Ignorance Is Bliss? Uncertainty About Product Valuation May Benefit Consumers

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ABSTRACT

Truthful unbiased information about a product which is beneficial for any one consumer may hurt if given to all consumers. In a fallacy of composition effect higher prices can make ignorance preferable to general knowledge. Assuming rational expectations we demonstrate this perverse effect of advertising for two extreme market structures.

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1. Introduction

Would providing consumers with information that dissipates uncertainty about the true value of a newly released good before their purchasing decision help them? Self-interested advertisers, providers of information services and even neutral smart economists would probably say "yes" without caveats. Based on the model we present in this paper, however, the answer that emerges is "not necessarily." Moreover, because providing information to consumers is costly, it may even be socially harmful.

We model a market in which consumers have imperfect information about the true value of a good. Imperfect information is a market imperfection which leads to some consumers making decisions which they will rue once they own the product and others deciding not to buy the product when they would have found it worth buying had they had full information.

For any *individual*, improving their information can certainly be beneficial as they would be more likely to make the right purchase decision. But there is a fallacy of composition. Providing better information to *all individuals* will alter the demand structure and endogenously the equilibrium price may change in a fashion which reduces

consumer surplus. Truthful informative advertising may be disadvantageous for consumers and it may reduce the sum of consumers' and producers' surplus.

The intuition can be motivated by assuming that all consumers have the same (perfect information) reservation price for one unit of the good. Consider rational expectations in the sense that, although some consumers undervalue the product, others overvalue it and that the average valuation across all consumers is correct.[3]

With perfect consumer information, a monopolist would set price equal to the reservation price with Consumer Surplus [CS] equal to zero. With imperfect information some consumers would not buy at this reservation price. The monopoly price with imperfect information is lower than the perfect information reservation price to sell to more consumers. All inframarginal consumers, those who buy at this lower price, have positive CS; those who do not buy have CS=0.

Consider truthful advertising leading to a mean preserving reduction in spread of valuations around the true mean. A monopolist would not pay for such advertising unless its profits (producer surplus – PS) would go up. As information narrows the spread, the equilibrium monopoly price rises and infra marginal consumers' CS goes down and there are clearly parameters for which total surplus declines.

Interestingly and importantly, the same qualitative conclusions hold for generic advertising in competitive markets as well. In the text, for these extreme market structures, we discuss conditions under which ignorance is bliss.

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[3] Perhaps the clearest intuition comes from imagining valuations as being uniformly distributed along [T-d, T+d] where T is the true value.

2. Literature review

Our work is related to the literature in advertising in as much as we assess the welfare effects of providing consumers with information on goods' attributes. "Advertising" should be widely construed, including display areas in stores, knowledgeable salespeople, customer demonstrations, etc.

In a comprehensive survey, Bagwell (2007) discusses the three main views of advertising. The persuasive view, wherein advertising changes the utility function, is correlated with anti-competitive consequences and consumer surplus loss. Directly related to this paper, the informative view is correlated with pro-competitive consequences and consumer surplus gain. The proponents of the complementary view claim that even uninformative advertising (such as persuasive ads) can be beneficial since consumers may value the advertising itself.

Johnson and Myatt (2006) consider a monopolist's choice of information provision to passive consumers. The authors point out that despite conceptual distinctions, those three traditional views ultimately assume a demand shift outward, and so can only increase sales at each possible price. However, they observe that advertising need not always increase demand, as some consumers may learn that the product is not suited to their tastes even as others realize that it is. Accordingly, they propose a taxonomy in which any advertising that shifts demand outwards is called hype, in contrast to real information rotating the demand curve. Our model relates to the latter class as it is a mean-preserving rotation of the demand curve. The authors acknowledge in a footnote that welfare effects are outside the scope of their paper.

Dixit and Norman (1978) [D&N] evaluate the welfare impact of advertising. They conclude that monopoly advertising is socially excessive, even when one adopts the post-advertising tastes as the welfare standard. Importantly, they emphasize that "Whichever standard is chosen, one wants to measure the effect of a change in output as judged by that standard, and not the effect of altering the standard on the value of a given level of output." We follow their wisdom by applying a single standard for measuring welfare changes.

3. Model

Consumers are continuously and uniformly distributed over the interval [0,1]. Each consumer considers buying an indivisible unit of the product.

Consumers are *ex-ante* heterogeneous and risk-neutral. Consumers at location x have prior valuation that depends on their exposure to information (i), $v(x,i) = T + (d-i) - 2(d-i)x$, where d is a constant $(0 < d < T)$, $0 \leq i \leq d$ and T is a constant that we detail in the next paragraph. Note that $v(x,i)$ is a linear function of x and as i approaches d, $v(x,i)$ approaches T for all x, i.e., $\underset{i \to d}{Lim}\ v(x,i) = T$, which does not depend on x.

After consumers buy the product and actually use it, they realize its true value, T, which is assumed to be common across all consumers.

To clarify the role of information, note that our model assumes a form of rational expectations. In particular we assume that without any information consumers'

valuations are on average equal to the true valuation, T, or $\int_0^1 v(x,0)dx = T$. Also note that, for the middle point $x = 1/2$, $v(1/2,0) = T$.

Further in our model *more* information is *better* information in the sense of maintaining this form of rational expectations but narrowing valuations to be closer to the truth. That is, it is:

1. ***truthful***, in the sense that when $i_2 > i_1$, $|T - v(x,i_1)| \geq |T - v(x,i_2)|$ for all x and

2. ***unbiased***, in the sense that $\int_0^1 v(x,i)dx = T$ for all i.

Truthfulness implies more information moves all valuations closer to the true value T. These properties are easily checked once one sees that more i rotates linear $v(x,i)$ around its middle point towards the horizontal line at T.

$$\text{The derivative } v_i(x,i) = 2x - 1 \begin{cases} < 0, \ x < 1/2 \\ = 0, \ x = 1/2 \\ > 0, \ x > 1/2 \end{cases}. \text{ Better information increases the}$$

valuation of those who undervalue and reduces the valuation of those who overvalue. Moreover, unbiasedness maintains the collective rational expectations, i.e., it implies that the integral of the derivative of v is equal to zero: $\int_0^1 v_i(x,i)dx = 0$.

Consumers located at x with information i buy the product if and only if $v(x,i) \geq p$. Consider $x = q$ such that $v(q,i) = p$. Therefore we can write $q = x(p,i)$.

Next we consider the welfare effects of providing information in a monopoly industry and in perfect competition.

Monopoly

The monopolist in D&N advertises information in excess of what would be socially optimal. D&N analyze demand shifts when either consumers undervalue the product or when the advertiser exaggerates the value of the product. We, on the other hand, analyze rational expectations in which average undervaluation is invariant to receiving more/better information. A mean-preserving, counter-clockwise rotation of the demand is an appropriate characterization of the effect of better information on consumers' pre-purchase valuations. With our rational expectations model we evaluate the impact of better information on consumers and welfare.

For simplicity we assume zero marginal cost and no fixed cost. Figure 1 shows the no information equilibrium as a black star and a better information equilibrium as a transparent star. No information CS is represented by the area A+B. With better information CS is A+D. Hence, the change in CS is D-B. In this representation, B is clearly larger than D, so the change in CS is negative.

Next consider the additional profits from providing the illustrated level of information at cost of α. This is B+E+F-α and must be positive if this information is to be provided.

The change in total welfare is D+E+F-α [=(D-B)+(B+E+F-α)], which may be negative for a large enough α. Hence, in our model, an intriguing and counter intuitive

result is that better information can hurt consumers. Moreover, it may even be socially excessive as in D&N.

But the cost of providing better information may be born by consumers as in the case of the *Consumer Reports* magazine.

If *Consumer Reports* had provided the illustrated information at cost of β (not necessarily β=α) the producers benefit by B+E+F and consumers directly lose B-D. With *CR*'s not-for-profit status, consumers face an additional loss of β.

The conditions under which perverse consumer surplus consequences arise in the linear demand rotation model are:

1. the no information price should be less than the true value, *T*;
2. more/better information should rotate the linear demand curve so that the change in price times the no information quantity is greater (area B) than the change in quantity times the difference between *T* and the better information price (area D).

Condition 2 is satisfied when:

a) the change in quantity tends to be small as is the case when the no information quantity is close to either the satiation point or the monopolist's capacity; or
b) the difference between *T* and the better information price goes to zero as consumers become perfectly informed.

Perfect competition

In perfect competition, producers of a good would gain nothing by *individually* spending money on informing consumers about the features of the good, mainly because of the free-riding problem. If, however, producers coordinate their information activities, they can circumvent this problem. A not uncommon coordination method is use of the government. For example, it is not uncommon in agricultural markets for producers to receive government assistance for generic product advertisements such as the "Got Milk" advertisements for milk in the United States.

We assume perfect competition in the sales market and cooperation in the provision of information, generic advertising. The competitive price would reflect the industry MC (Supply curve) which we model as a ray from the origin, or $p = k \cdot q$.[4]

In Figure 2, the no information competitive equilibrium is depicted as a black star and an equilibrium with better, but still imperfect information is depicted as a transparent star. No information consumer surplus (CS) is represented by the area A+B. With better information CS is A+E. Hence, the change in CS is E-B. In this representation, B is clearly larger than E, so the change in CS is negative.

Producer surplus (PS or rents) increases by B+F, which is positive, so producers would like better information being provided by, for example, a government agency. Total welfare may increase or decrease depending on the cost of better information.[5]

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[4] Monopoly is often depicted as horizontal MC with a fixed cost. Competitive markets, like agricultural products are often depicted as having upwards sloping supply (industry MC) functions. This distinction is important here, as producers' surplus is in the form of rents (which are zero with horizontal industry MC).

The conditions for consumer harm are the same as in the monopoly case, expect that condition 2a can be met for a sufficiently steep supply curve resulting in an interior better information equilibrium.

4. Conclusion

We all want to be well informed when making purchases. *Consumer Reports* is flourishing after 75 years[6], numerous web sites provide information about products. And manufacturers advertise product characteristics. So more/better information should be to everyone's benefit? At least this would seem to be true.

We demonstrate that the advertising (product information) literature seems to have ignored the potential for a fallacy of composition, information which can be beneficial for one consumer may in fact be deleterious to consumers as a whole.

In our model consumer rational expectations mean that consumers always *on average* correctly anticipate the in use value of a product (utility value) and that in use utility is unaffected by advertising. Advertising provides *more* information which is *better* in the sense that every potential consumer's prior evaluation becomes closer to their true valuation in use. This alters the demand curve so that the equilibrium prices go up. The resultant loss in consumer surplus may be more than compensated for in producer surplus, but depending upon the costs of advertising, the sum of CS and PS may

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[5] The cost of better information provision may be paid for by the government based on taxes on producers in this industry, all producers, or consumers generally.
[6] http://www.nytimes.com/2011/12/11/business/media/consumer-reports-going-strong-at-75-digital-domain.html?_r=1&emc=eta1

in fact go down with the provision of *better* information. We demonstrate this for both a monopoly and for generic advertising in a competitive market.

In our reading of the literature, it appears that economists have overlooked that in some cases, for the aggregate, ***Ignorance is Bliss***!

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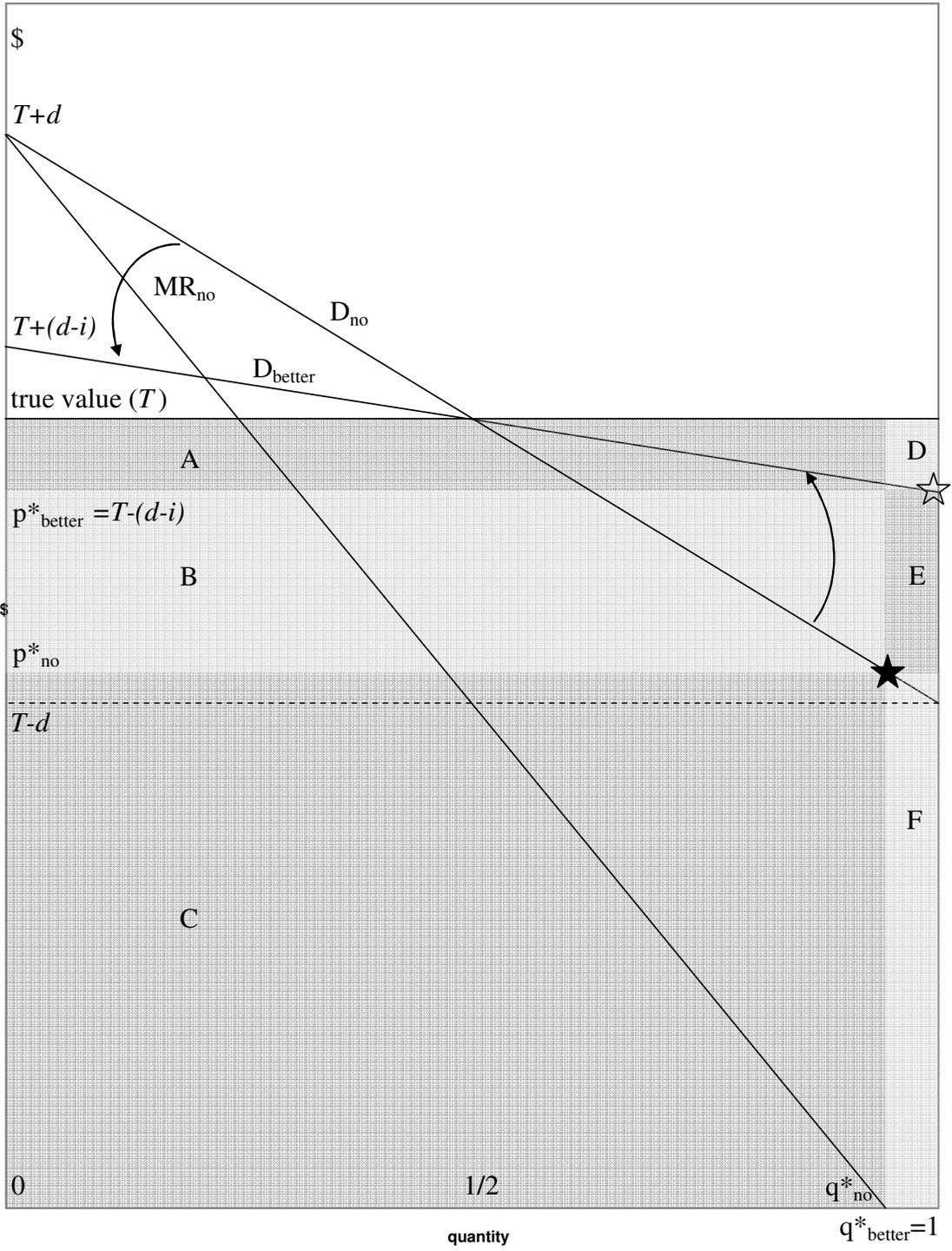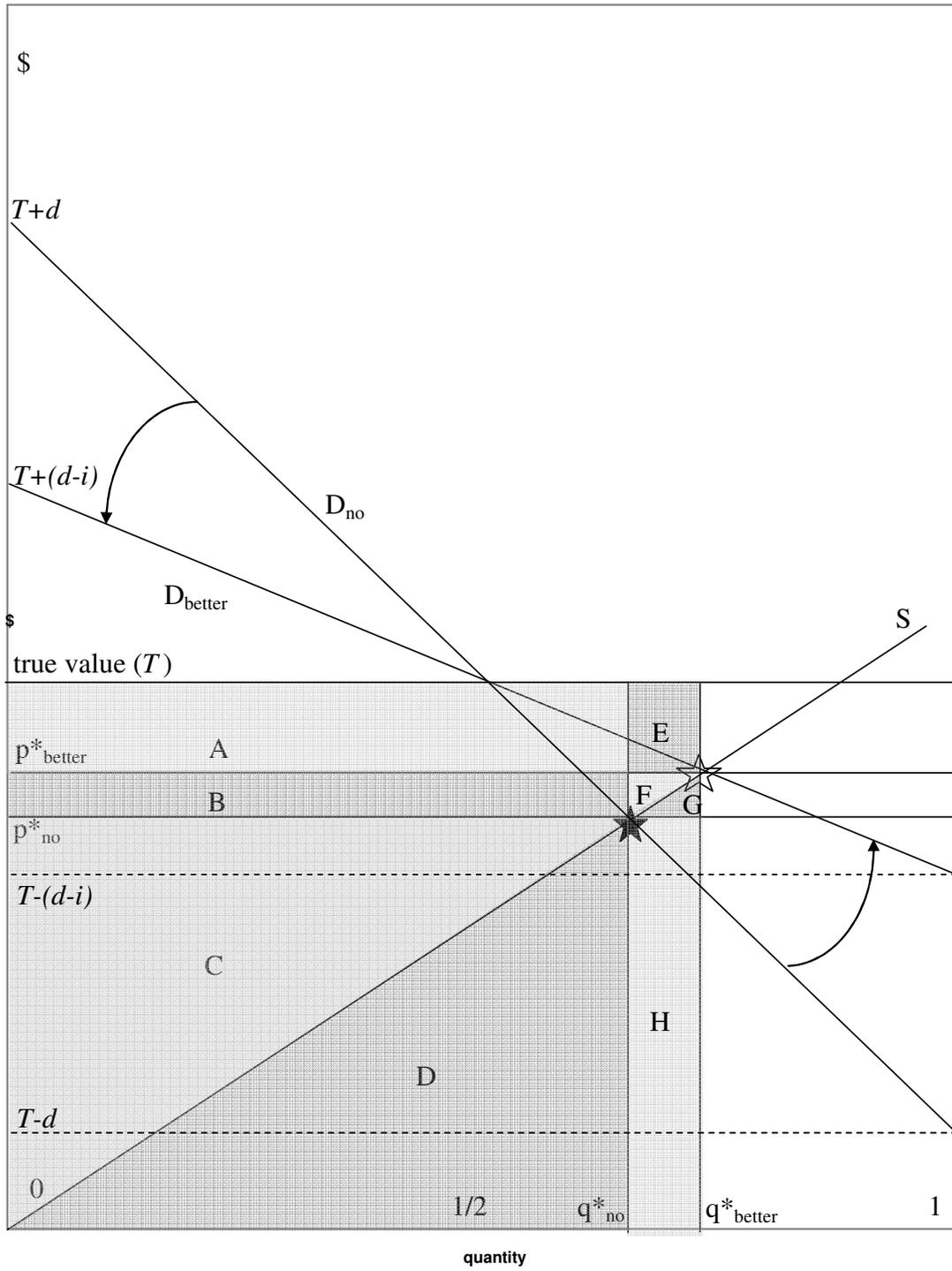
Figure 1

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$T+d$

$T+(d-i)$

D_{no}

D_{better}

S

$

true value (T)

p^*_{better} A

E

B   F   G

p^*_{no}

$T-(d-i)$

C

H

D

$T-d$

0

1/2 q^*_{no} q^*_{better} 1

quantity

Figure 2