Information and the Law : Evaluating Legal Restrictions on Competitive Contracts

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In markets with many buyers and sellers, some of whom are imperfectly informed, legal restrictions on the terms of contracts may improve allocative efficiency. We examine three quite different forms of government intervention and show that in each case interference with what may appear to be "competitive" market outcomes can be justified on an efficiency (rather than equity) criterion. The contractual restrictions we discuss are:

a) forbidding banks from denying loans to an entire class of borrowers;

b) forbidding stores from charging prices which are high relative to the average price in the market;

c) forbidding contract provisions which impose some of the cost of product failure on consumers.

1. EXCLUSION OF BORROWERS

We should not be surprised to find banks charging different borrowers different interest rates. What is surprising is that banks, at times when the usury laws do not seem to be binding, may refuse to lend to an entire class of borrowers at any interest rate. The fact that banks are not using the price system (interest rates) to allocate credit, *i.e.*, giving loans to those borrowers willing to pay the highest interest rate, suggests that the credit market is not operating in the way we would expect from the usual analysis of competitive markets with perfect information. Before showing why forbidding banks from excluding borrowers can improve welfare, we need to understand why they will practice this form of exclusion.

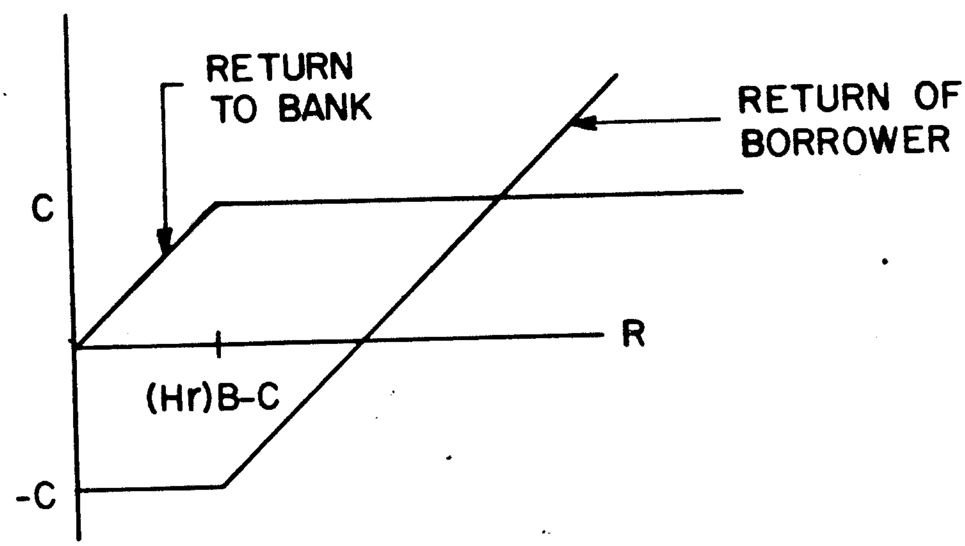
If usury laws are not binding, a profit maximizing bank which excludes a group of borrowers from credit must have determined that there were no interest rates or collateral requirements at which loans to those borrowers would be profitable. That is, as interest rates go to infinity it cannot be the case that the return to the bank also goes to infinity, even if the bank could also change collateral requirements with the increase in interest rates. (For a rigorous analysis of market equilibria with credit rationing see Joseph Stiglitz and Andrew Weiss [*a*, *b*].)

There are two reasons why bank profits may not rise with increases in interest rate. First, borrowers will tend to favor projects with a higher probability of default when the interest rate is increased. This is because the interest rate is not paid in very bad states — when the borrower defaults; thus the increase in the interest rate has a greater impact on projects with a low probability of default. If a borrower were initially indifferent between two projects at interest rate r^* then at interest rate $r^* + \epsilon$ he would undertake the project with the higher probability of default. This incentive effect of interest rates would discourage banks from raising the interest rate when faced with an excess demand for loanable funds.

Second, borrowers who are deterred from borrowing by the high cost of capital may be precisely the borrowers to whom the bank could most profitably lend money. Let us assume that the bank has prescreened borrowers, so that within each class of borrowers the expected total return on a loan is constant, and further assume that each borrower has only one available project. These projects can be ranked so that a "riskier" project is a mean preserving spread of a "safer" one. In Figure 1 we show the return to the bank and to the borrower as a function of the realized total return on the project R, the amount borrowed **B**, the interest rate **r**, and the collateral demanded **C**. From Jensen's inequality and the convexity of the borrower's return function we can see that borrowers make higher profits on riskier projects; on the other hand a risk neutral bank prefers to finance safer projects. Therefore, if borrowers are risk neutral, the marginal borrowers, the ones deterred from borrowing by a higher interest rate, are those who would have invested in safe projects, which are the most profitable loans for the bank.

Figure 1

The intuition behind this result is that a riskier project has higher returns in good states and lower returns in poor ones. The higher returns in the good states benefit the borrower who gets to keep all the returns on the project above the cost of the loan, but do not benefit the bank which simply repaid the loan with interest regardless of the extent by which the actual return exceeds this commitment. The lower return in poor states do not hurt the borrower, who defaults on loans in those states, but do hurt the bank which gets all the assets of the


RETURN
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-C

borrower in the case of a default. The lower return implies less assets available to the bank. Therefore, the expected profit of a borrower is an increasing function of the riskiness of his project while the expected profit of the bank decrease with the riskiness of the project. Higher interest rates therefore discourage the safe borrowers whom the bank preferred.

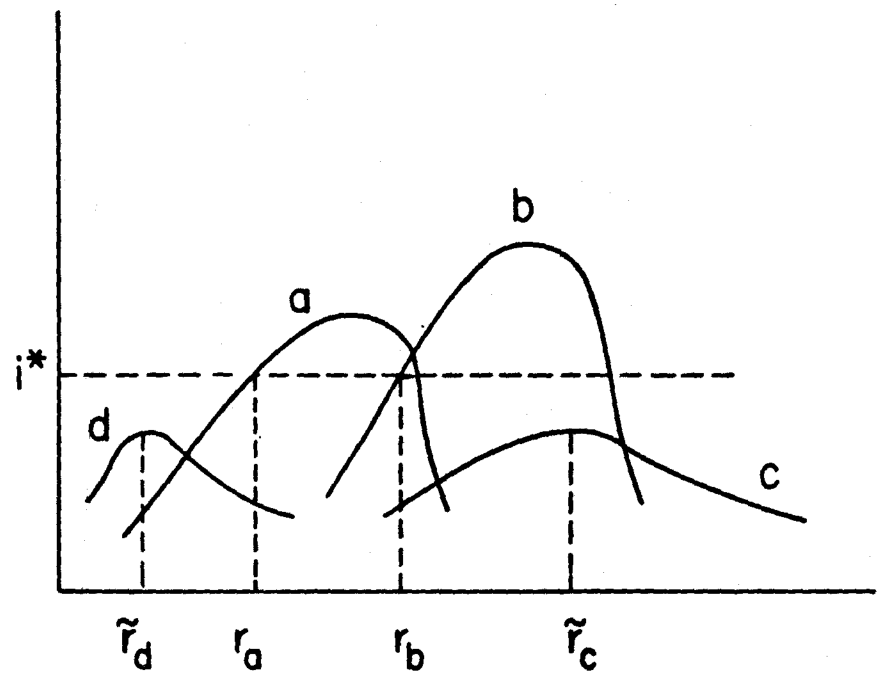
This sorting effect, in general, reinforces the incentive effect of interest rates in discouraging banks from raising their interest rate in response to an excess demand for credit.

Stiglitz and Weiss (a) also show that collateral requirements may have similar adverse selection effects so that increasing collateral requirements in response to an excess demand for credit may also decrease the banks profits. The most striking of the sorting effects of collateral requirements is that if borrowers have decreasing absolute risk aversion (an assumption with overwhelming empirical support) then raising collateral requirements discourages those borrowers who would have intested in the safest projects. Higher collateral requirements also results in smaller scale projects which may (if there are increasing returns to scale in investment) lower bank profits; and the ability to meet the collateral requirements of banks may be due to the high returns on previous risky investments so that those borrowers able to satisfy high collateral requirements are precisely those borrowers with the highest preference for risky investments.

In Figure 2 we draw the return to a bank from lending to different groups at different interest rates (holding collateral requirements fixed). We are assuming that the combined incentive and sorting effects of interest rates will cause the return to a bank to decline with increases in the interest rate it charges borrowers when that interest rate is sufficiently high.

Figure 2

Figure 2 shows a situation in which at a cost of funds to the bank of $\mathbf{i}^*$, type **a** borrowers receive loans at interest rate $\mathbf{r_a}$ and type **b** borrowers get credit at interest rate $\mathbf{r_b}$. Type **c** and **d** borrowers are totally excluded from the credit market because the maximum return a bank could get from lending to either *c* or *d* is less than $\mathbf{i}^*$, the competitive return to depositors.


b
a
i*
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c
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r_a
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The maximum return to a bank for a class of borrowers is a function of the expected value of the projects they undertake, the riskiness of the set of feasible projects available to the borrower, the heterogeneity of the borrowers, and the degree to which a bank can monitor the actions of borrowers. (The importance of the last two effects can be seen by noting that if borrowers were homogeneous and banks could monitor investments the return for the bank would not be affected by the adverse sorting and incentive effects noted above.)

Therefore a group of borrowers may be denied loans despite their intention to invest in projects with unambiguously higher expected total returns than the investments of groups which are receiving loans. However, because the former group is less well known to the bank so that its actions can't be as accurately monitored and cannot be as readily sorted into different risk types, or because the high total return projects of the excluded borrowers represent riskier projects and so have lower returns to the bank, they are excluded from the credit market. In this case forcing banks to lend to all borrowers at some interest rate would increase the expected total return per dollar loaned. Types c and d borrowers would get credit at interest rates $\tilde{r}_c$ and $\tilde{r}_d$, respectively, while the interest rates for a and b borrowers would rise. By also imposing taxes on the profits of borrowers, and transfers to depositors, the government could ensure that the supply of loanable funds was unchanged by its intervention, and hence that the aggregate return on investments was increased because of the "better" allocation of credit.

2. FORBIDDING UNCONSCIONABLY HIGH PRICES

The very existence of a price distribution of a homogeneous product suggests again that the market is not acting in the way we would expect if all traders were perfectly informed. It seems reasonable to assume that consumers who purchase at an unconscionably high price and later sue to get the sale negated, were uninformed when they made the purchase.

In order to analyze the impact of government restrictions on relative prices, one needs to formulate a model in which there is substantial dispersion in the prices of a homogeneous product. Here we borrow from models developed independently by Hal Varian and Robert Rosenthal. Using the Varian notation, there are **M** uninformed and **I** informed consumers each of which buys one and only one unit of the commodity at prices less than or equal to below **r** and no units at prices above r. M, I, and r are determined exogenously. The *informed* consumers know all the prices charged in the economy and buy at the lowest price store. The *uninformed* consumers buy at the first store they enter, charging a price $\mathbf{p} \leq r$. Free entry determines the number of (identical) stores **n** and ensures that each store makes zero profits. Varian also assumes that a store must charge the same price to all its customers and that for each store average costs are decreasing. There is a unique mixed strategy symmetric equilibrium in which the distribution of prices charged by each store, $F(p)$ is defined by

$$F(p) = \begin{bmatrix} 1 & p \geq r \\ 1 - \left[\dfrac{\pi_f(p)}{\pi_f(p)-\pi_s(p)}\right]^{\frac{1}{n-1}} & p^* < p < r \\ 0 & p \leq p^* \end{bmatrix} \tag{1}$$

where $\mathbf{p}^*$ is the average cost of a store selling to $I + M/n$ customers, $\boldsymbol{\pi}_f(\mathbf{p})$ is the profit of a firm charging price p when it fails to be the lowest priced store, and $\boldsymbol{\pi}_s(\mathbf{p})$ is the firm's profit when it is the lowest priced store. In equilibrium $\pi_f(p) < 0$ for all $p < r$.

Let us assume that each store has a fixed cost **k** and constant marginal cost **c**. Then

$$\pi_s(p) = (p-c)[I + \frac{M}{n}] - k \tag{2}$$

and

$$\pi_f(p) = (p-c)\,\frac{M}{n} - k\ . \tag{3}$$

From the equilibrium condition that $\pi_f(r) = 0$, $n = \dfrac{(r-c)M}{k}$. Substituting into eq. (1), and letting $p - c = \tilde{p}$ and $r - c = \tilde{r}$ the distribution of lowest prices is

$$1 - [1-F(p)]^n = 1 - \left[\frac{k}{I}\left(\frac{1}{\tilde{p}} - \frac{1}{\tilde{r}}\right)\right]^{\frac{\tilde{r}M}{\tilde{r}M-k}} \tag{4}$$

Eliminating high prices has the same impact in this model as lowering r, whether or not the high price is defined in absolute terms or relative to the lowest price offered, p^*. Therefore, we can find the effect on the equilibrium price distribution of court decisions penalizing high prices by differentiating $[1-F(p)]^n$ with respect to r.

Let $[1-F(p)]^n = A$, and $\frac{k}{I}\left[\frac{1}{\tilde{p}} - \frac{1}{\tilde{r}}\right] = B$ then

$$\frac{dA}{d\tilde{r}} = A\left[\frac{-Mk}{[\tilde{r}M-k]^2}\ln B + \frac{kM}{I\tilde{r}(\tilde{r}M-k)B}\right] \tag{5}$$

Since $B > 0$ the second term in the brackets is positive. The first term is non-negative for all values of p for which $B \leq 1$. However, B takes on its largest value where $\tilde{p}$ is at its smallest value, which is at $\pi_s(p) = 0$. Substituting for $\frac{M}{n} = \frac{k}{\tilde{r}}$ in eq. (2), and $p^* - c$ for $\tilde{p}$ in the definition of B, we see that $B \leq 1$, therefore $\frac{d(1-F(p))^n}{dr} > 0$ and $\frac{d[1-(1-F(p))^n]}{dr} < 0$. Thus, decreasing the maximum allowed price (lowering r) will cause a lower distribution (by first order stochastic dominance) of the lowest price. From eqs. (1), (2) and (3) it is straightforward to show that $\frac{dF(p)}{dr} < 0$. Consequently both informed and uninformed consumers benefit from an unconscionability rule. Since we've assumed free entry (zero profits) the profits of firms are unchanged; therefore, this is a Pareto improving change.

This result uses the assumption that there are consumers with zero search costs. Avishay Braverman has shown that the nature of equilibrium in models similar to Varian's can be sensitive to the distribution of search costs.

Suppose that all individuals have positive costs of becoming informed and that an uninformed individual knows neither the distribution of prices nor the price charged by any store. Therefore, the decision to become informed is a function of the individual's expectations about the distribution of prices and the individual's own cost of information. In game theoretic terms the strategy of an individual is a decision to become informed and buy at the lowest price store or stay uninformed and buy at some randomly chosen store. The strategy of a firm is the choice of a price or price distribution to offer. Let us assume that individuals believe that the unconscionability rule will cause each firm to offer the same price, then no consumer will become informed, and each store will charge the monopoly price, r. This is a Nash equilibrium; no consumer or firm would be better off by changing its strategy. It is also apparent that the expectations of consumers were rational: after the unconscionability rule was imposed the distribution of prices did collapse to a single price.

Even if all consumers eventually learn the prices charged by all firms (albeit after having made their purchase) and could invoke the unconscionability rule to revoke their sale and switch to the lowest price store, the equilibrium described above may still be stable. Remember that the unconscionability rule nullifies contracts only if the price is unreasonably higher than the *average* price. If there are many stores, then one deviant store charging a low price will have a very small effect on the average price.

Therefore, the welfare implications of an unconscionability rule are quite sensitive to its effect on expectations, and to the precise information structure of the market.

3. FORCING FIRMS TO ASSUME THE FULL COST OF PRODUCT FAILURE

It is commonly agreed that when markets are perfectly competitive, in particular: consumers are fully informed about the risk of a product, producers costlessly distinguish between the various types of buyers of their product, and contract terms do not affect the behavior of buyers, then the choice between consumer liability and strict producer liability is immaterial from an efficiency standpoint. This result does not obtain, however, when consumers differ according to unobservable innate carefulness (see Ordover for a full exposition of this model).

Let us assume that there are only two types of consumers in the population, careful and careless ones, that the product-*cum*-warranty market is perfectly competitive, and that the probability of product failure depends only on the (known) quality of the product and on the unobservable characteristics of the consumer. By a simple extension of the work of Michael Rothschild and Joseph Stiglitz, one can show that in the absence of government restrictions on contract terms, if an equilibrium exists, it will be characterized by careful consumers signaling their characteristic by assuming some of the risk of product failure. The careless consumers prefer not to assume such residual risk and obtain full insurance (*caveat venditor* contracts) but at a higher per unit price. Thus, if an unconstrained equilibrium in the product-*cum*-warranty market exists, it entails a separation of consumers into different risk classes. The intuition is that because the indifference curves in price-warranty space of the careful and careless consumers have different slopes, any putative single contract equilibrium will be broken by contracts which attract only careful customers. These separating contracts will contain *exculpatory clauses* which modify, explicitly or implicitly, either the scope of the warranty or limit the remedies for breach of existing warranties. Hence, if there is an equilibrium with unrestricted contracts, it will not entail the "pooling" of the consumers but rather the use of exculpatory clauses to separate consumers.

However, the imposition of a *caveat venditor* rule, with a prohibition on exculpatory clauses, precludes separation through incomplete warranties. Therefore, one consequence of a regulation imposing full producer liability is to force both careful and careless consumers to purchase the same contract; that is, they pay the same price for the product and both obtain full protection against product failure. This pooling contract makes careless consumers better-off and careful consumers worse-off as compared to their expected utilities in the separating "market" equilibrium. However, because the pooling contract has the risk-neutral firm bearing all the risk while in the unconstrained market equilibrium risk-averse consumers (albeit careful ones) bear some risk, one could argue that strict producer liability may lead to a "better" allocation of risk in the economy.

Thus far we have assumed that an equilibrium exists. An equilibrium will fail to exist if every separating set of contracts is Pareto dominated by a zero profit pooling contract. In that case a pooling contract "breaks" the separating contract by attracting both careful and careless consumers. (A pooling contract is most likely to dominate a separating one if the proportion of careless consumers is small so that the "penalty" to a careful consumer from being grouped with the population as a whole is small relative to the cost, in terms of risk bearing, of the separating contract.) Although a Nash equilibrium does not exist, the sorting contracts are locally stable. That is, there exist sorting contracts which cannot be broken by other contracts in their neighborhood in price-warranty space. One might argue that this local stability is sufficient for these sorting contracts to arise in competitive markets where firms do not know the entire distribution of consumer types. In that case there are two possible market outcomes: a pooling contract and a set of sorting contracts. The former Pareto dominates the latter. A *caveat venditor* rule, with a prohibition on exculpatory clauses, by eliminating the possibility of separating contracts would (under these circumstances) be a Pareto improving change.

CONCLUSION

The usual debate over government restrictions on the prices or other terms of market transactions has revolved around equity versus efficiency arguments. We have confined our discussion to efficiency questions and shown that in markets with many sellers of a homogeneous product, but asymmetric information, government intervention may in some instances improve efficiency. Our analysis indicates that even in markets composed of a large number of agents, absolute freedom of contract does not inevitably conduce to an efficient allocation of resources. On the other hand, the presence of informational asymmetries does not provide a blanket justification for government restrictions on the terms of contracts.

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