In Defence of Usury Laws

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Abstract

This paper shows that if moral hazard leads to credit rationing, an appropriate usury law must raise social welfare. Under market clearing, a usury law is always beneficial if funds are inelastically supplied. When entrepreneurial heterogeneity is introduced, an improvement arises even when the supply of funds is elastic. These results apply also in costly state-verification models and diversionary models of the credit market. Finally, a usury law proves useful in eliminating low-yielding projects when some entrepreneurs display excess optimism.

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1. Introduction.

With the surprising exception of Adam Smith, the consensus amongst economists is that usury laws are "...mischievous interferences with the spontaneous course of industrial transaction … originated in a religious prejudice against receiving interest on money" (J.S. Mill, 1891). Nevertheless, as Homer and Sylla (1991) document, throughout history interest rate ceilings have been the norm and are still surprisingly widespread. Amongst non-economists, the debate over the merits of interest rate caps remains lively. As the Economist recently reported, the boom in a new form of consumer finance, pay-day lenders, who cash a check issued by the consumer on proof of a regular job *"...has caused an uproar among advocates for the poor. The Consumer Federation of America calls the practice 'legal loan sharking'."* (Consumer finance pay dirt, 5-June, 1999). The credit industry stands accused of misleading the consumers about the true cost of these loans, which often imply APRs of more than 500%. Such high interest rate loans are prohibited in nineteen USA states as a result of longstanding usury laws. Free-market advocates argue that those harmed most are the very people for whom the regulation is in place; risky (predominately poor) borrowers will simply be denied credit when the ceiling interest rate is insufficient to cover their credit risk. Even so, anti-usury legislation has proved remarkably resistant to criticisms repeal attempts. In Arkansas, one of the states with the strictest regulations, twice in the last decade credit-industry backed referenda have rejected repeal by large majorities. (Usury laws, the bad side of town, The Economist, 28 Nov. 1998).

In this paper we discuss some possible reasons why usury laws may be efficient. Two lines of argument are pursued. The first observes that high interest rates induce moral hazard in borrowers and hence may involve significant deadweight costs in transferring income from debtors to creditors. In the presence of credit rationing, the marginal deadweight cost is infinite so, under any concave social welfare function, putting a cap on interest rates is beneficial. We explore this idea in a variety of credit rationing and market clearing settings.

The second theme we pursue involves self-selection arguments. We consider systematic reasons why marginal borrowers, i.e. those least willing to pay high interest rates,

could nevertheless be the highest quality from a social perspective. Excluding the keenest borrowers from credit is then directly beneficial if their use of funds entails a social loss, or indirectly advantageous through their replacement by those with higher social but lower private benefits. As we show, this is exactly what happens when, as the evidence suggests, some entrepreneurs are optimistically biased concerning their projects' prospects.

Section 2 surveys the economics literature on usury laws. Section 3 presents a standard moral-hazard model and demonstrates that when the equilibrium is characterized by rationing, or if the market clears but the supply of funds is inelastic, an appropriate interest rate ceiling must increase welfare. In Section 4, we introduce entrepreneurial heterogeneity in a moral-hazard setting. We find that usury laws then increase welfare under market clearing, even when the supply of funds is elastic. Section 5 extends the result to costly-state verification and diversionary models. Finally, Section 6 introduces unrealistically optimistic entrepreneurial expectations. Doing so provides a possible framework in which to rationalize Adam Smith's otherwise puzzling views and a strong argument for usury laws themselves.

2. Economic perspectives on usury laws.

Since the birth of the discipline economists have debated the merits of usury laws. The most notable controversy was between Adam Smith and Jeremy Bentham. Interestingly, the inventor of the metaphor of the invisible hand did not feel that its reach extended to the credit market. He tackled the issue in a famous passage of the "Wealth of the Nations" where he argued that, were it possible to charge high interest rates, most funds

"....would be lent to prodigals and projectors, who alone would be willing to give this high interest. Sober people ... would not venture into the competition."

This passage can be read as envisaging an adverse selection effect of high interest rates on loan quality. The problem with this interpretation is that Smith does not spell out the reason why sober people would drop out first, why lenders fail to recognize this adverse

selection effect and of their own volition curb the interest rate below the market clearing level, and indeed why lending to prodigals and projectors should be socially undesirable. Bentham (1790), engaged in a battle against usury laws, was naturally disappointed by the views of his fellow liberal. He argued that usury laws were not efficacious in preventing profligacy. Prodigals would be granted credit even at low interest rates if able to offer security. Moreover, according to Bentham, it is innovators (Smith's projectors), rather than traders engaged in established activities, that are responsible for advancement in conditions from one era to the next. By their very nature, innovative trades involve high risk and therefore can only be funded at high interest rates. Limiting the allowed interest rate would therefore stall the engine of growth. Finally, usury laws harm borrowers by limiting their access to legal credit. Funds may be available if the law is evaded, but in this case lenders will require a premium for the additional risk due to illegal trading. Underlying all these arguments was Bentham's belief in the virtues of contractual freedom:

"My neighborours, being at liberty, have happened to concur among themselves in dealing at a certain rate of interest. I, who have money to lend , and Titus, who wants to borrow it of me, would be glad, the one of us to accept, the other to give, an interest somewhat higher than theirs: Why is the liberty they exercise to be made a pretence for depriving me and Titus of ours".

J. Bentham "In defence of usury"

Over the following century and beyond, Bentham's liberal view came to be considered the established orthodoxy in the profession. Chapter X of John Stuart Mill's 'Principles' (1891), for example, files usury laws under the heading "Of interferences of government grounded on erroneous theories" with the existence of usury laws in most legal system being explained by irrational (religious) beliefs. The scope for such regulations was confined to the protection of the borrower in non-developed societies where credit is not generally available (Marshall, 1920).

A major challenge to this established orthodoxy came from Keynes' General Theory (1936). Keynes' view was that the interest rate, being an essentially monetary

phenomenon with potentially vast real effects, could and should be manipulated in order to increase investment. In his opinion,

"...the rate of interest, unless it is curbed by every instrument at the disposal of society, would rise too high to permit an adequate inducement to investment."

Keynes, J.M., General Theory, Book VI, Chap. 23.

As long as funds are available, a usury laws counters the tendency to inadequate investment by lowering the hurdle rate sought by investors. Of course, as Blitz and Long (1968) point out, whether a usury law increases or decreases investment depends not only on willingness to invest but also on the supply of funds. As the short side of the market determines the level of transactions, a simple partial equilibrium analysis suggests that at best, the quantity of funds traded in the credit market would be unaltered if the supply of funds is inelastic. Steeped in Marshallian economics, Keynes would have been well aware of this argument, but in his general equilibrium system with unemployment, the result is not so clear-cut. Greater investment demand generates the higher income that brings about extra savings. The problem is that at the regulated interest rate there is excess demand for money balances and excess supply of the bonds issued to finance the extra investment. If, as seems reasonable, bonds are the best substitute for cash balances, the story ends with the usual multiplier expansion in income. If, alternatively, the frustrated demand for cash balances spills into increased consumption, this boosts output yet more. [1]. Keynes' position is certainly defensible.

Subsequent literature has ignored unemployment and focused on the substitution effects of usury laws inducing credit rationing both in the form of quantity rationing (see for example Jaffee and Modigliani, 1969) and redlining of the most risky types (Blitz and Long, 1968). In these cases, rationing, is associated with a diminished availability of credit. Keeton (1979) however points out that, for non-Keynsian reasons, a usury law may even increase the quantity of funds traded in the credit market. When the bank bears a fixed cost for each

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[1] For a single country in a world of perfect capital mobility the process fails, and even if capital is somewhat immobile, the dynamics is delicate

loan granted, it may "force" borrowers to accept larger-than-desired loans. An interest rate ceiling may further increase the value of the loan required by the bank.

Another strand of literature attempts to explain the pervasiveness of anti-usury regulation throughout economic history. Blitz and Long (1968) find that usury laws benefit prime borrowers, who profit both from lower interest rates and from diminished competition due to the exclusion of high-risk borrowers from the market. Following this line of argument, Ekelund *et al* (1989) adopt a public choice approach and argue that usury laws were due to the influence of large institutional borrowers, and specifically of the Church. However, the pervasiveness of this type of regulation seems to suggest that usury laws counteract some genuine market failure. Were they solely the result of such rent-seeking activity, it is necessary to believe that, throughout history, the prime borrowers have almost always been more influential than other borrowers and lenders. Ordover and Weiss (1981) build an argument for a positive welfare effect based on the existence of uninformed borrowers and search costs. In this case the unregulated equilibrium may well entail some banks charging inefficiently high rates. Finally, Glaeser and Scheinkman (1998) take a Rawlsian approach and suggest that usury laws perform a social insurance role against adverse idiosyncratic transitory income shocks. They demonstrate that such a policy is a rough but effective tool for transferring resources from good states to bad states of the world whenever the elasticity of savings to the interest rate is sufficiently low. Evidence is the fact that interest rate ceilings tend to be lower in societies with high wealth inequality but a relatively stable composition. Even if not unlawful, the moral opprobrium that frequently attaches to "unconscionable" interest rates may also reflect these concerns. There is room for debate though to what extent usury laws are a better device than the more natural alternatives, direct social insurance and redistributive policies.

Empirical investigation of the effects of usury laws has focused on two issues: the effects on the overall amount of lending and on the distribution of funds among borrowers with differing riskiness. All studies to address the issue (Goudzwaard, 1968, Shay, 1970, Greer, 1974) find that the degree of riskiness of bank lending is strongly positively correlated with the height of the ceiling interest rate. Therefore, high-risk borrowers are less likely to obtain a loan when the usury ceiling is lower. A further but improper inference

drawn by some authors, based on the simple competitive model, is that total lending must also be correlated with the height of the ceiling rate. The direct evidence on this point is actually mixed.[2] Crafton (1980) finds a positive correlation, Shay (1970) finds that the volume of loans is not affected by the ceiling, Greer (1974) finds that the correlation is positive for low levels of the ceiling and becomes negative at high levels (above 27%), while Kawaja's (1969) data set displays a negative correlation. Analyses of loan rejection rates deliver a similarly ambiguous picture. Goudzwaard (1968b) finds that rejection rates are uncorrelated with the height of the ceiling rate, while Greer (1975) finds a negative correlation.

3. Moral Hazard.

Moral hazard effects provide a simple and appealing case for usury laws. Whenever the interest rate has an adverse incentive effect, thereby creating a deadweight loss, usury laws may improve on the market equilibrium by reducing the effect of moral hazard. To demonstrate this possibility we will use the simplest possible case of moral hazard. Suppose there exists a population of N identical risk-neutral entrepreneurs, each one endowed with an indivisible investment option, requiring a fixed amount of capital input K. For simplicity, suppose that entrepreneurs own no wealth and therefore rely exclusively on the credit market for funds. Projects succeed with probability p, and, in the event of success, yield a gross return, S. Failure yields no revenue at all. The success probability of the project also depends smoothly on the unverifiable effort, e, exerted by the entrepreneur. Project revenue is also unverifiable and therefore a regular debt contract is the only feasible method of finance[3]. Banks attract funds in a perfectly competitive deposit market. The supply of

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[2] Imperfect competition is the most straightforward explanation of why a maximum interest rate may increase lending.
[3] Assume that in the event of default the bank can seize all revenue and no renegotiation is possible. Then the entrepreneur will only default in the event of failure.

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deposits, expressed in terms of the number of projects that can be funded is *n(I)*, where *I* is the repayment on a deposit of K^4, and $n' \geq 0$.

With a regular debt contract and linearity of utility in income and effort, each entrepreneur maximizes

$$U_e = p(e)(S-D) - e \qquad (1)$$

where *D* is the repayment on loans.

Entrepreneurs' choice of effort is determined by the condition

$$p'(e)(S-D) - 1 = 0 \qquad (2)$$

with $p'(e) > 0$. The second order condition is satisfied provided that returns to effort are decreasing ($p''(e) < 0$). Since effort only increases the probability of success, *p(e)*, entrepreneurs are unable to capture the whole marginal return from effort (*p'S*) and so exert even less effort than were they able to self finance. An increase in the repayment has a negative effect on effort because it decreases the appropriability of the return from effort:

$$\frac{de}{dD} = \frac{p'}{p''(S-D)} < 0 \qquad (3)$$

From (3), it follows that the chance of default is increasing in *D*, and the bank return function is not necessarily monotone increasing (as in Keeton, 1979, and Stiglitz and Weiss, 1981). The market equilibrium is either market clearing or rationing. Rationing occurs if, at D^*, which maximises the banks' expected return, when paid to depositors, attracts insufficient funds to finance all entrepreneurs.

In assessing the effects of usury laws, our strategy is to evaluate the marginal changes in agents' welfare when the interest rate is capped just below the free market equilibrium. We examine the rationing case first[5].

Proposition 1: *When moral hazard results in a rationing equilibrium, a usury law marginally decreasing the interest rate below the market level increases any well-behaved social welfare function.*

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[4] Hence if we define *i* as the deposit interest rate, then *I=(1+i)K*.
[5] A very similar analysis applies if entrepreneurs select project riskiness, as in Stiglitz and Weiss (1981).

Proof. We must consider the effect of a usury law on all three types of agents in the economy. By the competitive assumption we know that banks are constrained to zero-profits and therefore that their surplus cannot be affected by the interest rate ceiling. We can therefore restrict attention to the effects on borrowers' and depositors' welfare. Consider borrowers first. Rationing requires that the banks' expected return per-loan, M, reaches an internal maximum, i.e. there exists a D^* such that:

$$\frac{dM}{dD} = p'D^*\frac{de}{dD} + p = 0 \tag{4},$$

Given (4), a sufficient condition for rationing is that at I^*, such that $I^*=M(D^*)$, available funds are insufficient to serve all the entrepreneurs, that is $n(I^*)<N$. In this case only a proportion $I=n(I^*)/N$ of entrepreneurs is funded. The entrepreneur's expected utility in this equilibrium is:

$$U_e^* = I[p(S-D^*)-e^*] \tag{5}$$

A usury law that sets the allowed repayment marginally below D^* benefits borrowers if:

$$\frac{dU_e^*}{dD} = I\left(\frac{de}{dD}[p'(S-D^*)-1]-p\right) +$$
$$+ (p(S-D^*)-e^*)\frac{dI}{dM}\frac{dM}{dD} < 0 \tag{6}$$

The first term on the right hand side of (6) captures the change in the welfare of funded entrepreneurs, keeping constant the probability of being funded. The square parenthesis is zero from the entrepreneurs' choice of effort, (2). The second term captures the welfare variation consequent on the change in the number of loans the bank can grant. Since, in the rationing equilibrium, the return function is at a maximum, $\frac{dM}{dD}=0$, this term vanishes and therefore

$$\frac{dU_e^*}{dD} = -Ip < 0 \tag{7}.$$

Hence, at the equilibrium rationing interest rate, the borrowers' welfare is decreasing in the interest rate.

Next consider depositors. Their surplus equals the gross bank return, $M = pD$ as, under competition, this whole return is simply transferred to depositors. From (4), a

reduction in D has no effect M, so depositors bear no loss from a marginal lowering of the interest rate.

The impact of interest rate controls on borrowers and lenders is summarized by the utility possibility frontier in Figure 1.
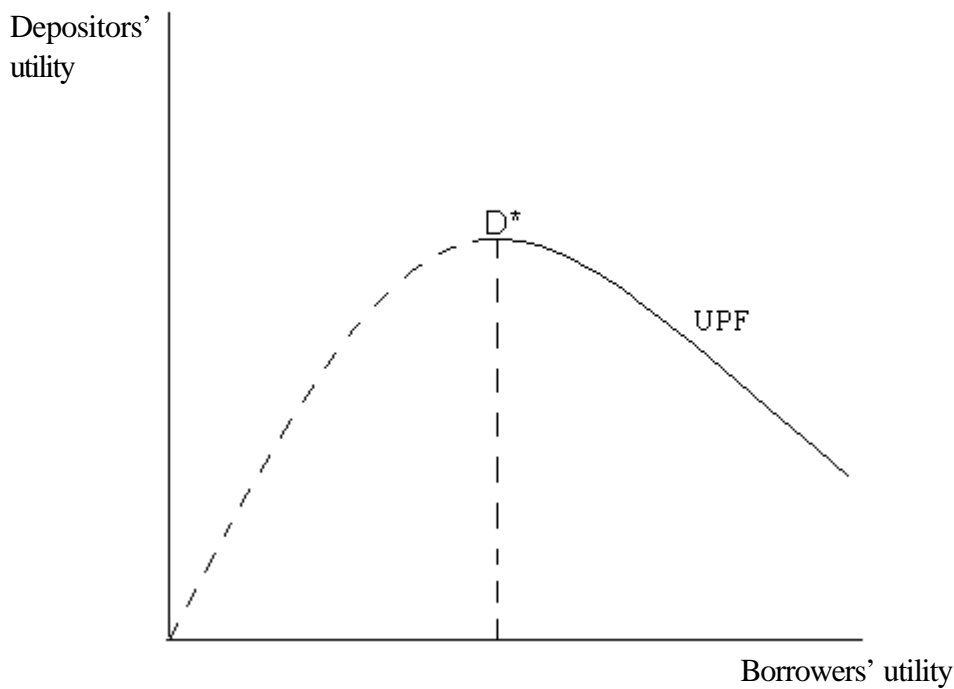

Figure 1: Utility Possibility Frontier (UPF).

The figure shows combinations of (expected) utilities for borrowers and depositors as the repayment varies. At the turning point, utilities are those at the repayment, D^*, that maximizes the banks' expected return per loan. Evidently, the social optimum will be achieved at a repayment lower than D^* for any "well-behaved" social welfare function. QED.

At first sight, a reduction in the interest rate affects depositors and borrowers in opposite directions so an unambiguous welfare result is not possible. Depositors suffer because, at a lower interest rate, the banks gain a lower return and therefore transfer back to depositors a lower amount of revenues. In the rationing equilibrium however, the banks' return is at a maximum and, by the envelope theorem, a marginal change in the interest rate does not affect bank expected return and thus depositors welfare. A marginal decrease in D

does though definitely benefit entrepreneurs. The overall efficiency gain arises because the usury law dampens the distortion due to the incentive problem, and counteracts the undersupply of effort [6]. As a consequence, an infinitesimal reduction in the interest rate must generate a Pareto gain. When we consider a discrete change in the interest rate, depositors' welfare does decrease. However, due to the fact that the market equilibrium allocation is Pareto dominated by that generated by an infinitesimally lower interest rate, for any smooth concave social welfare function, the optimal interest rate is below the credit rationing level.

When market clearing occurs, the analysis is complicated by the fact that, contrary to the equilibrium rationing case, depositors' welfare is affected by infinitesimal changes in the interest rate. Moreover, regulation now causes rationing to arise. We proceed by adopting a utilitarian welfare function. Social welfare, W, is defined as the unweighted sum of the utilities of all the agents in the economy.

Proposition 2: *If the market clears and deposits are in fixed supply, a usury law increases a utilitarian social welfare function.*

We are interested in the direction of the change in W following a marginal reduction in D. If n is the number of loans granted, then

$$\frac{dW}{dD} = \frac{dnU_e}{dD} + \frac{dU_d}{dD} \qquad (8),$$

where $\frac{dU_d}{dD}$ is the change in the aggregate surplus of depositors. Noting that under market clearing, the initial equilibrium involves $n = N$, from (1):

$$\frac{dnU_e}{dD} = \frac{dn}{dD}[p(S-D)-e] - Np \qquad (9).$$

By the envelope theorem the second term in (8) is $dU_d/dD = N \, dI/dD$. Writing $M = pD \, (= I)$ as the expected revenue from an individual loan,

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[6] Note that the envelope theorem implies that the volume of funds supplied is unchanged and therefore there is no increase in rationing.

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$$\frac{dU_d}{dD} = N\frac{dM}{dD} = N\left(p'D\frac{de}{dD} + p\right) \qquad (9').$$

Since n depends on the supply of deposits and Bertrand competition implies $I=M$, so $\frac{dn}{dD} = \frac{dn}{dI}\frac{dM}{dD}$, where $\frac{dn}{dI}$ is the slope of the supply curve of deposits.[7] It follows that (8) can be rewritten:

$$\frac{dW}{dD} = \frac{dn}{dI}\frac{dM}{dD}(p(S-D)-e) + N\frac{de}{dD}(p'S-1) \qquad (10).$$

The relevant condition for a welfare improving usury law requires this expression to be negative. Rearranging, the condition becomes:

$$\boldsymbol{e}_{nI} < -\frac{I\left(\dfrac{dM}{dD} - p\right)}{\dfrac{dM}{dD}(p(S-D)-e)} \qquad (11),$$

where ε_{nI} is the elasticity of the supply of deposits with respect to the repayment to depositors, I. The bracketed term in the numerator of the right hand side of (11) is $P'D$ so is negative making the whole expression positive. It follows that each of the following is sufficient for a usury law to be welfare increasing:

1) The supply of funds in the deposit market is inelastic, $\boldsymbol{e}_{nI}=0$;

2) The return function is at a maximum, $\dfrac{dM}{dD}=0$ (the rationing case).

The benefit of a usury law decreasing the interest rate below market level is that it lowers the incentive problem on projects that continue to be funded. The cost is that rationing arises, so some positive net surplus projects are now unfunded. When the supply of funds is totally inelastic, there is no such cost, and a welfare improvement is guaranteed.

Outside of these cases, the condition is obviously more likely to be satisfied if the elasticity of funds' supply, $\boldsymbol{e}_{nI}$, is small. Further analysis of (11) shows that a usury law is more likely to be beneficial when the net surplus of projects is low, since then the cost of

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[7] Expressed in terms of number of fixed-size loans.

having projects unfounded through rationing is low, and also if success probabilities are very sensitive to effort since then moral hazard effects are high.

<u>4. Heterogeneous entrepreneurs.</u>

The case for usury laws is strengthened when we relax the assumption that entrepreneurs are all endowed with the same project. Suppose entrepreneurs (i.e. projects) are heterogeneous but the bank is perfectly able to discriminate among them. The marginal project funded in a market-clearing equilibrium pays the highest interest rate of all but contributes zero private and social surplus. Introduction of a just binding usury law causes exit of the marginal entrepreneur, which of itself causes no aggregate loss but, due to the lower demand for funds, it implies lower interest rates for the infra-marginal entrepreneurs. Moral hazard is therefore reduced, and a net gain emerges even in a market clearing case with elastic supply of funds.

To illustrate, suppose each entrepreneur has access to a project with a two-point return distribution. In the event of success entrepreneur i generates revenue S_i and failure yields zero revenue for all types. To activate the project requires a fixed amount of capital, K. All entrepreneurs are endowed with wealth $W,$ which is insufficient to cover the whole cost of the project and therefore an amount L, must be borrowed to proceed. Entrepreneurs can be unambiguously ranked in terms of ability. In the event of success the return differs across projects, with $S_j > S_{j+1}$. As in Section 3, entrepreneurs can increase the probability of success, p, by exerting unobservable effort, e. The function relating the success probability to effort, $p(e)$, is the same across all projects. Risk-neutral banks engage in Bertrand competition and are fully informed of every loan applicant's type. As a result, banks offer tailored contracts (i.e. repayments, D_i) to each entrepreneur which generate expected revenue equal to the cost of funds, $pD_i = I(n)$, where $I(n)$ is the inverse supply of funds as a function of the number of projects to be funded.

The expected utility of entrepreneur i is

$$U_i = p(e_i)(S_i - D_i) - e_i \tag{12},$$

Substituting $D_i = I/p_i$ in the FOC (2), it follows that:

$$\frac{de_i *}{dS_i} = -\frac{p'}{p''(S_i - D_i) - D_i p'^2 / p} \qquad (13),$$

which is positive under the standard assumption that returns to effort are positive and decreasing. The intuition here is that as better entrepreneurs gain a larger return in the event of success, they have more incentive to apply effort and, in equilibrium, enjoy a higher success probability.

<u>Proposition 3.</u> *When projects' quality is heterogeneous but public knowledge, and there exists moral hazard, a just binding usury law always increases a utilitarian welfare function under market clearing.*

<u>Proof.</u> In market clearing equilibrium let the best n entrepreneurs be funded with associated contracts $D_i = \frac{I(n)}{p_i}$, for i=1,….n. By definition of a market clearing equilibrium, the participation constraint of the marginal entrepreneur, n, is just binding.

$p_n(S_n-D_n)-(1+r)W-e=0$

(14).

The banks' profit on a loan to n is

$\boldsymbol{p}_n = p_n D_n - I(n) = 0$ 　　　　　　　　　　(15).

Note that (14) and (15) together imply that the marginal project actually produces no surplus at all. Finally, recall that the interest factor on loans is inversely related to the project's quality. Hence D_n must be the largest repayment observed in the market. Suppose that a usury law is imposed forbidding repayments above D_m such that $D_{n-1} < D_m < D_n$. The regulation drives (only) the marginal entrepreneur out of the market. By (14) the expelled entrepreneur is no worse-off. Nor, considering (14) and (15) jointly, does aggregate social surplus decreases because of his exit. However, the interest rate on funds must decrease as fewer projects (n-1) are undertaken, the new repayment on deposits being $I(n-1) < I(n)$. As a consequence, the repayment on each loan (i=1,…,n-1) must decrease:

$$D_i = \frac{I(n-1)}{p_i} \qquad\qquad (16).$$

There is a redistribution of surplus from depositors to borrowers. More interestingly, the lower repayment dampens the moral-hazard effect on all infra-marginal projects, as $\frac{de*}{dD} < 0$. So, the exclusion of the marginal entrepreneur, which causes no direct loss of social surplus, means banks set lower repayments for all other entrepreneurs. This in turn increases each entrepreneur's incentive to supply effort, and the net expected surplus generated by each funded project also rises. Hence a net gain emerges from the imposition of the usury law. QED.

This result extends Proposition 2 to all instances in which the elasticity of supply of funds is strictly positive. The key point is that a just-binding usury law now has no rationing cost because the marginal project is zero private and social surplus.

Notice how the merits of a (finite) usury law compare to those of a (finite) interest rate subsidy. As long as funds are not in totally inelastic supply, the subsidy is to some extent passed on to existing borrowers, so eliminates some of the deadweight cost of moral hazard. Even ignoring the problem of raising the required revenue, the drawback of the subsidy is that it attracts entrepreneurs with negative expected value projects, whereas the usury law limits moral hazard at the cost of expelling good projects. It is thus optimal to combine the two policies.

5. Usury laws in costly-state-verification and diversionary models.

A similar case for usury laws emerges when bankruptcy there involves dissipative costs. Such is the case with costly-state-verification models. Also, transferring the assets of a defaulting firm may involve several varieties of deadweight cost. It is reasonable to assume that the owner of the firm generally better manages these assets than would the lending institution. Moreover, fire sales necessarily involve a discount on the 'true' value of the

assets themselves.[8] Whenever such costs exist and the lending institution is unable to observe the realization of the borrowers' project, inefficient liquidation occurs in equilibrium (Townsend, 1978, Diamond, 1984, and Gale and Hellwig, 1985). Under certain conditions, rationing may take place as well (Williamson, 1986). A usury law may decrease the amount of inefficient liquidation that occurs in both rationing and market clearing regimes. As in the cases in the previous sections, this effect has to be balanced with potential losses from decreased depositors' welfare and funds' availability. We will consider the rationing case first and show that Proposition 1 applies also in this environment.

Consider a population of N identical entrepreneurs each endowed with the same investment project yielding stochastic return R. The expected return is

$$S = \int_0^{\bar{p}} Rf(R)dR \tag{17},$$

where $f(.)$ is the pdf of the projects' return. If D is the borrower's stipulated repayment, and transfer of the assets to the bank involves a loss proportional in the assets' value of $c<1$, then the expected return to the bank may reach a maximum when there exists a D^* such that

$$\frac{dM}{dD} = \int_{D*}^{\bar{p}} f(R)dR - cD^*f(D^*) = 0 \tag{18}.$$

In this case rationing occurs at D^* if the supply of deposits at $I=M(D^*)$ is less than the number of entrepreneurs. In assessing the effect of a marginal change in the repayment, because of the envelope theorem argument used in Section 3, a marginal decrease in the lending rate has no effect on depositors' welfare or on the availability of funds. The only relevant consideration concerns the entrepreneurs' welfare. Given unchanged availability of funds, entrepreneurs' welfare must be decreasing in the repayment, D. Once again, a usury law improves on the market equilibrium at the margin. Figure 1 represents the situation and the welfare-maximizing repayment must be strictly lower than the free-market-equilibrium repayment for any well behaved social-welfare function.

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[8] This may be due to a 'lemons' problem or because the next best-user of the asset faces a similar adverse shock as the defaulting business (Shleifer and Vishny, 1992 and Kyotaki and Moore, 1997)

In the market clearing case we need to consider changes in the welfare of both borrowers and depositors.

<u>Proposition 4</u>: *When there exists a dissipative cost from defaulting and the equilibrium entails market clearing, a usury law always increases a utilitarian social welfare function if the supply of deposits is inelastic.*

Proof. We wish to analyse the case in which no rationing occurs and therefore all *N* entrepreneurs are served in the unregulated equilibrium with debt repayment *D**. When a usury law is implemented, entrepreneurs' welfare is affected through the effect on the expected return and also through the possibility of being rationed. Depositors' welfare change can be evaluated remembering that, at the margin, it equals the change in banks' revenues. Then

$$\frac{dW}{dD} = \frac{dnM}{dD} + \frac{dnW_e}{dD} = -cND*f\left(D*\right) +$$
$$+ \frac{dn}{dI}\frac{dM}{dD}\left(\int_0^{\bar{p}_i} Rf(R)dR - c\int_0^{D*} Rf(R)dR \right) \tag{19},$$

where $n \pounds N$ is the number of loans that is granted. A usury law is welfare improving when (19) is negative. Note that, as in Section 3, the second (positive) term on the RHS of (19) is zero whenever the slope of the supply of funds (*dn/dI*) is zero. QED.

From (19), the condition for a welfare gain is more likely to be satisfied if the banks' return is not very responsive to the repayment, if the bankruptcy cost is relatively high, and if the probability of default is high.

A dissipative cost may also emerge in connection with entrepreneurs' ability to 'divert' (part of) the return from the project (Barro, 1976, Black and de Meza, 1992, Hart, 1995). Depending on the realization of the return and on an exogenous cost of default (reputation loss, inability to borrow further, social stigma, etc.), entrepreneurs may find it advantageous to divert the return to their private uses and default even when repayment could be actually met. In the diversion process it appears reasonable to assume that some part of the surplus will be lost. Suppose this loss amounts to a proportion of the return, ***a***.

Increasing repayment will have an adverse incentive effect and therefore rationing may occur in this setting as well (see for example Black and de Meza, (1992)[9]). If entrepreneurs differ in their costs of defaulting, c, with pdf $f(c)$, for any repayment there exist a threshold, c^*, such that default occurs if[10]

$$c^* < D - R(1-a) \qquad\qquad (20).$$

If c is private information, then even when project return is non-stochastic, the banks' return may attain a maximum. This occurs at D* if

$$\frac{dM}{dD} = \int_{c*}^{\bar{c}} f(c)dc - D^* f(D^* - R(1-a)) = 0 \qquad\qquad (21).$$

Decreasing the repayment is again necessarily welfare improving as it involves less aggregate diversion of funds and associated deadweight cost. As in the costly-state-verification model, a just binding usury law implies no change in the banks' return, no loss in depositors' welfare, and no variation in the availability of funds. Borrowers do though gain from the lower interest rate. In the market clearing case, the banks' expected return and the availability of funds are affected by a change in the repayment. Therefore, a welfare improvement occurs only if the gains from less diversion on remaining projects compensates for the loss of positive value projects due to the rationing induced.

Note that in this model there are two possible sources of gain from a usury ceiling; the reduced costs of diversion and the saving of default costs. With some extension, this model provides a possible underpinning for Adam Smith's support of usury laws. Suppose that the 'projectors' mentioned are simply entrepreneurs with a relatively low aversion to default. Also, allow project returns to be stochastic so there may now be a cut off c above which entrepreneurs do not seek loans. Amongst those who do borrow, entrepreneurs with low c default in more states. A usury law now lowers the probability of default by any given entrepreneur and so saves deadweight costs. In addition there is a composition effect. Low c entrepreneurs are now induced to apply for loans when previously they did not do so. The average c of funded entrepreneurs must therefore rise. It is ambiguous whether this is socially desirable. High c means less default and associated costs, but if default does occur,

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[9] The formulation here is slightly different.
[10] We assume that R-D>0 so irrespective of their c, all entrepreneurs seek loans.

it is more costly. Assuming the former effect dominates, Smith was right in wanting to eliminate "projectors" and a usury law will be helpful.

6. Excess optimism.

Adam Smith (1776) noted that most people have an inflated view of their own abilities and life chances.

"The over-weening conceit which the greater part of men have of their own abilities is an ancient evil remarked by the philosophers and moralists of all ages. Their absurd presumption in their good fortune has been less taken notice of. It is, however, if possible still more universal."

Adam Smith, Wealth of Nations

Recent empirical investigation by psychologists, massively confirm Smith's insight into human nature (for a survey see De Bondt and Thaler, 1995). Of particular relevance here, Arabsheibani et al. (2000) find evidence not only that entrepreneurs are excessively optimistic, but also that, as a class, they are significantly more optimistic than employees. On the basis of such evidence, theorists have explained some important empirical regularities in the credit markets.[11]

Excess optimism provides a simple argument for usury law. When some entrepreneurs have biased expectations about their projects' profitability, they may be willing, other things equal, to pay very high interest rates. Assuming banks, as outsiders with considerable experience of dashed expectations, are more realistic in their evaluations than individual entrepreneurs, the highest borrowing rates in the market will be paid by optimists endowed with low quality projects. Under these conditions, a usury law forbidding the highest interest rates pushes out of the market entrepreneurs who are more likely to be

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[11] In particular Chan and Kanatas (1985) explain why the use of collateral may be preferred to high interest rate. de Meza and Southey (1996) use over-optimism to explain the high rate of default on start-ups, the use of debt and the correlation between project risk and collateral. Manove and Padilla (1999) argue for bankruptcy exemptions and general limitations on the rights of lenders to repossess collateral on the ground that these limitations encourage banks to actively screen sober entrepreneurs from over-optimistic ones.

over-optimistic and whose projects tend to be negative expected value when objectively assessed.

To illustrate formally the idea we will suppose that there exists equal numbers of each of two types of entrepreneurs; realists and over-optimists. Each entrepreneur owns an investment project. All projects have two possible outcomes, S in case of success and zero otherwise. Projects differ only in their success probability, p with support $(\underline{p}, \overline{p})$. While realists correctly estimate their chances of success, over-optimists upgrade the true chance by a factor λ (>1).[12] Note that these assumptions imply that the intrinsic project quality of the two classes of entrepreneurs is not systematically different[13]. Each project requires a fixed amount of capital, K. Entrepreneurs do not possess wealth and therefore are compelled to search for external finance. Implementing the project also involves entrepreneurs exerting to a fixed level of effort, e. As returns are non-verifiable *ex-post*, as before bank loans are the only viable finance instrument. If D is the repayment, the expected utility from undertaking the project is

$$U^r = p(S-D) - e \qquad (22),$$

$$U^o = \lambda p(S-D) - e \qquad (22'),$$

respectively for realists and optimist. For each type, participation ($U^r \gtrless 0$, $U^o \gtrless 0$) depends on the quality of the project and bank repayment. For optimists, however, it depends also on the extent to which they overestimate their chances of success, λ.

Banks are competitive and are perfectly able to discriminate entrepreneurs. As a consequence, each entrepreneur will be offered a 'fair' repayment sufficient to cover the cost of funds. We initially assume, that the market supply of funds is perfectly elastic with I being the repayment due to depositors on a loan sufficient to fund a project. Banks have no

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[12] With $\lambda \overline{p} < 1$.

[13] It could be argued that entrepreneurs' ability to assess the quality of their projects should be correlated with their overall entrepreneurial ability and hence with the quality of their projects itself. For example an entrepreneur able to formulate correct expectations should also be able to take better decisions during the execution of his project. This would reinforce our result. Another possibility is that entrepreneurs may overestimate the size of the success payoff. If effort were a continuous variable optimists would work harder in some formulations, a force tending to make them low interest rate borrowers.

operating costs so the repayment required of a project with success probability p_I, is

$$D_i = \frac{I}{p_i} \ .$$

Proposition 5. *When some entrepreneurs display excessive optimism, an appropriate usury law increases aggregate expected income even when the supply of funds is perfectly elastic.*

In order to assess the effects of a usury law we will look at marginal entrepreneurs. The participation constraints (PC) for realistic (i) and optimistic (j) entrepreneurs can be written;

$$p_i \geq \frac{e}{S - D_i} \qquad \qquad (23),$$

$$p_j \geq \frac{e}{\mathbf{I}(S - D_j)} \qquad \qquad (23'),$$

For the marginal entrepreneur in each group, the PC holds as an equality. Denote with p^i and p^j, their respective success probabilities and by D^i and D^j, the repayments they face. Then ,

$$\mathbf{I} = \frac{p^i(S - D^i)}{p^j(S - D^j)} = \frac{p^i(S) - I}{p^j(S) - I} > 1 \qquad (24)^{14}.$$

from which it follows that $p^i > p^j$, and therefore, $D^i < D^j$. This implies that the highest repayment in the market will be D^j. Suppose that a usury law forbidding any repayment larger or equal than D^j is now introduced. The optimistic entrepreneur with success probability p^j cannot now be funded. Note however that, substituting for D^j , it follows from the participation constraint (23') that the net social surplus from this project is negative when evaluated at the objective success probability. Hence, an interest rate cap, by preventing project j from being undertaken, increases surplus. QED.

The intuition is straightforward. The marginal optimistic entrepreneur executes his/her project even if its net surplus is negative because of biased expectations. Due to the

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[14] Using (23) and (23').

low quality of the project, the interest rate charged is the highest among participating entrepreneurs. Forbidding this interest rate precludes the funding of the project and increases welfare. The gain accrues entirely to the excluded entrepreneur. There is scope to debate whether it is appropriate to "overrule" the entrepreneur's own judgement even in the light of evidence of systematic errors. There are obvious arguments on both sides of this question.

 Accepting that *ex post* evaluation is appropriate, the exclusion of any optimist entrepreneur willing to accept a debt contract with a repayment larger than D^i, is beneficial so the optimal interest rate ceiling must be D^i.

The argument is strengthened if the supply of funds is not perfectly elastic. The cost of funds for each project is now a function of the number of projects funded so *I(n)*. Participation constraints are still defined by (23), (23') hence the marginal optimist is carries out a negative-expected-surplus project in the unregulated equilibrium and should be excluded. In addition, when the interest rate ceiling is imposed, the interest rate on deposits drops as a consequence of the exit of optimistic entrepreneurs so the repayments set to other must drop. Additional realists will enter the market and realize their projects. The partial substitution of optimistic entrepreneurs by realists involves a substitution of negative-surplus projects by positive-surplus ones.

These results also obtain in a more general setting allowing for a continuum of psychological attitudes (optimism-pessimists). Suppose, as above, that projects are differentiated only in their success probability, and that *p* is continuously distributed with support $\left(\underline{p}, \overline{p}\right)$ and let each entrepreneur's evaluation of his/her success probability be biased by a factor $\boldsymbol{1}_i$. where $\boldsymbol{1}$ is distributed with support $\left(\underline{\boldsymbol{1}}, \overline{\boldsymbol{1}}\right)$. Finally, *p* and $\boldsymbol{1}$ are independently distributed. The space of projects and psychological attitudes is represented by the box in Figure 2.
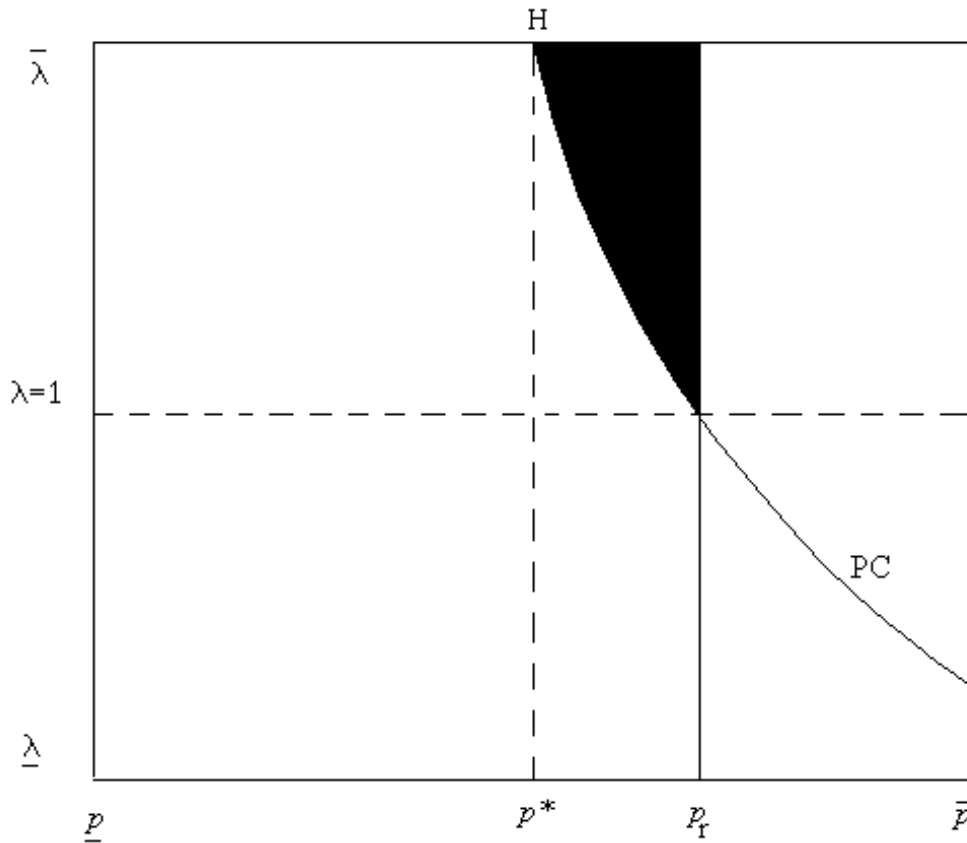
Figure 2.

No further special assumption is made about the distribution of psychological attitudes among entrepreneurs and the supply of deposit is assumed perfectly elastic at a repayment I. Given the assumption that banks possess full information, each entrepreneur is again offered an actuarially fair contract, the repayment being based on the break even condition: $p_iD_i=I$. Participation for entrepreneur i requires that:

$$\mathbf{1}_i \, p_i(S-D_i)-e \; \geq 0 \tag{25}.$$

From (25), the participation constraint (PC) locus shown in Figure 2 is

$$\mathbf{1} = \frac{e}{p(S-D)} = \frac{e}{pS-I} \tag{26}.$$

Consider now the entrepreneur on the top point on the PC locus, H. His probability of success, p^*, is the lowest in the pool of participating entrepreneurs. If we denote by D^*

($D^*: p^*D^*=I$), the repayment required from the bank, this repayment will be the largest any bank charges. His participation constraint holds as an equality, and hence

$$\overline{I}p^*(S-D^*)-e=0 \qquad\qquad (27).$$

Since $\overline{I}>1$, the expected project surplus must be negative. Therefore a usury law constraining the repayment strictly below D^* and preventing this project from being realized, must increase welfare. By the same argument, all projects in the shaded area in Figure 2, for which $p<p_r$, where p_r is the probability of success of the realist entrepreneur on the PC locus, are negative-present-value projects. Denote by D_r the repayment associated with a project with success probability p_r, then welfare is maximized when a usury law forbidding repayments above D_r is imposed.

Also in this case the argument can be favourably be extended to a setting in which the supply of funds is elastic to the interest factor. Suppose the supply of funds, expressed in terms of number of loans, is $n_s(I)$. The participation constraint and the PC locus can be written again like [25] and [26] above, but in this case they depend on the number of loans because of the cost of funds, $I(n)$. The unconstrained equilibrium entails market clearing. Suppose the number of entrepreneurs served is n^* and that PC in Figure 3 is the participation constraint locus when n^* entrepreneurs are served.

When a binding usury ceiling, D' is implemented, some entrepreneurs cannot be served. The forced exit of these entrepreneurs however decreases the volume of lending so the cost of deposits also falls. As a consequence, the repayment required of each entrepreneur in equilibrium, decreases. More entrepreneurs are now willing to borrow funds and the participation constraint locus shifts downwards to PC' in Figure 3. To assess qualitatively the effects of the usury ceiling we will compare the pre- and post-ceiling situation in the Figure. In the constrained equilibrium, entrepreneurs in the area HOM cannot obtain funds any more. These were the worst entrepreneurs served in the unconstrained equilibrium. Their participation was driven by over-optimistic expectations. As a consequence of their exit, some on average more realistic entrepreneurs, unwilling to participate in the unconstrained equilibrium because of the high cost of funds, are now served in the constrained equilibrium (those in zone MNN'M').
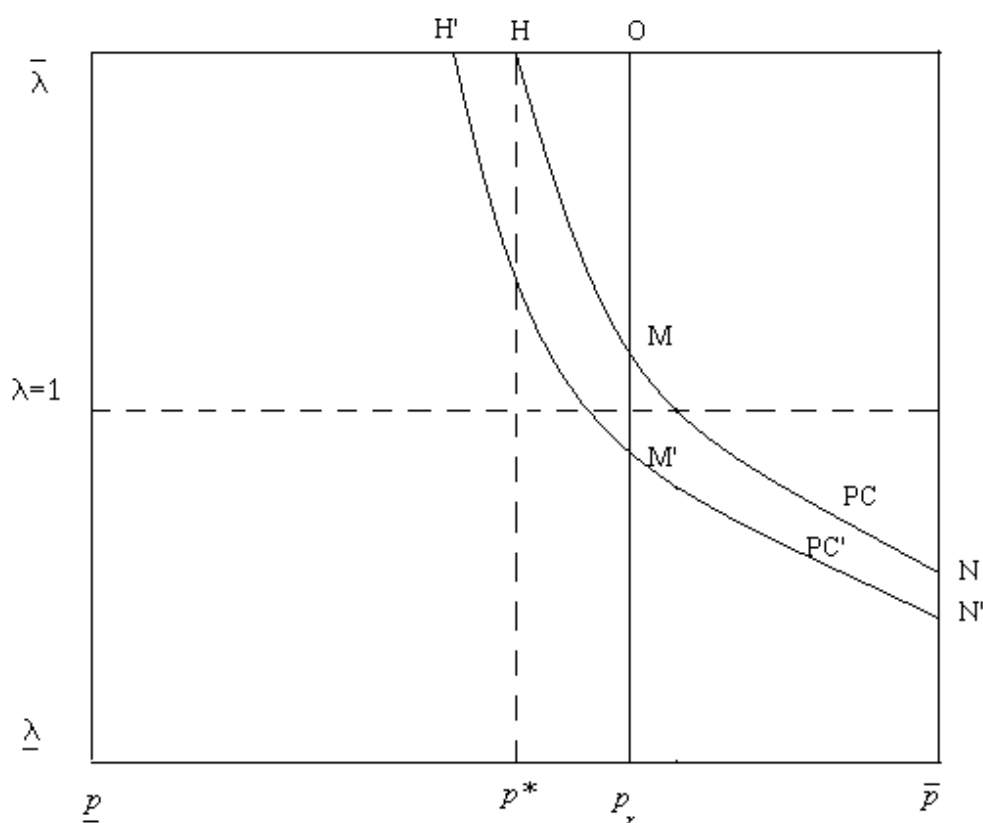
Figure 3

  The exit of entrepreneurs in the area HOM yields a direct welfare gain as their projects
deliver negative expected net-present value. The substitution of low-quality optimists by
high-quality pessimists is only partial. The number of entrepreneurs entering the market
following the implementation of the ceiling must necessarily be lower than the number of
excluded entrepreneurs. This follows because the fall in the cost of funds only occurs if the
overall volume of lending decreases.

        This then is a plausible key to Adam Smith's surprising support for usury laws.
Overoptimistic entrepreneurs, willing to pay high interest rates, cause the interest rate on
deposits to rise so high that 'sober' (i.e. realistic or even pessimistic) entrepreneurs do not
demand loans. A usury ceiling, by preventing loans to the optimists, decreases the overall
cost of funds and induces the substitution of better for worse projects.

7. Conclusion.

Usury laws may be welfare enhancing in a variety of circumstances. When moral hazard causes equilibrium credit rationing, an appropriate usury law must increase welfare, while in the market-clearing regime, an improvement definitely occurs if the supply of funds is inelastic. When entrepreneurial heterogeneity is introduced, an unambiguous improvement emerges whenever funds are not in perfectly elastically supply. Variants of the basic moral-hazard model in which usury laws may also be beneficial are when the bank can verify the entrepreneur's return only at a cost, and when entrepreneurs can divert part of the project return to their private uses. Nevertheless, usury laws are not always helpful when credit markets are subject to asymmetric information. Hidden types, whether in the Stiglitz and Weiss (1981) or the de Meza and Webb (1987) form, preclude gains from usury laws. In the first case entrepreneurs' return distributions differ by mean preserving spreads. An effective usury law would then increase or introduce rationing and the volume of lending would decrease. The average riskiness of loan applicants falls but as all projects have the same expected return, this is of no welfare significance. In the second case, entrpreneurs' returns can be ranked by first order stochastic dominance and the credit market always clears, As in the conventional demand and supply analysis, a usury law creates rationing and diminishes lending. Although under *laissez faire* equilibrium involves overlending, the usury law is not helpful because it is a random selection of borrowers that is excluded rather than those of negative present value. In fact, the consequences are worse still, for at the lower interest rate, the average quality of the pool of loan applicants deteriorates. The average surplus per loan and the number of loans falls. Both hidden types formulations therefore cause total welfare to decreases. Usury laws may therefore be appropriate for markets where screening is unnecessary or easily accomplished, but hidden action is difficult to control (for example, through collateral provision or procedures for recovering bad loans). This may possibly explain why usury laws are often directed to consumer loans.

Finally, we noted that entrepreneurs tend to be unrealistically optimistic and those willing to pay the highest interest rate will, on average, be the most biased of all. Hence, a

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lower interest rate may improve the intrinsic quality of the pool of loan applicants. As long as the supply of funds is not perfectly elastic, a usury law may therefore be beneficial in redirecting funds from the negative present value projects of unrealistic optimists to the positive present value projects of more realistic entrepreneurs. This appears to be the basis of Smith's advocacy of a usury law. This shrewd observer of human nature would have known of the irrational exuberance stirred up in the South Sea Bubble episode in England and the similar frenzy in France surrounding his compatriot, John Law's, Mississipi Company. Smith's case cannot be dismissed out of hand. Not even today.

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