policies" (Homburger and Gallagher 1995) and "Mortgage Drafting: Lessons from the Restatement of Mortgages" (Whitman 1998) coach lawyers on the ins and outs of writing mortgage covenants and other real estate-related financial contracts in order avoid such reinterpretation.

One financial contract used in real estate markets has demonstrated some historical success in avoiding re-characterization, however. The main exception to universal enforcement of the doctrine against clogging has been with respect to installment land contracts.[2] Under this financial contract, the seller finances the purchaser's acquisition of the property, and the seller retains title to the real estate until the principal balance of the loan, or some significant portion thereof, is paid off. With a land contract, the buyer normally takes immediate possession of the real estate and commences payments to the seller, but without any formal ownership or equity rights in the property. The installment land contract normally includes a forfeiture clause which allows the seller to terminate the contract if the buyer fails to meet the repayment schedule and also allows the seller retake possession of the asset upon that event.

In effect, the entire principal amount that has been paid to the seller up to the time of "default" by a buyer is forfeit under an installment land contract and forfeitures were consistently enforced in favor of the seller by the courts up until as late as the 1980s. Nelson and Whitman (1994) provide evidence that several states have now written statutes to govern forfeitures, while in others courts have ruled in favor of a purchaser's

[2] Also called a contract for deed or land contract.

right to redeem her equity investment prior to forfeiture, analogous to a right of equitable redemption. They conclude that it is highly unpredictable as to how courts will enforce a seller's attempt to reclaim possession of land financed with a land contract in the event of default.

It should also be noted that the general legal rule regarding redemption is that the mortgagor must tender the entire amount due, and not just bring the mortgage current.[3] In what follows, we abstract away from this requirement in part by assuming that the mortgagee will be willing to allow reinstatement of the mortgage when it is valuable to do so. Absent the mortgagee's willingness to reinstate a delinquent mortgage, we assume that in competitive and complete financial markets, the mortgagor will be able to find alternate sources of financing.

The Model

We consider a commercial real estate mortgage that lasts three periods. Both the mortgagor (she) and the mortgagee (he) are risk neutral, and the risk free rate is normalized to 0. In the first period, the mortgage is originated for the amount L. For simplicity we assume that the mortgagor's initial endowment, $y_{o,}$ is fully sunk in the purchase of the real estate and she has no remaining liquid wealth after the first period.[4] The endowment is represented by the equity in the asset $y_o = P - L > 0$, where P is the known value of the real estate in the first period. The mortgage obligation is interest-only with interest payment, i, due in the second and third periods and the principal also due in the third period.

[3] "It is a well-established general rule that a partial redemption of a mortgage is not permissible, but that the redemption from a mortgage must be entire" (Hurwitz 2004).
[4] We assume that this information is known to the lender.

In the second and third periods, the asset produces cash flows y_2 and y_3, respectively. For simplicity we assume $y_2 = y_3 = y$. These cash flows are not known to the lender or the borrower at the time of mortgage origination. What is known is that *y* is distributed over the interval [*a,b*] with *b>0* and cumulative distribution function *G(y)*. The mortgagor must make the interest payment to the lender from these cash flows if she does not wish to default or sell the asset. Whenever the mortgagor is in possession of the real estate during a particular period, she is assumed to be able to receive the cash flow in that period and successfully divert it from the mortgagee. In other words, there exists a basic agency problem which motivates the use of secured debt. We model cash flows in order to examine the ability of the mortgagor to undertake additional investment in the real estate during the life of the mortgage.

In the next section we identify the conditions under which a period of equitable redemption is valuable in the mortgage, whether included on a voluntary or involuntary basis. First, however, consider the mortgage *without* a period of equitable redemption. When no equitable redemption period is included in the terms of the mortgage, then a sale of the real estate is assumed to happen instantaneously upon mortgagor default, and the lender receives the ex-dividend value of the real estate. Default is assumed to occur when the mortgagor fails to make the interest payment at time 2 or the interest and principal payment at time 3.

The mortgage is originated in the first period and the interest payment *i* corresponding to the loan amount *L* is competitively determined. With probability *q* a re-investment opportunity in some outside (non-real estate) project arises in period 2. The reinvestment opportunity would cost *R*, with *R>P-L*, and is expected to earn a rate of

return, $s>0$. We assume that the reinvestment proceeds are fully realized in period 3. The returns accrue to the mortgagor in possession. In addition, however, we assume that once the reinvestment funds are sunk at time 2, neither the funds nor the returns to the reinvestment will be available to the borrower for repayment of the mortgage at time 3.[5]

If $y \geq i + R$ the mortgagor is able to make both the interest payment and the reinvestment. However, it may be the case that $i + R > y \geq i$ in which case the mortgagor can only make the interest payment and cannot reinvest unless she renegotiates the terms of the mortgage with the mortgagee.

We assume that the borrower's default costs are sufficiently large so that the borrower will try to avoid default whenever she can. In particular, $D>2i+L-P$, hence $D+P>2i+L$, so that a borrower who makes it to period 3 without making any payments will repay $2i+L$ out of property value and cash flows, if possible. We also assume that the mortgagee knows that the mortgagor will bear significant default costs if she defaults and therefore believes that she will repay him whenever possible. A relevant question is whether the lender is willing to renegotiate the mortgage and offer an extension in the case when an investment opportunity exists but the mortgagor has insufficient cash to make *both* the investment and the interest payment in the second period. We assume that $\int_a^b (2y + P - R - 2i - L)\, dG(y) < 0$, such that the lender does not expect the borrower to be able to both reinvest and repay him at time 3. Recalling that the lender is unable to

[5] The reason for this assumption is simple. If the reinvestment funds and returns were contractible and available for repayment of the mortgage, or if the reinvestment opportunity were on the same property so that it would affect the property value and cash flows, then the lender would in fact be eager to offer financing for the reinvestment opportunity as long as the expected return from the reinvestment project is positive. This would eliminate the role of PER in the mortgage contract since the lender and the borrower would always renegotiate the contract to pursue the reinvestment opportunity regardless of whether or not the original contract involved PER.

observe the actual cash flows at time 2, the lender instead concludes that the borrower is more likely to be in default if she attempts to renegotiate the mortgage.[6]

Therefore the borrower's expected payoff function without a period of equitable redemption is

(1)

$$U(a,b) = \int_{a}^{i+L-P} (y - D)dG(y) + \int_{i+L-P}^{i} (y + P - i - L)dG(y) + \int_{i}^{i+R} (2y - 2i + P - L)dG(y) + \int_{i+R}^{b} (2y - 2i + P - L + qsR)dG(y)$$

where a and b are the lowest and highest possible values of y with $b>0$ and $a<L-P$ (so that the first integral's upper bound exceeds its lower bound for all values of i). The first term captures the case where the borrower's income is less than the interest payment and the borrower's income plus the value of the property is not sufficient for the borrower to prepay and avoid default, $y+P < i+L$, i.e., $y < i+L-P$. In this case, the borrower collects the second period cash flow y and defaults, incurring default cost D. The second term captures the case where while the borrower's income is less than the interest payment, the borrower's income plus the value of the property will be sufficient for the borrower to prepay and avoid default, $i > y > i+L-P$. The third term captures the case where the borrower's income exceeds the interest payment but it is not sufficient to both make the interest payment and pay for the reinvestment, $i+R > y > i$, in which case the borrower collects second and third period cash flows $2y$, makes the two interest payments, and receives the difference $P-L$ upon the sale of the property at the end of the third period. The last term represents the case where the borrower's income exceeds $i+R$, in which case the borrower is able to reinvest as well as making the interest and principal

[6] Note that it is always in the borrowers best interest to attempt to stay in possession of the real estate for an additional period in order to claim the time 3 cash flow.

payments. Recall that the initial endowment of the borrower is assumed to be $P-L$, which cancels out the borrower's initial cash flows at the time of borrowing, $L-P$. Notice also that there is a region in (1), as captured in the third term, where no reinvestment is undertaken because the mortgagor must choose between making the interest payment and reinvestment.

Without loss of generality, the lender's cost of funds and discount rate are assumed to be zero. The lender's payoff without a period of equitable redemption or renegotiation is,

$$(2) \qquad V(a,b) = -L + \int_{a}^{i+L-P} (P + y - F)dG(y) + \int_{i+L-P}^{i} (i + L)dG(y) + \int_{i}^{b} (2i + L)dG(y)$$

where F is the lender's foreclosure costs. When the borrower's income plus property value is less than $i+L$, i.e., $y<i+L-P$, the borrower defaults and the lender gets the possession and collects the third period income y (the first integral term). If the borrower's income exceeds $i+L-P$ but less than i, then the borrower prepays the loan and the lender receives the second period interest payment plus the principal payment (second integral term).[7] If the borrower's income exceeds i then the lender receives the two interest payments and the principal payment (third integral term). Foreclosure costs F are assumed to be large enough so that $F>P+E(y)-L$ where $E(y)$ is the expected value of the periodic cash flows. Otherwise, the lender would not care about default since his payoff even in the case of default, $P+E(y)-L-F$, would be positive.[8]

Now consider the case in which the parties agree to include a covenant that allows for a period of equitable redemption (PER) and allows a mortgagor who does not make the

[7] Since the lenders operate in a competitive market, their expected profits, including from re-lending the prepayment amount, will be zero.

[8] Also note that without the $P+E(y)-L<F$ condition, the zero-profit condition would result in negative interest rates.

full interest payment at time 2 to continue to remain in control of the real estate until time 3. The covenant is assumed to be priced, and the interest rate for this contract is i'. In this case, we have the following possibilities:

- $y + P < i' + L$ or $y < i' + L - P$: The borrower's second period cash flow plus equity will not be sufficient to prepay in the second period and avoid default. The best strategy for the borrower is to collect *y* in each period and let the lender foreclose the property in t=3. The borrower's payoff will be $2y - D$ and the lender will receive $P - F$ - *f* where *f* represents the additional costs of foreclosure when PER is included in the mortgage.[9]
- $y > i' + L - P$ but $y < i'$: The borrower's second period cash flow plus equity will suffice to prepay in the second period and avoid default. However, the periodic cash flow is smaller than the periodic interest payment. The borrower's optimal strategy is to prepay in period 2 and enjoy the payoff $y + P - i' - L$ while the lender receives $i' + L$.
- $y \geq i'$ but $2y+P<2i+L+R$, hence $i' \leq y < i' + \frac{L - P + R}{2}$: Although the borrower's cash flows exceed the interest payments, the cash flows plus the equity are not sufficient to make the loan payments and reinvest in the new opportunity (recall that $R>P-L$). The borrower's payoff is $2y + P - 2i' - L$ while the lender receives $2i' + L$.

[9] The additional foreclosure cost reflects the fact that PER is typically associated with a lengthier and more costly foreclosure process.

- $y \geq i' + \frac{L - P + R}{2}$: The borrower is able to defer repayment until t=3, reinvest and then pay the lender $2i' + L$ at t=3. The borrower's expected payoff is $2y + P - 2i' - L + sR$.

Thus, the period of equity redemption offers two advantages to the borrower. It enables the borrower to delay the second period payment, hence creates more opportunities for the borrower to pursue the investment *R*, and it allows the borrower to possess the property for both periods and collect the third period cash flow even when the borrower is in default.

The borrower's payoff function under PER becomes:

(3)

$$U'(a,b) = \int_{a}^{i'+L-P} (2y - D)dG(y) + \int_{i'+L-P}^{i'} (y + P - i' - L)dG(y) + \int_{i'}^{i'+(L-P+R)/2} (2y + P - 2i' - L)dG(y) + \int_{i'+(L-P+R)/2}^{b} (2y + P - 2i' - L + qsR)dG(y)$$

The lender's expected payoff is now given by:

(4) $$V'(a,b) = -L + \int_{a}^{i'+L-P} (P - F - f)dG(y) + \int_{i'+L-P}^{i} (i' + L)dG(y) + \int_{i'}^{b} (2i' + L)dG(y)$$

Note that since the lender under PER has to wait until period 3 to foreclose, he can no longer collect any cash flows from the property other than the sale price *P* in the case of default by the borrower. A comparison of (2) and (4) clearly indicates that

Lemma 1: For any given $i = i'$, $V > V'$.

Thus, for any given interest rate, the lender would generate more profits from a contract that does not involve PER. On the other hand, as stated in the following lemma, for any

given interest payment, the borrower would prefer a contract with PER to a contract without PER.

Lemma 2: For any given $i = i'$, $U' > U$.

Proof: Taking the difference between (1) and (3) for a given $i = i'$, we obtain:

$$U' - U = \int_{a}^{i+L-P} y dG(y) + \int_{i+(L-P+R)/2}^{i+R} qsRdG(y) > 0 \cdot \tag{5}$$

Note from (5) that the additional value created by PER for the borrower is due to the fact that the borrower collects and additional period's cash flows in case of default and has a higher probability of utilizing the reinvestment opportunity.

A comparison of equations (1)-(4) illustrates the role that PER plays. On one hand, it enables the borrower to continue to possess the property and collect the cash flow *y* even in the case of default, and increases the probability of reinvesting in the new project. On the other hand, it raises the lender's costs because it prevents the lender from possessing the property immediately after the borrower fails to make the full payment and results in additional foreclosure costs.

When all borrowers are identical, then in equilibrium all (none) of the mortgage contracts will involve PER when the benefits of PER to borrowers are greater (smaller) than the cost to the lender. Hence, there will be no role for court involvement when there is a single borrower type. Any interference by the courts will have a negative impact on total surplus.

We next consider the case of asymmetric information with two borrower types. Our objective here is to see how borrowers of different risk types would value PER, whether the outcome would be a separating or pooling equilibrium with respect to which

borrower types decide to pay for PER and whether a universal imposition of PER would be welfare improving.

Asymmetric Information

Suppose there are two borrower types. The two borrower types differ with respect to the expected cash flow *y* from their project. The risky borrower's cash flow *y* is distributed over the interval [*a*,*b*] while the safe borrower's cash flow is distributed over the interval [*a*,*B*] where $B>b$. A borrower's type is private information to that borrower and not observable by the lender.

While the risky borrower's payoff function with and without PER is the same as in (3) and (1), the safe borrower's payoff functions with and without PER becomes

(7)

$$U'(a,B)=\int_{a}^{i'+L-P}(2y-D)dG(y)+\int_{i'+L-P}^{i'}(y+P-i'-L)dG(y)+\int_{i'}^{i'+(L-P+R)/2}(2y+P-2i'-L)dG(y)+\int_{i'+(L-P+R)/2}^{B}(2y+P-2i'-L+qsR)dG(y)$$

(8)

$$U(a,B)=\int_{a}^{i+L-P}(y-D)dG(y)+\int_{i+L-P}^{i}(y+P-i-L)dG(y)+\int_{i}^{i+R}(2y-2i+P-L)dG(y)+\int_{i+R}^{B}(2y-2i+P-L+qsR)dG(y)$$

To keep the analysis tractable, we assume the future cash flows are uniformly distributed over the interval [*a*,*b*] for risky borrowers and [*a*,*B*] for safe borrowers. Thus, $dG(y)=\frac{1}{b-a}dy$ for risky borrowers and $dG(y)=\frac{1}{B-a}dy$ for safe borrowers.

The following proposition will be critical for the equilibrium analysis:

Proposition 1: For any given interest rate, risky borrowers value PER more than safe borrowers.

Proof: As given in (5) above, the difference between the risky borrower's payoff functions with and without PER equals:

$$U'(a,b)-U(a,b)=\int_{a}^{i+L-P} y\frac{1}{b-a}dy+\int_{i+(L-P+R)/2}^{i+R} qsR\frac{1}{b-a}dy\cdot$$

Since the only difference between the two borrowers is that safe borrower's distribution function has a higher upper limit, $B>b$, and since U'-U is a decreasing function of b, the risky borrowers will value PER more than safe borrowers at any given interest rate.

The significance of this proposition is stated by the following Remark.

Remark 1: The only separating equilibrium possible in this game is where risky borrowers would take a contract with PER while safe borrowers would choose a contract without a PER.

The reason for the remark is simple. Since risky borrowers value PER more than safe borrowers, then if a lender offered a contract with PER, they would be more willing to pay a higher interest rate for such a contract than the safe borrowers. That is, if the additional cost of PER is worth paying for the safe borrowers, then it is certainly worth paying for the risky borrowers, but not necessarily vice versa. There is also a possibility of a pooling equilibrium where neither or both borrower types choose to pay for PER. We will analyze such a possibility shortly.

It is also worth noting that the value of PER to either borrower type increases with the value of reinvestment opportunity.

Proposition 2: For any given $i = i'$, $\frac{d}{dR}(U'-U) > 0$.

Proof: Follows from the fact that $\frac{d}{dR}(U'-U) = \frac{(P - L + 2R)qs}{2(b-a)}$ for any given $i = i'$.

We next consider the loss to the lender from a PER at a given *i*. Comparing the lender's payoffs with and without PER, we obtain:

(9) $$V'-V = -\int_{a}^{i+L-P} (y+f)\frac{1}{b-a}\,dy.$$

Keeping the interest rate unchanged, the lender's gain from including PER is clearly negative. Equation (9) yields the following important component of the equilibrium analysis:

Proposition 3: It is costlier for the lender to offer PER to the risky borrower than to the safe borrower.

Proof: Directly follows from the fact that the cost of PER, V'-V, decreases as *b* increases.

We now prove a key result of the paper. Let *i'*(b)* and *i*(b)* be the zero profit interest payments with and without PER when the contract is chosen by a risky borrower. Similarly, let *i'*(B)* and *i*(B)* be the zero profit interest payments with and without PER when the contract is chosen by a safe borrower.

Proposition 4: When the proportion of risky borrowers in the market is high, there exists parameter conditions under which the unique equilibrium will be a separating equilibrium where risky borrowers pay a higher interest rate, *i'*(b),* to include PER in their mortgage contract while safe borrowers choose to obtain a lower interest rate, *i*(B),* by agreeing not to include PER in their contract.

Proof: In order for such a separating equilibrium to exist, we would need the following conditions to be satisfied:

(a) $U'(a,b, i'^*(b)) > U(a,b,i^*(B))$

(b) $U'(a,B, i'^*(b)) < U(a,B, i^*(B))$

Condition (a) requires that risky borrowers value the contract with PER at their zero-profit rate of *i'*(b)* more than the contract without PER at the zero-profit rate for safe borrowers, *i*(B).* Similarly, condition (b) ensures that safe borrowers prefer the no-PER contract at their zero-profit to a contract with PER at the zero-profit rate for risky borrowers. In other words, these two conditions guarantee that neither borrower type has an incentive to choose the contract designed for the other borrower type.

In order to complete the proof, we also need to show that a lender could not break this equilibrium by offering a "pooling contract" where he offers PER at a "pooling rate" lower than the separating equilibrium rate of *i'*(b)* and attract both risky and safe borrowers. However, when the proportion of risky borrowers in the market is high enough, then such a pooling interest rate will have to be close enough to the separating interest rate, hence will still be too high to attract safe borrowers. Thus, when the proportion of risky borrowers in the market is high enough, the separating equilibrium above will be the unique outcome.

Given the complexity of the payoff functions for the lender and the borrower, we cannot prove the existence of the separating equilibrium in Proposition 4 for all parameter values. In fact, our analyses indicate that such a separating equilibrium does not exist for some parameter values. However, as stated in the proposition, we are able prove that there exist parameter conditions under which the above separating equilibrium exists. Consider the set of parameters given in the upper half of Table 1. When we plug these parameter values to the lender's payoff functions, we obtain the zero-profit interest rates given in the lower half of the table.

Table 1: Example of an Equilibrium

Exogenous Variables			
L	400,000	*F*	250,000
P	500,000	*f*	150,000
a	-125,000	*D*	750,000
b	300,000	*R*	340,000
B	400,000	*sq*	0.3
Endogenous Variables – Zero profit interest rates			
i(b)*	15,371	*i*(B)*	10,343
i'(b)*	20,943	*i'*(B)*	13,069

Note: The parameters *s* and *q* have no effect on the lender's profits, hence on the zero-profit interest rates. Consequently, all of the results based on this example will hold for any combination of $s>0$ and $q>0$ as long as $sq=0.3$

It can be checked that the above parameter values satisfy the two conditions in the paper that $\int_a^b (2y + P - R - 2i - L)\, dG(y) < 0$ and $F>P+E(y)-L$. Note also that, as expected, the interest rates for PER and no-PER contracts for the risky borrowers are higher than those for safe borrowers, $i'^*(b) > i'^*(B)$ and $i^*(b) > i^*(B)$.

When we substitute these parameter values and the resulting interest rates into the borrowers' payoff functions, we verify that the two conditions in the proof of proposition 5 are satisfied:

$U'(a,b, i'^*(b)) = 195{,}690 > U(a,b,i^*(B)) = 193{,}960$

and

$U'(a,B, i'^*(b)) = 322{,}250 < U(a,B, i^*(B)) = 324{,}880$.

In order to prove that the above separating result can be sustained as an equilibrium, we also need to show that a lender could not break this separating equilibrium by offering a "pooling contract" where both borrower types choose PER. Let the proportion of risky borrowers to be $\alpha = 95\%$. The zero-profit (lowest) interest rate for the lender to offer a pooling contract can be calculated as $I^P(b,B) = 20{,}417$. Clearly, high risks would prefer this contract to their separating equilibrium contract since they can now obtain PER at a lower interest rate. Low risks, however, would remain with their choice of no-PER contract at $i^*(B) = 10{,}343$ because their expected payoff from this contract exceeds their expected payoff from the pooling contract at $I^P(b,B) = 20{,}417$, $U(a,B, i^*(B)) = 324{,}880 > U'(a,B, I^P(b,B)) = 324{,}122$. This also suggests that there cannot be a pooling equilibrium in this economy since even the zero-profit pooling equilibrium can be broken by offering a no-PER contract to the safe borrowers. Thus, the unique equilibrium under these parameter conditions is a separating equilibrium where

safe borrowers obtain a no-PER contract at a lower interest rate while risky borrowers opt for a PER contract at a higher interest rate.

As indicated earlier in the paper, equitable redemption is universally enforced in all mortgages and the application of the doctrine against clogging to modern commercial real estate mortgages is puzzling. When parties to a contract are sophisticated, they should be able to include terms in these contracts that are efficient. Thus, why do courts write such terms for the two parties? We next offer an explanation.

We have already shown that when the proportion of risky borrowers is high enough, a lender cannot attract both borrower types to a PER contract. Safe borrowers would signal their type by choosing a no-PER contract and enjoy a lower interest rate. The weighted average surplus per borrower, weighted by the proportion α =95%, under the separating equilibrium that emerges without any court involvement, can be calculated as:[10]

$\alpha U'(a,b, i'^*(b)) + (1-\alpha)U(a,B, i^*(B)) = 202{,}149.$

What if courts impose a pooling PER contract on every mortgage? We already know that the zero-profit interest rate for such a contract would be $I^P(b,B) = 20{,}417$. When we add the payoff functions of both borrower types under this pooling PER contract, we obtain a weighted average surplus per borrower of:

$\alpha U'(a,b, I^P(b,B)) + (1-\alpha)U'(a,B, I^P(b,B)) = 204{,}080.$

Thus, we obtain the main result of the paper.

[10] Recall that lenders' expected surplus under each contract is zero.

Proposition 5: There are cases under which a universal enforcement of PER improves total welfare.

The parameter conditions in Table 1 are just one example of a scenario where a universal enforcement of PER leads to greater social welfare. There are clearly many other combinations of parameters under which this result holds. It is important to note, however, that we cannot make a Pareto comparison between a world with and without the universal enforcement of PER. Enforcing PER benefits high-risk borrowers at the expense of low risk-borrowers. Basu (2003) refers to this phenomenon as the "large numbers argument" in which observing a single Pareto-optimal deviation from a pooling equilibrium does not mean that a change in the law to allow a particular type of contract results in a Pareto-superior outcome. In our context, imagine a world in which PER is universally enforced. We have shown that there exists a case in which it is Pareto-optimal for an individual safe borrower to deviate from this contract. However, if we change the rule to make PER voluntary, it is possible that enough individual deviations might lead to a separating equilibrium. Proposition 5 suggests that there exist cases where the new equilibrium results in real tradeoffs, because while the safe borrowers may be better off in the new equilibrium, the risky borrowers are worse off. Indeed, when the proportion of risky borrowers is high enough, the benefits of court intervention to risky borrowers outweigh the costs to the safe borrowers.

Conclusion

Although the right to freely contract plays a central role in financial markets in the U.S., there also exist restrictions on financial contracts in real estate that might appear to impede innovation. In particular, the requirement that all mortgagors in both residential and commercial mortgages be guaranteed a right to redeem the real estate after default is almost universally enforced. Both historically and recently, borrowers and lenders have sought to avoid the consequences of equitable redemption in writing financial contracts involving real estate. Examples abound. Presumably in commercial real estate markets, the attempt to deviate from the standard requirements imposed on such contracts is *ex ante* efficient or valuable from the viewpoint of the individual borrower and lender writing the contract. What we have demonstrated in this paper, consistent with the work of Basu (2003), is that individual Pareto-optimal deviations are not sufficient to demonstrate that a change in the governance of financial contracts involving real estate will be socially valuable. Indeed, we have demonstrated that such a change may result in a social outcome that is inferior to the current system in which PER is universally enforced. This result should be of particular interest to judges and legislators who may seek to revise or override well-established common law precedents on the basis of compelling, individual cases. There are likely to be both winners *and* losers if the rules of the game are changed.

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