Crowding Out Wasteful Activities by Wasteful Activities

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Abstract

A seller can benefit from information about the valuation a potential buyer places on the good. Under some circumstances, improved information raises social welfare. But under other circumstances, the information has private value but no social value, so that agents may spend too much on collecting information. A government which collects and disseminates some information about valuations can limit spending by private agents on data collection, thereby increasing social welfare. That is, governmental provision of information may be useful not because information is socially useful, but because it limits the amount private agents spend on collecting information.

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JEL Classification: D61, D82, D83

1 Introduction

Laidlaw v. Organ 15 U.S. 178 (1817), decided by the United States Supreme Court in 1817, concerned the effects of private information held by a buyer or a seller. Organ bought tobacco from Laidlaw on the same day that news broke that a peace treaty had been accepted between America and Britain, lifting a naval embargo and raising the US price of tobacco by thirty to fifty percent. Organ, unlike Laidlaw, was aware of the news, allowing Organ to make a large profit. The court unanimously ruled that a party cannot withhold information with the aim of deceiving the other party, but a party was not bound to communicate all its information.

The Laidlaw v. Organ case is especially interesting because it involves the division of profits between two parties—the information affected the transaction price, but not the trade itself. In other words, Laidlaw v. Organ concerned rent seeking or a "directly unproductive activity."[1] The analysis below illustrates how a seller may collect excessive information. That part of the paper is not novel, as will be seen in the literature review. What is novel is showing how government can limit private spending on data collection by providing private agents with partial information. This view contrasts with the standard view which sees government collecting data because the private market has too little of it. I argue the opposite—the government wants to limit private data collection.

My approach, to be plausible, should broadly accord with the standards expected of government statistics. In a report issued by the National Academy of Sciences, Martin, Straf, and Citro (2005) write that "public policy makers are best served by statistics that are accurate, timely, and relevant for policy decisions. Even more, the operation of a democratic system of government depends on the unhindered flow of statistical information that citizens can use to assess government actions and for other purposes. Federal statistical agencies are established to be a credible source of useful, accurate statistics in one or more subject areas that are available to the public and policy makers on a timely basis ... And credibility requires concern for both the reality and appearance of impartiality, and of independence from political control. It is the primary mission of agencies in the federal statistical system to work to ensure the goals of accuracy, timeliness, relevance, and credibility

[1]For seminal works on such activity, see Tullock 1967, Krueger 1974, Posner 1975, Bhagwati 1982, and Tollison 1982.

of statistical information" (p. 3). In this paper I give different reasons for the desirability of such statistics.

2 Literature

A demonstration that the private benefit of information can exceed the social benefit, and that indeed the social benefit can be zero, is a major contribution by Hirshleifer (1971). He shows this result for an exchange economy with identical people trading future claims: an agent who knows future demands can generate a profit, benefiting himself at the expense of others, and leaving social welfare unchanged.

Others build on this insight. Shavell (1994) analyzes incentives to acquire information about valuations before sales transactions, concluding that voluntary disclosure results in socially excessive incentives to acquire information.

Consideration of how governmental dissemination of information affects social welfare is discussed by Morris and Shin (2002). They argue that when each individual benefits from taking the same action that others do, but suffers when his action does not match the state of nature, then public information can reduce welfare. Svensson (2006), however, shows that under most plausible parameter values, under this framework social welfare is increased by dissemination of information. Extending Morris and Shin (2002), Wong (2008) considers how increased provision of information by the central bank reduces the incentives of private firms to collect information on the state of the economy, and finding that therefore the central bank may maximize social welfare by limiting the amount of information it provides. Cornand and Heinemann (2008) consider how public announcements which serve as focal points for higher-order beliefs can reduce social welfare, concluding that public information should always be provided with maximum precision but, under certain conditions, not to all agents.

One of my results is that increased spending by one agent can reduce spending by others. This effect relates in spirit to the analysis of limit pricing. In particular, Bain's classic work (1956) suggests that an incumbent may want to distort his price downwards (as by increasing capacity), with the aim of preventing entry. Milgrom and Roberts (1982) show how imperfect information can induce such behavior: if the entrant is unaware of the incumbent's costs, an incumbent who behaves as if he has low costs may deter

entry. Similar in spirit is the argument by Caplan (2008) that "the [gas] tax holiday is a relatively cheap symbolic gesture that makes truly bad policies less likely." He, however, looks only at governmental activity, whereas I look at how governmental activity can reduce wasteful private activity.

3 Assumptions

The market consists of one buyer and one seller. The seller posts a price. The buyer has a reservation price of V_L, V_M, or V_H, with $V_L < V_M < V_H$. The prior probability of valuation V_i is π_i. The buyer but not the seller knows the value of the good. In any case, the good is worth more to the buyer than to the seller. Getting information on whether the valuation is V_L instead of V_M or V_H costs F_{L_MH}. Getting perfect information costs $F_{L\_M\_H}$.

I spoke of getting information on LMH. But the information collected need not be so direct. It can instead concern demographic or economic data which inform the seller of the likely valuation by the buyer.

4 Outcome with no government intervention

Consider the seller's behavior when government provides no information. The seller can collect either no information, information on L_MH, or information on L_M_H. In the absence of any information, the seller faces the following choices. If the seller charges V_L, he earns V_L. If the seller charges V_M, his expected revenue is $(1-\pi_L)V_M$. If the seller charges V_H, his expected revenue is $(1-\pi_L\pi_M)V_H$. Suppose first that $V_L(1\pi_L) > V_M$ and that $V_L > (1-\pi_L\pi_M)V_H$. That is, in the absence of any further information, the seller would charge V_L.

We can now ask about the value of information to the seller. Suppose the seller gets information on L_MH. A seller who finds that the buyer values the good at V_L charges V_L. A seller who finds that the valuation is either V_M or V_H (but does not know which) must decide whether to charge V_M or else V_H. If he charges V_M his expected profits are

$$-F_{L\_MH} + \pi_L V_L + (1-\pi_L)(V_M). \tag{1}$$

A seller who charges V_H has expected profits

$$-F_{L\_MH} + \pi_L V_L + (1\pi_L)\frac{\pi_H}{1-\pi_L}V_H. \tag{2}$$

A seller with perfect information has expected profits

$$-F_{L\_M\_H} + \pi_L V_L + \pi_M V_M + (1 - \pi_L - \pi_M)V_H. \tag{3}$$

The seller who has no further information will charge V_L if $V_L > (1 - \pi_L)V_M$ and $V_L > (1 - \pi_L - \pi_M)V_H$, generating the socially efficient outcome. Nevertheless, V_L may be less than profits given by expressions (**??**) (**??**). The seller would then incur the cost of collecting information, which is socially useless. Moreover, data collection can reduce social welfare. Suppose that in the absence of any further information, the seller would charge V_L. But if he finds that the reservation value is either V_M or V_H, then he may charge V_H. That means that with some positive probability a potential buyer with valuation V_L orV_M will not buy the good, though he values the good more than the seller does.

5 Government collection of data

5.1 Seller collects too much information

A natural way to limit an activity which is costly but not socially useful is to tax it. It is difficult to see, however, how the collection of information can be detected and fined. And surely any such policy would be viewed skeptically in any democracy.

A different, second-best, approach is for government to provide partial information. The government may provide information on L_MH (that is, whether the buyer's valuation is V_L or not); that would induce the seller to charge either V_L or instead V_M (if the appropriate parameter values hold). The seller may find it unprofitable to incur the additional cost of $F_{L\_M\_H}$ to get perfect information, which may allow him to charge the price V_H. That is, the government can induce the seller to spend less on gathering information.

To illustrate why government collection of data which limits private collection can be efficient, suppose that a seller who knows that the valuation is either V_M or V_H charges a price V_M. If the data show a valuation of V_L, then clearly the seller will collect no further information. If the data reveal that the valuation is MH, the seller will collect no further information if

$$V_M > -F_{L\_M\_H} + \frac{\pi_M}{1\pi_L} V_M + \frac{\pi_H}{1 - \pi_L} V_H. \tag{4}$$

Notice that a seller who increases the price (say V_M instead of V_L, or V_H instead of V_M) increases his profits by more than the increase in social benefits—the lost revenue from selling less equals the social loss, but the gain from the higher price is a private gain with no social benefits. Therefore, a private seller may spend too much on collecting information.[2] For example, suppose that $F_{L\_M\_H}$ slightly exceeds the gain to the seller of gaining information on M_H instead of MH. That is, if government gave data that the buyer's valuation is MH, then the seller would not incur the cost of collecting further information. But $F_{L\_M\_H}F_{L\_MH}$ may yet be less than the benefit to the seller of gaining the perfect information, and that $F_{L\_M\_H}$ is less than the gain to the firm from getting perfect information instead of no information. Then, the seller on his own would get perfect information, and government can improve welfare by providing imperfect information.

For a demonstration that government can increase social welfare by providing partial information, consider a numerical example. Let the buyer's possible valuations be 100, 110, or 120, each with probability 1/3. Consider the seller's profits under different conditions of information.

1. In the absence of any further information, the seller charges 100, and earns revenue 100. (The seller would not, for example, charge 120, because then his expected revenue is only $(1/3)(120) = 40$, which is less than 100.)

2. A seller's expected revenue with perfect information is $(1/3)(100) + (1/3)(110) + (1/3)120 = 110$.

3. A seller who knows that the buyer's valuation is either 110 or 120 maximizes expected profits by charging 110. Therefore, a seller with partial information (that is, who learns whether the valuation is 100 or not) has expected revenue of $(1/3)100 + (2/3)110 = 100 + 20/3$.

Suppose the cost of collecting imperfect information is 20/3, and that the cost of collecting perfect information is a bit under 10. That means that the seller would on its own collect perfect information, and that if it had imperfect information it would not spend the 10 to get perfect information.

[2]Note that government provision of partial information can reduce data collection even if for any given level of accuracy government has a higher cost of collecting information that does the private sector.

Thus if government collects imperfect information, at a cost of 20/3, it would stop the seller from spending 10 to get the perfect information. Indeed, government would be wise to spend up to 10 to collect imperfect information. What we have here resembles immunization—give a small illness to prevent a greater one.

5.2 Seller collects too little information

Of course, if a seller charges V_H when he knows the value of the good is MH, then the social benefit of perfect information will exceed the private benefit. And here government may want to provide information. For a numerical example, let the buyer's possible valuations be 10, $20+\epsilon$, and 40, each equally likely. Under imperfect information, the seller would charge $20+\epsilon$, earning revenue of $40/3+2\epsilon/3$. Social welfare is higher, $(1/3)(20+\epsilon+40) = 20+\epsilon/3$. Under perfect information, social welfare and profits are identical. So the private benefits of perfect information exceed the private benefits.

The general principle is that information collection on the buyer is socially excessive if it results in the seller charging a higher price.

6 Extensions

6.1 Costs of collecting information

I have assumed that if information on L_MH has already been collected, then the added cost of collecting information on L_M_H is the same as the cost when no other information has been collected, namely $F_{L\_M\_H}$. That assumption is stronger than needed. The qualitative results would hold for some parameter values if the added cost was smaller than $F_{L\_M\_H}$, but greater than $F_{L\_M\_H} - F_{L\_MH}$.

To extend the model further, we can think of government as collecting data daily, weekly, monthly, or annually. The more frequently it collects data, the more valuable it is, and the more government deters data collection by private actors. We can also think of this geographically. Government can collect data over large regions or small, with the smaller each region, the more valuable the information to private agents.

6.2 Research and development

The ideas expounded above can be applied in other areas. To give one more application, this section considers a contest between two agents, with the agent who exerts the most effort winning the prize. The effort may be socially useless, or involve a larger social cost than a social benefit, as in many contests. We may think of rent seeking, of lobbying activities, of tournaments where the winner receives a much larger prize than other contestants, of patent races, and of innovation races more generally where the first entrant earns large profits. To illustrate, I consider below an innovation race, where each of two firms chooses effort, which determines how fast it will make the innovation.

Consider a one-period model with two firms. A firm chooses between investing 0 (in which case it never wins the prize), innovating slowly (indicated by S for slow), or innovating quickly (indicated by F for fast). The first firm to innovate wins the prize, valued at W. If two firms innovated at the same time, each is equally likely to win the prize. The fixed cost of investing in R&D (either slow or fast) is C. The cost beyond that for action i is C_i.

I shall consider equilibrium behavior under two policies. Suppose first that government undertakes some research, making its results known to both firms. Think of such a policy as government making investment S for each firm, at zero marginal cost to each firm. Then no one firm will want to do F when it expects the other firm to avoid F if $W/2 > -C - C_F + W$, or if $W < 2(C + C_F)$.

Suppose next that government does nothing. Then it is not a Nash equilibrium for both firms to do S if either profits are negative under those conditions (or if $-C - C_S + W/2 < 0$), or if a firm gains by doing F (or if $-C - C_S + W/2 < -C - C_F + W$). Assume profits are positive when both firms do S, so that $W > 2(C + C_S)$. And suppose that when this condition holds, some firm would gain by doing F, or that $W > 2(C_F - C_S)$.

In short, government can reduce effort by the firms if the following three conditions hold: $W < 2(C + C_F)$, $W > 2(C + C_S)$, and $W > 2(C_F - C_S)$.

To demonstrate that these conditions can simultaneously hold, suppose $C = 10$ and $C_F = 10$. Let $W = 30$. Then the first condition is $30 < 2(10 + 10)$, which is satisfied. For the second condition, we have $30 > 2(10 + C_S)$, so let $C_S = 4$. For the last condition we have $30 > 2(10 - 4)$, which is satisfied.

The Nash equilibrium would have mixed strategies. Let a firm do F with probability f. So a firm is indifferent between S and F if $(1 - f)(-C - C_S +$

$W/2) = -C - C_F + fW/2 + (1-f)W$. The solution is

$$f = \frac{1}{2}\frac{W - 2C_F + 2C_S}{C + C_S}. \tag{5}$$

This is positive if $W > 2(C_F - C_S)$. It is less than 1 if $W < 2(C_F + C_S)$. Therefore, for some parameter values, a government which provides for slow innovation can preclude either firm from spending on fast innovation. Government can thereby reduce social costs.

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7 Notation

V_i Probability buyer's valuation is i

$F_{L\_M\_H}$ Cost of obtaining perfect information about buyer's valuation

F_{L_MH} Cost of obtaining information on whether buyer values good at V_L or not.

π_i Prior probability that buyer values good at V_i