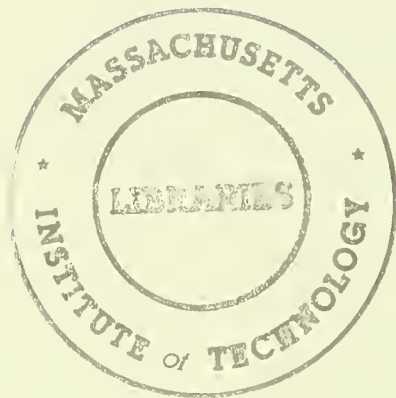



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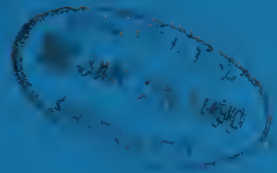


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Voluntary Disclosure:

Robustness of the Unraveling Result,  
and Comments on Its Importance

Joseph Farrell

Number 374

May 1985

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Voluntary Disclosure:  
Robustness of the Unraveling Result,  
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by

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November 1984

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## 1. INTRODUCTION

Used car dealers have always had a poor reputation for revealing faults in their cars. In 1976, the Federal Trade Commission (FTC) proposed a strong rule requiring inspection by dealers of each of 52 systems or components, and revelation of the results, together with estimated repair cost, and other disclosures.

The National Automobile Dealers Association (NADA) claimed that such a rule was unreasonable, citing estimates of inspection cost of about \$200, about ten times what the FTC believed. NADA's protests were effective, and in May 1980 the FTC tentatively proposed a different rule, under which inspection would not be required, but defects known to the dealer must be disclosed to buyers. Having apparently defeated the compulsory-inspection rule, NADA and the National Independent Automobile Dealers Association (NIADA) turned on the new rule, claiming that difficulties in knowing what a dealer had known would make this rule tantamount to the previous proposal. However, in August 1981 the FTC adopted the second rule.

The rule did not immediately take effect, because in 1980 Congress had decreed that FTC rules should be subject to veto by both houses of Congress (acting together) within an uninterrupted 90 day period. (This was called the FTC Improvement Act.) Because the Act required an uninterrupted 90 days, a Congressional recess extended the review period until May 1982, when both houses of Congress voted to veto the "known-defects" disclosure rule. (Incidentally, the rule was the first to come before Congress under the 1980 Act.) Thus the rule seemed dead, especially after a move to attach a revised version of its provisions to a FTC funding bill was defeated in committee three months later.

However, the courts had been active meanwhile in the area of legislative vetoes. In January 1982 the U. S. Circuit Court of Appeals in Washington had ruled a "one-house veto" (either house of Congress could veto agency actions) unconstitutional, in a case involving the Federal Energy Regulatory Commission

(FERC). In October, the same court extended that finding to two-house vetoes, and in particular the veto provision of the 1980 FTC Improvement Act, in a case brought by Consumers Union and Public Citizen against Congress. In July of 1983, the Supreme Court upheld these rulings, on the grounds that vetoes violate the constitutional provision that everything must be presented to the President before becoming law: a somewhat illogical argument, since the agencies' rulings themselves are not normally presented to the President.

Thus the known-defect rule appeared to have been reinstated. However, the FTC then decided to take another look at the rule, and in July 1984 the five-member Commission voted 3-2 to abolish it, citing difficulty of enforcement. So ended the tortuous history of one of the FTC's most controversial rules.

In this paper, we ask: How much difference does this make to economic efficiency? A tentative conclusion - surprising to me - is that it makes rather little difference. The reader can judge whether or not this view is noticeably supported by the analysis below, which is the result of thinking about disclosure in general rather than the result of trying to analyze this case in particular.

The principal existing model of voluntary disclosure is due (independently) to Grossman (1981) and Milgrom (1981). It is summarized below in Section 2. The "unraveling result" claims that voluntary disclosure will lead to the same results as compulsory disclosure, and therefore it makes no real difference whether disclosure is required or not.

Plainly, something is missing in that model, for the passion brought to bear in the 1980-1982 lobbying battle testifies that, whatever the results may be, it does matter. A natural candidate for modification is the assumption made by Grossman and Milgrom that it is common knowledge that sellers are fully informed about their products. In section 3, I use a simplification of a model in Farrell and Sobel (1983) to examine the effects of having not all sellers informed. Although we reproduce the continuity result of Farrell and

Sobel, we also see in this version that continuity may be misleading, in a sense I discuss.

In Section 4, I use the Farrell-Sobel model to examine whether disclosure requirements will actually increase the amount of information acquired and disclosed. The result is ambiguous.

In Section 5, I try to evaluate the allocative gains from information. Although the models just discussed lack welfare benefits from information, there clearly are such benefits. However, by considering reasonable numerical examples, I show that the benefits of simple allocative efficiency may be surprisingly small.

## 2. THE BASIC MODEL: A BASIS FOR DEPARTURE.

For completeness, and to introduce notation, I will now describe the model discussed by Grossman and Milgrom.

Each of a large number of sellers has available for sale one item, which he does not value himself. Its value to each of many buyers,  $q$ , is initially known to the seller but not to buyers. The seller may make any true statement concerning  $q$ , and buyers will believe it: lies are assumed to be impossible, or adequately deterred. Buyers are concerned with expected value, and compete to buy, so that the price of an item certified to be of quality  $q$  will be  $q$ , while the price of an incompletely certified item will be the expectation of  $q$ . In forming expectations, buyers know the prior (overall) distribution of  $q$ , which is represented by a continuously differentiable distribution function  $F(\cdot)$  on  $[0, 1]$ : buyers also take into account any equilibrium effects (see below).

For a full and careful treatment of the model, see Milgrom (1981). Here, I simply give the unraveling result and a heuristic justification.

Suppose that a seller refuses to disclose  $q$ . What should buyers infer about  $q$ ? Clearly, they should not infer that  $q$  is at the top of the range - (for if they did so, then lower  $q$ 's would follow that concealment strategy). But then buyers' beliefs have to be such that if  $q$  were in fact at the top of the range, then the seller would rather reveal  $q$ . Next, we apply the same argument to the range remaining after the top  $q$ 's drop out . . . and so on.

A little more formally, suppose the price for a wholly unlabeled item were  $p$ . Then, if  $q > p$ , a seller would rather label, so that all unlabeled items are of quality  $q \leq p$ . Since  $p$  must equal the average quality of unlabeled items, this implies that none have quality strictly less than  $p$ : but the only way this can happen in equilibrium is for  $p$  to be zero. Thus we have:

## 2.1 PROPOSITION 2.1 (GROSSMAN, MILGROM).

With the assumptions discussed above, buyers are as pessimistic as possible - that is, if  $q$  is not revealed, or is only partly revealed, buyers infer that  $q$  has the lowest value compatible with whatever has been revealed. As a result, in equilibrium buyers know the value of  $q$  for each item, and the allocation is as if revelation were compulsory.

In Sections 3 and 4, we will briefly discuss the impact on Proposition 2.1 of allowing for incompletely informed sellers. Another natural path to follow, which we will not do here, is to relax the very strong assumption that lies are in effect impossible.

### 3. ALLOWING FOR UNINFORMED SELLERS: A CONTINUITY RESULT AND A CONTRARY RESULT

In this section, we briefly describe the model of Farrell and Sobel (1983) which allows for costs of sellers becoming informed; then we simplify it by making the fraction  $G$  of informed sellers exogenous. This enables us to show that the equilibrium price  $p(G)$  of unlabeled items is continuous at  $G = 1$ : a result (due to Farrell and Sobel) which seems to suggest that the Grossman/Milgrom assumption ( $G = 1$ ) is reasonable as an approximation. However, we then show that the derivative  $p'(G)$  is (negatively) infinite at  $G = 1$ , and I argue that this suggests a certain non-robustness.

Initially, sellers do not know  $q$ : they, like buyers, have prior beliefs  $F(\bullet)$ . However, a seller can, by paying a cost  $c$ , learn the quality of his item, without this being observed by buyers. This information cost  $c$  is distributed according to the distribution function  $G(\bullet)$ ;  $c$  is distributed independently of  $q$ , and a particular seller's  $c$  is not observable to buyers.

Equilibrium will now be characterized by two related variables: a price  $p$  for unlabeled items, and a cutoff value  $c^*$ , such that a  $c^*$ -seller is indifferent between buying and not buying information. We consider only "unlabeled" and fully labeled items, because partial revelation of  $q$  would reveal that the seller was informed, and thus Grossman - Milgrom would apply to him. Informed sellers who conceal  $q$  are riding on the coattails of uninformed (therefore, on average, of average quality) sellers.

We have two equations for  $p$  and  $c^*$ . First, the seller's ex-ante decision problem yields as an equilibrium condition:

$$p = -c^* + \int_0^1 \max(p, q) dF(q) \quad (3.1)$$

Second,  $p$  must be the average quality of unlabeled items. This average includes the genuinely uninformed, and the informed who found  $q \leq p$ :



$$p = \frac{[1 - G(c^*)] \int_0^1 q dF(q) + G(c^*) \int_0^p q dF(q)}{[1 - G(c^*)] + G(c^*) F(p)} \quad (3.2)$$

Existence and properties of solutions to (3.1, 3.2) are discussed in Farrell and Sobel. For the purposes of this section, we simplify by assuming that  $G(\cdot)$  has a very special form:

$$\begin{aligned} G(c) &= G \text{ if } 0 \leq c \leq 1 \\ &= 1 \text{ if } c = 1 \end{aligned} \quad (3.3)$$

Thus a fraction  $G$  of sellers have zero information costs (and so will always be informed), while  $(1 - G)$  have large enough information costs that they will never be informed. Then we have a single equation determining  $p$ :

$$p[1 - G + G F(p)] = [1 - G] \bar{q} + G \int_0^p q dF(q) \quad (3.4)$$

where  $\bar{q}$  is the mean value,  $\int_0^1 q dF(q)$ .

Integrating by parts in (3.4) gives us:

$$H(p, G) \equiv p(1 - G) + G \int_0^p F(q) dq - (1 - G) \bar{q} = 0 \quad (3.5)$$

The function  $H$  is differentiable in  $p$  and  $G$ , and has positive partials in both variables. This implies that  $p$  is uniquely defined given  $G$ , and that  $p$  is continuous and monotone decreasing in  $G$ . However, we have

$$\frac{\partial H}{\partial G} = (\bar{q} - p) + \int_0^p F(q) dq \quad (3.6)$$

which becomes  $\bar{q} > 0$  at  $G = 1$ ,  $p = 0$ , while

$$\frac{\partial H}{\partial p} = (1 - G) + G F(p) \quad (3.7)$$

which becomes zero at  $G = 1$ ,  $p = 0$ .

Thus,  $dp/dG = -\infty$  at  $G = 1$ . Summarizing, we have

### 3.1 PROPOSITION:

Defining  $p(G)$  by (3.4), the function  $p(\bullet)$  is uniquely defined, continuous and monotone decreasing. However, at  $G = 1$ ,  $p'(G) = -\infty$ .

The significance of the infinite derivative is the following. The continuity result shows a form of robustness of the unraveling result, in the sense that if  $G$  is very close to 1 then  $p$  will be almost zero. This is a one-term Taylor expression of  $p(G)$  around  $G = 1$ :

$$p(G) \approx p(1) \text{ if } G \approx 1 \quad (3.8)$$

For values of  $G$ , close but not very close, to 1, however, we ought to take another term in the Taylor series. This then gives us

$$P(G) \approx p(1) - \infty (G - 1) \text{ if } G \approx 1. \quad (3.9)$$

Plainly, (3.9) gives a different sense from (3.8) concerning whether we should rely on the model with  $G = 1$  to deal with cases in which  $G$  is "near" 1. (Of course, (3.9) does not claim that  $p(G) = -\infty$  for  $G < 1$ , any more than (3.8) claims that  $p(G) = 0$  for  $G < 1$ .)

To close this section, we solve a simple example explicitly. Let  $F(\bullet)$  be the uniform distribution on  $[0, 1]$  so that  $F(x) \equiv x$ . Then (3.4) becomes:

$$p[1 - G + G p] = [1 - G] \frac{1}{2} + G \frac{1}{2} p^2 \quad (3.10)$$

Multiplying by  $2G$  and rearranging gives:

$$G^2 p^2 + 2G(1-G)p - G(1-G) = 0$$

whose solution  $p > 0$  is

$$p = G^{-1} [\sqrt{(1-G)} - (1-G)] \quad (3.11)$$

Thus, for instance, if  $G = 0.91$ , then

$$p = \frac{0.3 - 0.09}{0.91} = \frac{0.21}{0.91} = 0.23$$

so that a 9% change in  $G$ , from 1 to 0.91, produces a change from  $p = 0$  to  $p = 0.23$ . The lesson is that continuity results must be viewed with care. When we ask about robustness, we may be concerned with more than continuity.

## 4. DO DISCLOSURE REQUIREMENTS INCREASE DISCLOSURE?

In this section, we apply the Farrell-Sobel (1983) model to ask whether more information emerges if the informed are more likely to be obliged to reveal their information. Given the amount of information acquired by sellers, this would be true; however, the prospect of compulsory revelation reduces the incentive to become informed, given the value of  $p$ . We will show that the net results on information flow are ambiguous.

In the Farrell-Sobel model, as described at the beginning of Section 3, suppose that there is a probability  $z \geq 0$  that a seller who becomes informed will be obliged to reveal his information. (We can think of  $z$  as measuring the degree of enforcement of disclosure rules, perhaps, although that interpretation might suggest that there would be more disclosure near  $p$ , and less near zero, than we will suppose.)

Then equations (3.1) and (3.2) are modified as follows: (3.1) becomes

$$p = -c^* + zq + (1 - z) \int_0^1 \max(p, q) dF(q) \quad (4.1)$$

and (3.2) becomes

$$p = \frac{[1 - G(c^*) + z G(c^*)] \bar{q} + (1 - z) G(c^*) \int_0^p q dF(q)}{1 - G(c^*) + z G(c^*) + (1 - z) G(c^*) F(p)} \quad (4.2)$$

It is easy to see that (4.1) represents a downward-sloping curve in  $(c^*, p)$  space, which shifts down and left with an increase in  $z$ .

(4.2) also represents a downward sloping curve, but this curve moves up when  $z$  increases. (A larger  $z$  makes buyers less cynical about unlabeled items, given  $c^*$ .) Thus we have two cases:

- i) if (4.1) is steeper than (4.2), then  $dp/dz > 0$  and  $dc^*/dz < 0$ . Both these effects tend to reduce the information transmitted:  $c^*$  falls, so less information is obtained by sellers; and  $p$  rises, so concealment is more attractive. These effects work against the direct revelation-producing effect of the increase in  $z$ , so overall the result is ambiguous.
- ii) if (4.2) is steeper than (4.1), then  $dp/dz < 0$  and  $dc^*/dz > 0$ . Then both indirect effects, as well as the direct effect of  $z$ , lead to more information being revealed.

Can we say whether case (i) or (ii) is to be expected? In an attempt to answer that question, we examine (4.1) and (4.2) when  $F(\cdot)$  and  $G(\cdot)$  are uniform on  $[0, 1]$ . Then (4.1) reduces to

$$(1 - z) p^2 - 2p + 1 - c^* = 0 \quad (4.3)$$

and (4.2) becomes

$$(1 - z) c^* p^2 + (1 - c^* + zc^*)(2p - 1) = 0 \quad (4.4)$$

The (absolute) slopes are given by

$$\text{slope of (4.3)} = \frac{-1}{2p(1 - z) - 2} = \frac{1}{2 - 2p(1 - z)} \quad (4.5)$$

$$\text{slope of (4.4)} = \frac{(1 - z)(p^2 - 2p + 1)}{2c^*(1 - z)p + 2(1 - c^* + zc^*)} \quad (4.6)$$

We can readily compare (4.5) and (4.6) only when  $z$  is close to 1: then (4.5) is greater, which tells us we are in the ambiguous case (i).

This ambiguity should not surprise us: we know that the "direct effect" of  $z$  increases revelation, but the prospect of compulsory revelation reduces the incentive to become informed, and the less cynicism of buyers about unlabeled items makes it more tempting to conceal information.

## 5. WELFARE EFFECTS OF INFORMATION

The alert reader may have noticed that, in the models above, there are no efficiency benefits of information. The reason is that the social value (as measured by market price) of an item of unknown quality is the expected social value of an item of known quality. Constructing models with a social value of information is a little more complicated: see Burdett and Mortensen (1980) or Farrell and Sobel (1983). However, the basic ideas described above will still go through. In this section, we try to get a sense of the size of the allocative efficiency benefits of information.

Used cars differ in their probability of breakdown, and people differ in their costs of experiencing a breakdown. Among the reasons for the latter variation: people's value of time differs; the probability of a breakdown being far from a service station differs, and people vary in how well they cope with the consumer's nightmare of auto repair.

The direct allocative efficiency effects of more information lie in getting the most reliable cars to those who most value reliability. To gain some notion of these benefits, we carry out an illustrative calculation.

## 5.1 PERCENTAGE SAVINGS FROM INFORMATION: DIRECT EFFECTS

Suppose that cars differ in their probability  $p$  of having a breakdown,<sup>1</sup> and suppose  $p$  is uniformly distributed (among used cars) on  $[.1, .9]$ . Suppose moreover that the cost  $c$  to drivers of such a breakdown varies uniformly between one hundred dollars and one hundred eighty dollars, for the reasons suggested above. (One might expect those with the very highest costs of breakdown to choose new cars, or to have their cars inspected: thus the upper tails will be truncated.) Then efficiency requires that the car with breakdown probability  $p$  be assigned to the driver with cost

$$\begin{aligned} c &= 180 - (p - .1) 100 \\ &= 190 - 100 p. \end{aligned}$$

Such an arrangement will give total cost of breakdowns

$$c^* = \frac{1}{.8} \int_{.1}^{.9} p(190 - 100 p) dp$$

<sup>1</sup> This "probability of breakdown" may be an aggregate figure, weighting different breakdowns by seriousness, in the following sense. Suppose there are  $n$  different possible breakdowns, and a car has probability  $p_i$  of breakdown  $i$ . If buyer  $j$  has cost  $c_i^j$  of breakdown  $i$ , then the cost of assigning this car to him is

$$\sum_{i=1}^n p_i c_i^j \tag{A}$$

Suppose that, for all buyers  $j, k$ , and all  $i$ ,

$$c_i^j / c_i^k = c_j^j / c_k^k, \tag{B}$$

for some  $c_j^j, c_k^k$ , independent of  $i$ . This says that, if  $j$ 's cost for a certain repair is twice  $k$ 's, then the same will be true for all other repairs. In this case, (not likely to hold exactly, like most aggregation conditions, but

$$\begin{aligned}
 .8C^* &= 95 [(.9)^2 - (.1)^2] - \frac{100}{3} [(.9)^3 - (.1)^3] \\
 &= 95 \times .8 - 33.3 \times .728 \\
 &= 76 - 24.26 \\
 &= 51.74
 \end{aligned}$$

Now suppose instead that the revelation system is imperfect, and all cars with  $p \geq .5$  are indistinguishable to buyers. Thus those cars are matched randomly to the buyers in the lower half of the cost distribution. Now we have:

$$\begin{aligned}
 .8C &= \int_{.1}^{.5} p(190 - 100p) dp + \int_{.5}^{.9} p \cdot 120 dp \\
 &= 95 [(.5)^2 - (.1)^2] - \frac{100}{3} [(.5)^3 - (.1)^3] \\
 &\quad + 60 [(.9)^2 - (.5)^2] \\
 &= 95 \times .24 - 33.3 \times .124 + 60 \times .56 \\
 &= 22.8 - 4.1 + 33.6
 \end{aligned}$$

a reasonable central case) we can write (A) as

$$\left[ \begin{array}{c} n \\ \sum \\ i=1 \end{array} \frac{p_i c_i^1}{c_1} \right] c_j$$

and write

$$\sum_{i=1}^n p_i \frac{c_i^1}{c_1}$$

as  $p$  (for this particular car). Then the optimization problem reduces to minimizing  $\sum pc$ , where the sum is over cars or buyers (equivalently).



$$= 52.3$$

This is only about 1.5% greater than the full information cost figure.

If all cars are indistinguishable, we have random allocation, and

$$\begin{aligned} .8c'' &= 140 \int_{.1}^{.9} p \, dp \\ &= 70 \times [.9^2 - .1^2] \\ &= 70 \times .8 \\ &= 56 \end{aligned}$$

Thus the direct efficiency effects of information are rather modest:

$$\frac{c'' - c^*}{c^*} = \frac{4.26}{56} = .076 \text{ as a fraction of no-information costs.}$$

In other words, even if information does not emerge at all, this is the equivalent of a 7 1/2% increase in breakdowns: serious, but not a terrible problem.

We generalize this calculation by noting that

$$E(pc) = \text{cov}(p, c) + E(p)E(c) \quad (5.1)$$

and that, while random allocation makes  $\text{cov}(p, c) = 0$ , efficient allocation in this case makes  $\text{cov}(p, c) = -\sqrt{\text{var}(p)\text{var}(c)}$ . Hence the proportional savings from efficient allocation are equal to

$$\frac{\sigma_p}{E(p)} \frac{\sigma_c}{E(c)} \quad (5.2)$$

the product of the "relative variations"  $\sigma_p/E(p)$  and  $\sigma_c/E(c)$ . Note that (5.1) is general, but (5.2) applies only when efficient allocation gives a correla-

tion coefficient of (-1) between p and c. In general, efficiency requires a perfect negative relationship between p and c, but it is only in special cases that this relationship is also linear, as required to obtain (5.2). Thus, in general, information is less valuable than (5.2) suggests.

We next derive a simple expression for (5.2) in the case where the variables are uniformly distributed. Suppose x is uniformly distributed on [a, b], where  $0 \leq a \leq b$ . Then

$$E(x) = \frac{a+b}{2}$$

$$\text{Var}(x) = \frac{2}{b-a} \int_0^{\frac{b-a}{2}} y^2 dy = \frac{1}{12} (b-a)^2$$

So the relative variation of x is

$$\frac{\sigma_x}{E(x)} = \frac{1}{\sqrt{3}} \frac{(b-a)}{a+b} = \frac{1}{\sqrt{3}} \left(1 - \frac{2a}{a+b}\right)$$

If  $b = ma$ , where  $m \geq 1$ , this becomes

$$\frac{1}{\sqrt{3}} \left(1 - \frac{2}{1+m}\right).$$

Thus, as one would expect, large dispersions - i.e., large values of m (for p and/or for c) give greater cost savings; but in no case can information save as much as a third of the costs. The percentage savings for some reasonable values of m are given below:

	1.25	1.5	2	4	10
1.25	0.4	0.7	1.2	2.2	3
1.5	0.7	1.3	2.2	4	5.5
2	1.2	2.2	3.7	6.7	9.1
4	2.2	4	6.7	12.0	16
10	3	5.5	9.1	16	22

The notable thing about this is that only for quite large values of  $m$  do the savings become "substantial" (say, in excess of 10%). Remember also that this represents an extreme comparison: perfect information versus no information. As we saw above, if some of the information emerges, it already achieves quite a lot of the potential savings from full information. Thus, these direct allocative efficiency benefits from information are surprisingly small.

If the distributions have a central tendency, the gains from information will be smaller. For instance, suppose each distribution has  $\lambda$  of its weight uniformly distributed, with  $(1 - \lambda)$  being an atom at the mean. Provided  $\lambda$  is the same for the two distributions (of  $p$  and of  $c$ ), we still get a very simple formula for the proportional gain from information:

$$\lambda^2 \frac{\sigma_p}{E(p)} \frac{\sigma_c}{E(c)}$$

(With more general distributions, the efficient allocation is less simple to write down and manipulate.)

The intuition behind this surprising (to many people) result is the fact that, provided all cars have positive value, each will be allocated to somebody in the efficient allocation. Thus the social value of knowing about a repair whose cost is the same to every buyer is zero. One's intuition tends to start from the private incentive not to be the person landed with the bad car.

## 5.2 INDIRECT EFFECTS

When goods of different qualities are not duly distinguished by the market, this will have feedback effects on incentives to maintain quality. In the used car market, one will see this in two forms. First owners of cars

intending to sell them used will not have enough incentive to maintain their cars. Second auto makers, who sell to new buyers most of whom (at least traditionally) will sell the used car, will not have as much incentive as would be desirable to make the cars last longer than the tenure of first owners. These effects may well be important, but I do not know how to quantify them.

## 6. CONCLUSION

We tentatively view this episode as one in which market participants fought hard over rather doubtful distributional gains, and in which the direct efficiency stakes were smaller than one might think. Interest-group theories of regulation suggest that questions close to purely distributional will tend to produce a lot of conflict. However, it is far from clear in this case that all parties were behaving rationally.

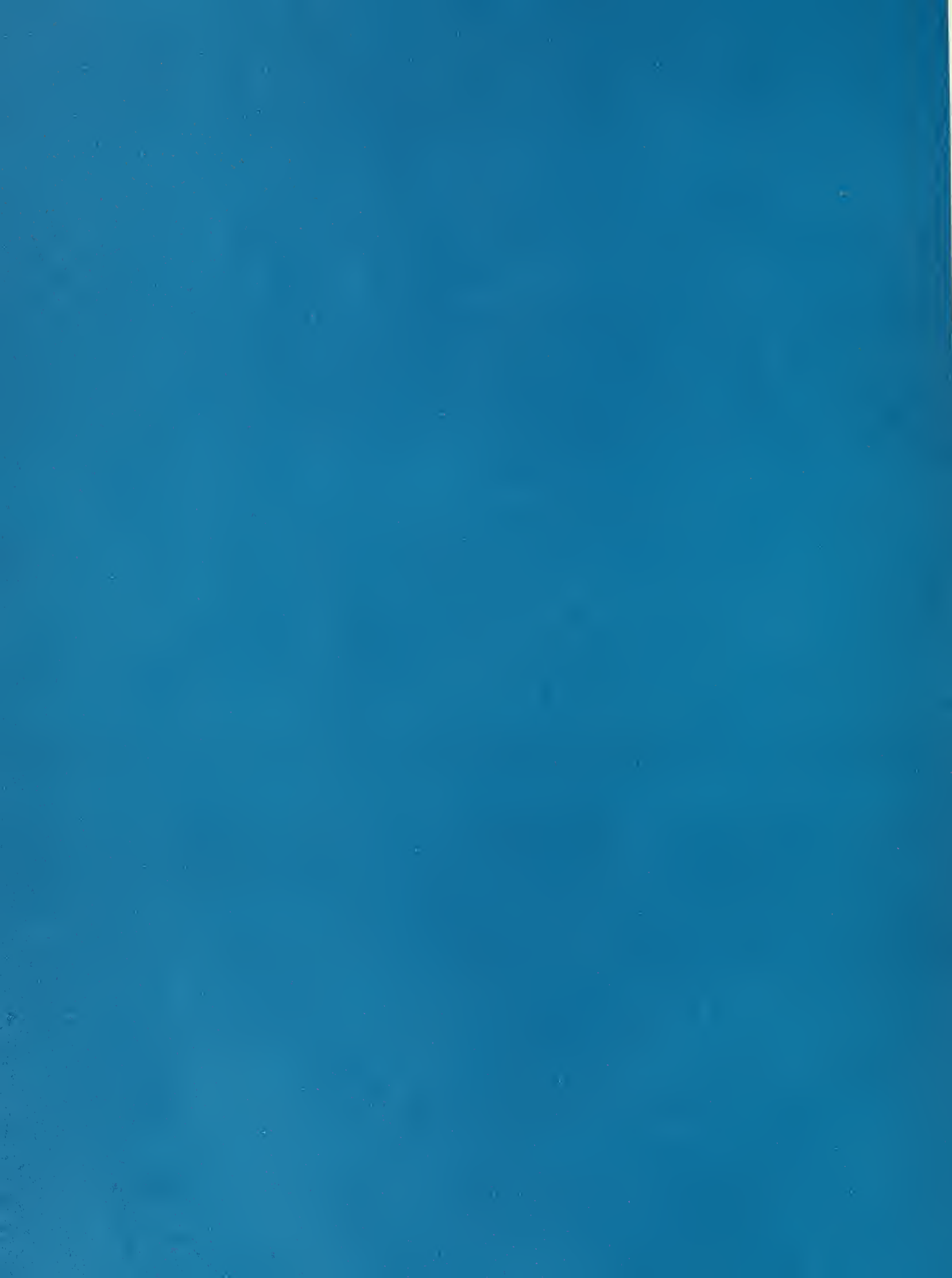
Economic theory does a poor job of predicting the attitudes of market participants. It may be that theory's predictions of the outcomes under different rules are mistaken. Alternatively, many market participants may have been wrong in their prediction. Sellers were almost uniformly against more disclosure enforcement. Consumer representatives were equally uniformly in favor, despite the fact that prices measure value under all sets of rules, so that not all consumers would benefit from more market information.

This raises an important methodological problem. In view of the ease of entry and exit, and very low level of sunk costs, few economists would hesitate in writing down zero-profit equations for the used-car industry. Yet an industry with free entry and exit ensuring zero profits would naturally be expected not to have strong views on the rules of the game: whatever the rules, each firm would earn a normal profit. Evidently, something is wrong with this argument; perhaps, it is that important comparative advantages translate into rents which will be affected by changes in the rules. This in itself is not a very interesting observation: but the caveat against a "natural" jump to a false conclusion may be important.

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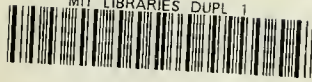


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