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VOLUNTARY DISCLOSURE OF INFORMATION*

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This paper considers a "persuasion game", in which a better informed agent (seller) strategically reveals his private information in an attempt to influence a decision maker (buyer). For this class of games, Grossman (1981) and Milgrom (1981) independently showed that in equilibrium the seller fully reveals his private information. A caution is provided in interpreting their results. It might be very easy to verify disclosed information but it is often difficult to detect the possession and hence the withholding of information. By simply introducing the possibility that the seller has no information, we conclude that only private information favorable to the seller is revealed to the buyer. Given the result, effects of disclosure rules are studied. Disclosure rules always benefit the buyer by enlarging his choice set, as well as transfer uncertainty from the buyer to the seller.

I. INTRODUCTION

This paper considers a "persuasion game", in which a better informed agent (seller) strategically reveals his private information in an attempt to influence a decision maker (buyer). An example is a sales encounter. The seller chooses the amount of information to give the buyer about the unknown quality of the goods. Then the buyer decides the quantity to purchase at a given price or how much to pay for a given quantity of goods. For this game, it is typically assumed that the seller makes a truthful, but possibly vague statement about the quality of the goods. Since making a statement is costless in the game, the game is different from the standard signaling games. It is also different from the cheap-talk game in that the seller's statements are restricted to be truthful.

For this class of games, Grossman (1981) and Milgrom (1981) indepen-

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dently showed that in equilibrium the seller fully reveals his private information. The argument for the result is that the seller with higher quality has an incentive to distinguish himself from the seller with lower quality. He can and will always do so by revealing the exact quality of his goods. The unraveling result leads to a negative policy implication about mandatory disclosure rules; if the seller's statements are *ex post* verifiable, anti-fraud law is enough for the full disclosure of private information. Mandatory information disclosure rules are not necessary, and if implemented, at best do not matter.

Several subsequent studies have extended the result. Surprisingly, Matthews and Postlewaite (1985) showed that if a seller can costlessly test the product to be informed about its quality, he will not test and disclose only if mandatory disclosure rules are in effect. Milgrom and Roberts (1986) argued that competition among interested parties as well as skepticism on the part of the decision maker can result in the emergence of all relevant information. Farrell (1986) introduced a cost to the seller of being informed, and found that mandatory disclosure rules have an ambiguous effect in increasing the amount of disclosed information. Also, the basic unraveling result has been applied to other situations; the disclosure of takeover intention in Grossman and Hart (1980) and the auctioneer's self-disclosure of his private information in Milgrom and Weber (1982) are two examples among others.

All the results, however, are somewhat misleading. Casual observation shows that a seller typically does not report unfavorable information about the quality of his product. A used car seller normally does not reveal every detail about a car to a buyer. Furthermore, mandatory disclosure rules are in effect in some markets[1]. To study the welfare effects of the rules, we need a model without the unraveling result. In this respect, some cautions in interpreting the unraveling result have been provided, especially with regard to the validity of the verifiability assumption. The unraveling result requires that all disclosed information be verifiable, so that no lie is permitted. This paper provides another explanation against the unraveling result.

The unraveling result critically depends on the assumption that the buyer knows exactly the kind of information the seller has; that is, the buyer knows exactly what questions the seller can answer, but he does not know what the seller's answers would be if he will be asked these questions and forced to answer honestly. The Grossman/Milgrom result evaporates when this assumption

[1] For example, the Security and Exchange Act requires parties to a takeover bid to disclose all information. As a recent example to show the importance of this analysis, Farrell (1986) reported the controversy around the rule proposed by the Federal Trade Commission (FTC) in 1980. It would have required that used car defects known to the dealer should be disclosed to buyers. There was a lobbying battle between dealer groups against the rule and consumer groups for the rule, before it was abolished because of the difficulty to enforce the rule.

is relaxed. A less restricted model has interesting implications; it also provides a more realistic description of economic phenomena.

The basic point here is that it might be very easy to verify disclosed information, but it is often difficult to detect the possession, and hence the withholding, of information. For example, a used car seller can safely withhold the information that a car's structure is weak because he may not have checked the frame or it may be difficult to discover welds and breaks[2].

Under this circumstance, we show that only private information favorable to the seller is revealed to the buyer, since the seller with bad information can safely pretend to have no information. This result accommodates the casual observation that a seller typically does not report unfavorable information about the quality of his product.

Given the partially revealing result, disclosure rules are effective; more information is disclosed to relevant parties. Specifically, the rules transfer uncertainty from the buyer to the seller. Even though their net welfare effect on the seller's part is ambiguous depending on the buyer's attitude toward risk and on the distribution of quality, disclosure rules always benefit the buyer by enlarging his choice set. Without the rules he chooses a single action for goods of different quality; with the rules he can choose different actions for goods of different quality.

In the next section, we set up a model for a persuasion game between a seller and a buyer. In section III, we analyze the effects of mandatory disclosure rules; the final section is devoted to concluding remarks.

II. MODEL

We consider a game with two players: a seller and a buyer. The buyer purchases a good or identical goods from the seller. The quality of the good is known to be a random variable t with distribution function $F(t)$, probability density function $f(t)$, and support $[\underline{t}\ \bar{t}]$ which we shall denote as Ω. The seller has a von Neuman-Morgenstern utility function $u(t,a)$, where a, a real positive number, is the action taken by the buyer. The interpretation may be that a represents the quantity which the buyer purchases or that a is his reservation price for a single unit of good. For expositional ease, we focus on the latter

[2] Milgrom and Roberts (1986) explicitly stated this as follows. "If a used car salesman has information about recent repairs to a car but does not report it, the buyer may not know that information has been withheld." But they assumed this possibility away. Matthews and Postlewaite (1985) also briefly mentioned this possibility. Farrell (1986) considered the case that not all sellers are informed. Assuming costly acquisition of information, he arrived at a different interpretation. The analysis in this paper applies to the case that the seller acquires his private information at a negligible cost.

case. The buyer, on his part, has a von Neuman-Morgenstern utility function $v(t,a)$.

Throughout the paper, we shall assume: $u_a(t, a) > 0$ for each t, where the subscript denotes a partial derivative; for each t, $v_a(t, a)=0$ for some a and $v_{aa}(t, a)<0$, so that $v(t, a)$ has a unique maximum for each t; and $v_{at}(t, a)>0$. The first assumption implies that the seller always prefers higher a's taken by the buyer, and the last assumption ensures that the higher t perceived as true quality by the buyer will induce higher a's to the benefit of the seller.

The game is played in the following way. With probability θ, the seller observes the quality of the good, t, and reports a subset of Ω to the buyer. He is not allowed to tell a lie, so that the subset he reports to the buyer must include the true quality t. We shall assume that the reports the seller makes are verifiable, so that the no lie condition is implementable. That is, with probability θ, he has private information and provides verifiable information in the form of the subset of Ω. In the other case, which will happen with probability $1-\theta$, he has no private information and just reports the whole set Ω. The buyer, not knowing the true quality of the good but having received the seller's report, decides his action, a, based on his beliefs about the true quality of the good. The true quality and the buyer's action determine the payoffs to the players according to their utility functions.

To construct players' strategies, we define B as the set of possible reports the seller makes, whose elements are represented by S. We shall assume that B is the class of Borel sets in Ω. Then the seller's pure strategy, $S(t)$, is a function from Ω to B, and his mixed strategy is a probability function $q(S \mid t)$ over B. To avoid technical complexity, we assume that the mixed strategy is defined over finite support. The buyer's purchasing strategy, $a(S)$, is a function from B to the set of real positive numbers. The buyer's strictly concave utility function guarantees that the buyer does not use a mixed strategy in equilibrium.

The equilibrium concept we shall employ is the sequential equilibrium introduced by Kreps and Wilson (1982a). For the model under consideration, the sequential equilibrium refines the Nash equilibrium by excluding some uninteresting equilibria. For example, it excludes the Nash equilibrium in which the seller always reports Ω, and the buyer sticks to the optimal action based on his initial beliefs regardless of what the seller reports. In doing so, we require the buyer's beliefs to be consistent. The buyer's beliefs, $\mu(t \mid S)$, is defined as a probability function over Ω. That is, μ specifies the probability assessments the buyer makes about the true quality when the seller reports S. μ is said to be consistent with a reporting strategy, q, if for all $S \in B$ except Ω,

(a) $\mu(t|S) = 0 \qquad \text{if } t \notin S,$

(b) $\mu(t|S) = \dfrac{q(S|t)f(t)}{\int_{s\in S} q(S|s)\, f(s)ds}$ if $t\in S$ and $\int_{s\in S} q(S|s)\, f(s)ds > 0$,

(c) $0 < \mu(t|S) \leq 1$ and $\sum_{t\in\{t \mid q(S \mid t)>0\}} \mu(t|S) = 1$ if $q(S|t)>0$ and

$$\int_{s\in S} q(S|s)\, f(s)ds = 0,$$

and

(d) $\mu(t|\Omega) = \dfrac{\theta\, q(\Omega|t)\, f(t) + (1-\theta)f(t)}{\theta \int_{s\in\Omega} q(\Omega|s)\, f(s)ds + (1-\theta)}.$

(a) reflects the assumption that the seller makes only a truthful statement in the sense that the subset he reports should include the true type. (b), (c) and (d) are statements that for the reports that are actually sent by some type of seller, the beliefs are consistent with Bayesian updating. Especially, when the seller reports Ω, the buyer takes into account the possibility that the seller has no information. Condition (c) is for the case that only finite number of types report S. Unlike (b), it does not restrict the buyer's beliefs to such an extent that the probability for each relevant type is specified, which we do not need to characterize the equilibria. However, it still specifies probability 1 for one type if he is the only one who reports S.

A sequential equilibrium is defined as a triple (q^*, a^*, μ^*) such that

(a) μ^* is consistent with q^*,

(b) for all $t\in\Omega$, if $q^*(\hat{S}|t)>0$,

$$\hat{S}\in \underset{S\in B}{argmax}\; u(t, a^*(S)),$$

(c) for all $S \in B$,

$$a^*(S) = \underset{a}{argmax} \int_{t\in\Omega} v(t, a)\, \mu^*(t|S)dt.$$

(b) and (c) are the sequential rationality conditions.

When the seller knows his type t, he can guarantee the payoff $u(t, a^*(\{t\}))$ to himself by reporting $\{t\}$, where $a^*(\{t\})$ is the buyer's optimal action when he knows the true quality is t. Therefore, the seller's payoff in equilibrium, u_t^*, is always no less than $u(t, a^*(\{t\}))$. We show in the following lemma that the only strategy the seller can use to receive a payoff higher than $u(t, a^*(\{t\}))$ in equilibrium is to report the whole set Ω.

LEMMA 1.

Let (q^*, a^*, μ^*) be a sequential equilibrium. If $\mu^*(t|S)>0$, either $S=\Omega$, or $\mu^*(t|S)=1$.

PROOF:

Suppose that $S\neq\Omega$, and $\mu^*(t|S)<1$. Let $N=\{t|q^*(S|t)>0\}$. Let $\hat{t}_N$ be the least upper bound for N. Then $q^*(S|t)=0$ for all $t>\hat{t}_N$. Since $v_{at}>0$, there exists $\varepsilon\geq 0$ such that $q(S|\hat{t}_N-\varepsilon)>0$ and $v_a(\hat{t}_N-\varepsilon, a^*(S))>0$. Also, $v_a(\hat{t}_N-\varepsilon, a^*(\{\hat{t}_N-\varepsilon\}))=0$. Since $v_{aa}<0$, $a^*(\{\hat{t}_N-\varepsilon\})>a^*(S)$, which violates the sequential rationality of the seller. Q. E. D.

The lemma states that if a subset other than the whole set is reported to the buyer in equilibrium, it is from only one type of the seller. Due to the consistency restriction, the buyer correctly knows the type who reports the subset. Therefore, even though the seller of lower types wants to pretend to be of the higher types, the only way to achieve that purpose is to report the whole set, that is, to pretend to be totally ignorant. Since reporting Ω is the only strategy not to reveal the true type, he does not use a mixed strategy in equilibrium.

To be precise, we state the result as a lemma. We define M to be the set of the seller types whose payoffs in equilibrium are higher than those from reporting the true types, that is, $M=\{t\in\Omega|u_t^*>u(t, a^*(\{t\}))\}$. Let $\hat{t}$ be the least upper bound of M.

LEMMA 2.

$$M=[\underline{t}, \hat{t})\subseteq\{t\in\Omega|q(\Omega|t)=1\}.$$

PROOF:

We only need to show that $\hat{t}\notin M$. Other parts of the lemma immediately follow from lemma 1. Since for all $\varepsilon>0$, $a^*(\{\hat{t}+\varepsilon\})\geq a^*(\Omega)$ and $a^*(\{t\})$ is continuous with respect to t, $a^*(\{\hat{t}\})\geq a^*(\Omega)$, which completes the proof.

Q.E.D.

In equilibrium, the seller types are divided into two groups: for all $t\in(\hat{t}\,\bar{t}]$, t is fully disclosed in the sense that $\mu^*(t|S)=1$ for all S such that $q^*(S|t)>0$, and $u_t^*=u(t, a^*(\{t\}))$; for all $t\in[\underline{t}\ \hat{t})$, $q^*(\Omega|t)=1$ and $u_t^*=u(t, a^*(\Omega))$.

To complete the characterization of the equilibria, we find $\hat{t}$. Since for all $\varepsilon>0$, $a^*(\{\hat{t}+\varepsilon\})>a^*(\Omega)>a^*(\{\hat{t}-\varepsilon\})$, it follows that $a^*(\{\hat{t}\})=a^*(\Omega)$. By assumption, $a^*(\{t\})$ is uniquely determined given $\hat{t}$. Defining $\hat{a}$ as $a^*(\{\hat{t}\})$, and substituting $\hat{a}$ for $a^*(\Omega)$, we derive the following equation from the buyer's first order condition, which determines $\hat{t}$.

$$H(\hat{t},\theta)=\frac{\theta}{\theta F(\hat{t})+(1-\theta)}\int_{\underline{t}}^{\hat{t}} v_a(t,\hat{a})f(t)dt+\frac{1-\theta}{\theta F(\hat{t})+(1-\theta)}\int_{\underline{t}}^{\bar{t}} v_a(t,\hat{a})f(t)\,dt$$
$$=0.$$

Since $H(\bar{t},\theta)<0<H(\underline{t},\theta)$, and $\frac{\partial H}{\partial \hat{t}}<0$, $\hat{t}$ is uniquely determined.

The following comparative statics result is quite intuitive.

LEMMA 3. $\frac{d\hat{t}}{d\theta}<0.$

PROOF:

By total differentiation, $\frac{\partial H}{\partial \theta}d\theta+\frac{\partial H}{\partial \hat{t}}d\hat{t}=0$. Since $\frac{\partial H}{\partial \theta}<0$ and

$\frac{\partial H}{\partial \hat{t}}<0$, $\frac{d\hat{t}}{d\theta}<0$. Q. E. D.

θ is the probability that the seller has private information. Obviously, if θ is low, the seller with lower quality can gain more by pretending to have no information. Since the Grossman/Milgrom result is for the case that $\theta=1$, the present model is a generalized version of the persuasion game.

III. MANDATORY DISCLOSURE RULES

Mandatory disclosure rules are intended to increase the amount of disclosed information by forcing the seller to reveal his private information whenever he has any. The idea seems to be that more disclosed information would increase social welfare. In the present model, if the seller is of the lower types, he pretends to have no information when he is allowed to do so. If disclosure of information is mandatory, even the seller of the lower types must reveal his information. While disclosure rules increase the amount of disclosed information as intended, the assumptions leading to the result in the model make it difficult to implement the rules. Because of the difficulty in detecting the possession and the withholding of information, the effectiveness of the rules is doubtful. We set aside this issue and assume that the rules are effectively implementable.[3)] By way of compensation, the present paper offers some clear results about the wel-

[3] This assumption may not be so strong as it looks. Allowing the possibility to detect the withholding of information with some probability, we can solve the game again. If the probability is very small, it does not change the equilibrium in section II substantially, and some moderate penalty will induce the seller to always reveal his information.

fare effects of the rules.

Even though the rules are effective in increasing the amount of disclosed information, their welfare effects are not clear even in this simple model. However, we could derive a general result; the rules transfer uncertainty from the buyer to the seller, and so they always increase the buyer's welfare. The effect is directly related to disclosure rules, regardless of the structure of the game such as the specific utility functions or the distribution of quality.

First, we show that disclosure rules always benefit the buyer by lessening uncertainty without any cost. The following proposition proves the result.

PROPOSITION.

Mandatory disclosure rules increase the buyer's *ex ante* expected payoff.

PROOF

Let V^d and V^o be the buyer's *ex ante* expected payoff with the rules and that without the rules respectively.

$$V^d - V^o = [\theta \int_{\underline{t}}^{\hat{t}} v(t, a^*(\{t\}))\, f(t)\, dt - \theta \int_{\underline{t}}^{\hat{t}} v(t, \hat{a})\, f(t) dt]$$
$$+ [(1-\theta) \int_{\underline{t}}^{\bar{t}} v(t, a^d(\Omega))\, f(t) dt - (1-\theta) \int_{\underline{t}}^{\bar{t}} v(t, \hat{a})\, f(t) dt],$$

where $a^d(\Omega)$ is the buyer's optimal response to the report Ω with the rules. The seller of the types higher than $\hat{t}$ reports the true quality regardless of the enforcement of the rules, so his payoffs are not affected by the rules. Since $v(t, a(\{t\}))$ is the maximum for all t, the first difference is positive. Also, $(1-\theta) \int_{\underline{t}}^{\bar{t}} v(t, a^d(\Omega)) f(t) dt$ is the maximum for all a, which shows that the second difference is also positive. Q. E. D.

Without the rules, the buyer has to choose a single action for goods of different quality; with the rules he can choose different actions for goods of different quality. Since all of his actions without the rules are feasible with the rules in effect, they always increase his welfare.

On the other hand, unknown quality poses uncertainty to the seller in two ways. His payoff varies depending on the buyer's action as well as the quality. When the seller of the lower types strategically does not reveal his private information, his payoff varies depending on the quality only, since the buyer's action is constant for the seller of all the lower types. In this sense, uncertainty is lessened from the seller's point of view. However, since the buyer's action in that case is not a simple average of his actions for the goods of known quality, the rules' effect on the seller's expected payoff is ambiguous. It depends on the players' attitude toward risk and the distribution of quality. The following example shows that the welfare effect is sensitive on the players' attitude toward risk in a non-trivial way.

EXAMPLE 1.

Let $u(t, a)=a^{\beta}$ with $0<\beta<1$ and $v(t, a)=t\ a^{\alpha}-\alpha a$ with $0<\alpha<1$. t is uniformly distributed on $[0,1]$ and $\theta=\frac{1}{2}$. The specifications satisfy all the assumptions we made in section II. If t is known, the optimal action of the buyer is $t^{\frac{1}{1-\alpha}}$. For this class of buyer's utility functions, $\hat{t}$ is derived to be $\sqrt{2}-1$. Then, without the rules, $a^{*}=t^{\frac{1}{1-\alpha}}$ if t is revealed, and $a^{*}=(\sqrt{2}-1)^{\frac{1}{1-\alpha}}$ otherwise. With the rules, $a^{*}=t^{\frac{1}{1-\alpha}}$ with probability $\frac{1}{2}$, $a^{*}=(\frac{1}{2})^{\frac{1}{1-\alpha}}$ with probability $\frac{1}{2}$. When $\beta=1-\alpha$,

$$U^{d}-U^{o}=\frac{1}{2}\int_{0}^{\sqrt{2}-1}\{t-(\sqrt{2}-1)\}\,dt+\frac{1}{2}\int_{0}^{1}\{\frac{1}{2}-(\sqrt{2}-1)\}dt=0,$$

where $U^{d}-U^{o}$ are the seller's *ex ante* expected payoff with the rules and that without the rules respectively. Therefore, disclosure rules decrease the seller's welfare if and only if $\alpha+\beta<1$.

The example shows that the rules transfer uncertainty from the buyer to the seller, and they affect the seller's expected utility through the buyer's reaction. Given the buyer's reaction, the rules decrease the seller's utility when $\beta<1-\alpha$. In the example, a small β means that the seller is more risk averse. Therefore, it is more likely that the rules decrease the seller's expected utility when he is more risk averse. For some cases, the rules always decrease the seller's expected utility. A special case leading to the result is when the buyer's utility function has the certainty equivalence property, in the sense that the buyer's optimal action for goods of unknown quality is a linear function of the expected value of quality. The following example shows it with a buyer with quadratic utility function.

EXAMPLE 2.

Let $u(t, a)=u(a)$ with $u'(a)>0$, $u''(a)<0$, and $v(t, a)=-(a-t)^{2}$. t is uniformly distributed on $[0,1]$ and $\theta=\frac{1}{2}$. If t is known, $a^{*}=t$, and again we can derive that $\hat{t}=\sqrt{2}-1$. The rules do not change the *ex ante* expected level of the buyer's action due to the certainty equivalence property. However, they increase uncertainty posed to the seller, so that any risk averse seller's expected utility decreases.

The welfare effects shown above are general only to the extent that the assumptions on the utility functions are appropriate. Even though the assumptions in the model generalize the utility functions used widely in the disclosure literature, they are still restrictive for the analysis of general market situations. Especially, when there is more than one type of buyers, the result that the rules always increase the buyers' expected utility cannot be guaranteed.[4] We provide a non-pathological example in which the rules decrease the buyers' aggregate expected utility.[5]

EXAMPLE 3.

There are two buyers and each buyer purchases either a single unit of good or none from a seller. In the event of a purchase at the price p, the high type buyer's preference is $t-p$ and the low type buyer's is t^2-p. The preferences can be interpreted as each buyer's surplus derived from the consumption of the good. t is uniformly distributed on $[0,1]$ and $\theta=\frac{1}{2}$. Suppose that the price of the good is determined in such a way that the seller's revenue is maximized. For example, if t is known, $p=t$ and only the high type buyer purchases the good when $0\leq t<\frac{1}{2}$, and $p=t^2$ and both buyers purchase when $\frac{1}{2}\leq t<1$. When the seller of the types $t\leq\hat{t}$ does not disclose his information, the high type buyer is willing to pay $\frac{1}{2}\int_0^{\hat{t}} t\,dt+\frac{1}{2}\int_0^1 t\,dt=\frac{1}{4}(1+\hat{t})$, and the low type buyer is willing to pay $\frac{1}{2}\int_0^{\hat{t}} t^2\,dt+\frac{1}{2}\int_0^1 t^2 dt=\frac{1}{6}(1+\hat{t}^3)$. Since $\frac{1}{4}(1+\hat{t})\leq\frac{1}{3}(1+\hat{t}^3)$ for $0\leq\hat{t}\leq 1$, $p=\frac{1}{6}(1+\hat{t}^3)$ and both buyers purchase. In equilibrium, $\hat{t}\approx 0.3473$. In this example, the buyers' surplus is positive only when both types of the buyers purchase. When disclosure is mandatory, the buyers' surplus is $A+\frac{1}{2}\int_0^1(t-\frac{1}{3})dt$, which is $A+\frac{1}{12}$. A is their surplus for the cases that the seller of the types $t\geq\frac{1}{2}$ disclose his information, which is

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[4] When the buyers' actions are independent of each other, and the seller's utility depends on the sum of the actions, all the results in the model are valid. Examples are when the price is fixed and each buyer decides how much to buy, or when a monopolist can perfectly discriminate the buyers, charging the reservation price for each buyer.

[5] Professor Joel Sobel provided this example.

$\frac{1}{2}\int_{\frac{1}{2}}^{1}(t-t^2)dt$. Without the disclosure rules, the buyers' surplus is

$A+\frac{1}{2}\int_0^{\hat{t}}\{t-\frac{1}{6}(1+\hat{t}^3)\}\ dt+\frac{1}{2}\int_0^1\{t-\frac{1}{6}(1+\hat{t}^3)\}\ dt$ with $\hat{t}\approx 0.3473$, which is approximately $A+0.4132$. Clearly, the disclosure rules decrease the buyers' surplus. Notice that new surplus is created when the seller of the lower types does not disclose his information. Furthermore, $\frac{1}{6}(1+0.3473^3)<\frac{1}{3}$, which shows that the buyers' surplus increases even for the cases in which the seller has no information. In this example, the disclosure rules deteriorate the terms of trade for the buyers, decreasing their surplus.

IV. CONCLUSION

A characteristic of information is that it is difficult to detect its possession. Paying attention to this property of information, we have shown that the Grossman/Milgrom result cannot be guaranteed in a less restricted model. Contrary to the policy implications of the unraveling result, the partially revealing result provides a clear welfare effect of disclosure rules. Furthermore, the result in the present paper offers different answers to the questions related to information disclosure. For example, in Milgrom and Weber's (1982) auction model, an auctioneer prefers *ex ante* to fully disclose his private information if it is affiliated with the bidders' information. They argued that the auctioneer's strategic disclosure of his information guarantees full disclosure due to the Grossman /Milgrom result. The present paper offers a different answer. If the bidders are uncertain whether the auctioneer has private information, we predict that the auctioneer will choose not to disclose bad information. Unless a binding contract forces the auctioneer to always reveal his information, his *ex ante* preferable full disclosure cannot be achieved. However, if the auctioneer repeatedly encounters the same bidders, full disclosure might be achieved by a reputation effect as in Kreps and Wilson (1982b) and Sobel (1985). In general the extension of the idea in the present paper to dynamic settings appears interesting.

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