Heads in the Sand: Information Aversion in a Market Context

Abstract

In this paper, we consider information avoidance in product markets. We show that misinformation can be an equilibrium outcome if consumers receive disutility when proven wrong in their product quality assessment. Consumers, however, are assumed to respond to market and other incentives. The incentive to learn contradicting information increases in the price of the product. The possibility of false information in equilibrium provides a rationale for regulation or establishing tort liability. However, even though regulation dampens the effects of information aversion, laissez-faire still might be better for consumers even when regulation is highly effective.

1 Introduction

In this paper we examine the issue of misinformation in product markets from a perspective different to those taken so far in the economic literature. Most of the literature has been exclusively concerned with the incentives of producers to misinform consumers, while consumers themselves have typically been assumed to be exogenously deceivable, or irrational. In this paper, we show that misinformation can be an equilibrium even in the case of consistently utility-maximizing consumers. This is because consumers might form some attachment for the product they consume which makes it costly for them to learn damaging information about it later on. In other words, consumers have incentives to avoid information about certain products.

Even though self-deception and information aversion is a feature of human nature described since ancient times[1], rational information aversion in product markets is an underdeveloped area of economics. The literature that does exist (see e.g. Golman et al, 2017) does not analyze information aversion in a market context: that is, it does not study the question of how aversion to new information manifests itself in a market equilibrium. Our paper purports to fill part of that void in the literature.

In our model, consumers sometimes regard information as a bad, not as a good. This is because individuals, ceteris paribus, dislike being proven wrong in their prior beliefs. If such

[1] Plato has referred to it, as well as other antic sources. It has also featured prominently in the writings of some classical economists, including Hume and Smith.

a taste against more information exists in certain settings, it implies that it can be rational to remain ignorant in the course of a number of consumption decisions.

Information avoidance, or the willingness to pay to avoid information stems not merely from the fact that the new information might be unpleasant, but from the fact that the new information might be detrimental to the consumer's self-image. Consumers for instance might be confident in their judgment of product quality, so when it turns out that their judgment was wrong, they experience a negative effect on their self-image. Hence they try to avoid such information unless the benefits of the new information outweighs the expected self-image cost. Take the case of healthcare consumption. Information avoidance is a well documented behavior in this field (see e.g. Dawson et al, 2006; Grusky et al, 2007; Sweeny et al, 2010; Howell and Shepperd, 2012a; or Howell and Shepperd, 2012b). In general, individuals may not welcome information about the efficacy of their chosen treatment, medicine or doctors and might opt to remain ignorant about them. Another good example might be the attitude of professors to remain ignorant towards the evaluation of their courses. Even though it might be useful to get feedback about their teaching practices, the acquired new information may also hurt their self-image. In order to prevent the potential psychological cost of unwanted information, it may be rational to delay or prevent the acquisition of new information. We believe that our assumptions regarding consumer preferences over information have some advantages over assumptions usually held by those in the behavioral literature, such as bounded rationality. Under bounded rationality, producers would still have incentives to provide information to consumers in ways that consumers can understand it. However, if consumers refuse to listen to even (in monetary as well as in cognitive terms) free information, that will not be the case.

The, so far limited, economic literature on information aversion provides empirical evidence of its abundance. Ganguly and Tasoff (2017) provide experimental evidence that individuals are willing to pay to avoid being tested for serious illnesses. In politics, as Cowen (2005) writes, such information avoidance is especially abundant. For instance, people who do not believe in global warming might avoid news on that topic, while environmentalists who believe in the most extreme scenarios avoid news sources that are more optimistic about the effects of climate change. Information as a bad also appears in the economic literature of cognitive dissonance, most of all, in the seminal paper by Akerlof and Dickens (1982) who

show that when workers can self-deceive about working conditions, a higher level of labor regulation can be optimal than it is generally assumed in the literature. Yet, to our surprise, not much have been written on the role of information aversion in ordinary product markets. In this paper we examine both the demand and supply side of a distaste for more information by postulating that consumers receive disutility when they are proven wrong in some of their beliefs, while producers, knowing this, can get away with marketing products that are the results of unsuccessful quality improvements.

Our paper is also related to some broader strains of the economic literature. It is related to the literature of misinformation in general, and through this, to the industrial organization literature on advertising, starting with the seminal articles of Dixit and Norman (1978) and Becker and Murphy (1993). The economics of identity and religion are another two areas related to our approach in various ways. First, investing in *identity capital* (Akerlof and Kranton, 2000; Becker, 1996) might increase the incentive of consumers to self-deceive themselves over the quality of some product which they choose to identify with. Second, such identification has some resemblance to religious beliefs. Religious markets have been modeled in economics as akin to ordinary product markets (see e.g. Iannaccone, 1998), while our research strengthens this association, but with a spin, emphasizing the religious aspects of ordinary product markets.

Another literature close to our approach is the economics of the media and persuasion through the media. Gentzkow and Shapiro (2006) build a model of media persuasion in which consumers have rational preferences but misinformation occurs in equilibrium. By contrast, Mullainathan and Shleifer (2005) consider a model in which news consumers have a preference for receiving news that validate their priors. Their approach is quite close to those taken by us in this paper.

The paper contributes to the economic literature on how to deal with externalities and asymmetric information. The Chicago school of Law and Economics, associated with Posner (1973) and Stigler (1966), have traditionally held that when private ordering is not feasible (for isntance due to high transaction costs), societies should rely primarily on tort law and not on regulation. This is because tort law can directly internalize externalities, while regulation is a blunter instrument: it requires state control of an activity. Regulation has also been shown by Stigler (1971) to often favor entrenched interest groups who can capture regulation

and use it to their own advantage. This became to be known as the interest-group theory of regulation, in contrast to the public interest view of regulation, which held that the increase in reliance on regulation in the late 19th and early 20th century has been an efficient response, driven by public demand, to new problems that arose to increasing market concentration and scale economies. Recently, the public interest view has enjoyed something of a comeback in the economic literature. Glaeser et al (2001) or Glaeser and Shleifer (2003) argue that when corruption is prevalent in the justice system, torts, often set at high rates in order to deter wrongdoings, can be ineffective, while small fines by regulatory authorities can be welfare-enhancing. This paper adds another modification to the standard view, but it does so not by relying on the assumption that consumers are irrational in some ways, but extending the rationality framework to include preferences toward information. In our framework, simply providing information to consumers, or providing means of protecting their rights through tort law may be ineffective and not first-best efficient even in cases where physical, as opposed to psychic information costs are negligible. However, our paper also adds one more justification for using tort law as opposed to regulation: the possibility of suing firms for misinformation provides an incentive to consumers to heed to new information about the product, leading to more informed consumers and thus more innovation by firms in the first place. Still, even under tort law not all consumers may choose to be informed, leaving room for regulation to be the most efficient tool in certain cases. More surprisingly, laissez-faire is sometimes optimal from a total welfare perspective even if the court system operates effectively.

The remaining of the paper is organized as follows. Section 2 presents the model and its main results. In Sections 3 we consider the possible policy responses and their implications. We outline and discuss the possible applications in Section 4 and conclude in Section 5.

2 The Model

Consider the following three period model. In the first period a monopoly firm chooses its level of innovation, which will affect the probability of developing a successful quality innovation. In the second stage consumers choose whether or not to consume the product, given their reservation price and the price of the product. and learn information about the product they have consumed. After this, consumers decide whether they wish to listen to the information and update their prior belief about product quality accordingly. Then, in

the last stage they decide whether to continue to consume the product they consumed in the previous period or exit the market.

We assume a mass of consumers normalized to 1, each with a unit demand and deriving a utility of $v(a)$ from consumption, where $a \in \{0, A\}$ denotes two possible values product quality can take with a subjective probability of ϕ consumer attaches to product quality being A instead of 0 and we assume that $v(0) = 0$, while $0 < v(A) \leq 1$. Furthermore, we assume that consumers derive utility (or disutility) directly from the information about product quality. If a consumer receives information that the product quality is lower than her prior assessment, she receives a disutility in form of psychic cost. Let this psychic cost (measured in money-metric utility), denoted by e_i, be a characteristic of the consumers i, and we assume that consumers are uniformly distributed along a unit line with regards of this psychic cost, i.e. $e_i \in [0, 1]$.

We assume that the utility function is separable in the taste for product characteristics and information about the product. Specifically, we assume that the utility can be written in the following form

$$U_i(a, e_i) = v(a) - u(e_i) \tag{1}$$

where $u(\cdot)$ is continuous and increasing function, while $U'_{e_i}(a, e_i) < 0$ and $U''_{e_i,e_i}(a, e_i) \geq 0$. In the followings, for the sake of tractability, we assume that the consumer's disutility (more specifically, the monetary value of it) if she learns that product quality is 0 instead of A is e, i.e. $u(e_i) = e_i$.

As we mentioned earlier, there is a monopoly firm that supplies the product.[2] It either produces a high quality product or a low-quality product. The probability that the firm's first period innovation is successful and thus it produces the high-quality product is given by $\psi > 0$. The production costs for any quality realization are, for the sake of simplicity, assumed to be zero. Having a monopoly producer first period pricing is straightforward. As consumers attach a prior probability of ϕ to the product having quality a instead of 0, the market price in the first period is going to be $p_1 = \phi v(A)$. Pricing in the second period is less straightforward and may depend on whether the product turns out to be of good quality

[2] We assume monopoly in order to abstract away from strategic interactions that may arise in case of multiple firms.

and how many consumers choose to get informed. First let us consider the case when the product turns out to be bad (but only informed consumers know this fact). Then the firm can only sell to the $1-\phi v(A)$ uninformed consumers. These consumers are not willing to pay more than $\phi v(A)$ for the product as this is their expected valuation. The question remains, however, whether the firm is able to "trick" the consumers by setting $p_2 = v(A)$ so as to make the uninformed consumers believe the product is of high quality. If such a deception is successful then the firm profit in the second period is $(1-\phi v(A))v(a)$ which is greater than $\phi v(A)$ if $\phi > \frac{1}{2}$. However, the consumers are aware of this, therefore such deception would not be successful. Hence, a bad quality product can only be sold at $p_2 = \phi v(A)$. A separating equilibrium that signals product quality would still be possible if the firm would choose to set $p_2 = v(A)$ for a high quality product. Then, if only informed consumers are served at this price, second period profit is $\phi v(a)^2$, while the firm can also choose to serve everyone at price $\phi v(A)$, where the second period profit is $\phi v(A)$. The profit is strictly higher in the former case. Thus, the second period price is necessarily $p_2 = \phi v(A)$.

When consumers choose to listen to new information, they are delivered either *good*, or *bad* news about the product. If they receive the former, they increase their valuation from $\phi v(A)$ to $v(A)$. In the latter case they lower their valuation to 0. In this case the consumer leaves the market. Then, by listening to new information, the consumer can save this price in the case of a bad product, therefore she listens to new information if and only if $(1-\phi)\phi v(A) \geq (1-\phi)e_i$. $1-\phi$ drops out, therefore we have

$$\phi v(A) \geq e_i \tag{2}$$

. Not listening to new information is a form of information aversion and we can interpret it in various ways. Consumers could literally "close their ears" to new information, or if they hear new information, they could nevertheless disregard it, clinging to their prior beliefs instead. Let e^* denote the consumer, who is indifferent between accepting and not accepting the new information. Thus, we have that $e^* = \phi v(A)$.

We solve the game for its subgame-perfect Nash equilibrium by using backward induction. In the last period, when the quality of the product is already revealed to the consumers who are willing to learn about it, the firm with the higher quality realization either continues to satisfy all of its consumers at a price $\phi v(A)$ or serves only those who are now informed and

thus value the product to $v(A)$, at price $v(A)$. The condition for the latter is

$$\phi v(A)^2 > \phi v(A) \tag{3}$$

which in never satisfied since $0 < v(A) \leq 1$, thus the firm will always serves all its consumers assuming that produces a high quality product.

Likewise, the firm with the low-quality realization always sets a price of $\phi v(A)$, however, it serves only its captured consumers, those who deceive themselves in the last period. This price yields a profit of $(1 - \phi v(A))\phi v(A)$. Thus, the firm's expected total profit function can be written as

$$E\pi = \phi v(A) + \psi \phi v(A) + (1 - \psi)(1 - \phi v(A))\phi v(A) \tag{4}$$

So far we have treated the success of quality improvement as exogenous. In the following we will be tying the probability of successful quality realization to the amount of innovation the firm engages in. For example, a firm might invest in quality improvement technology, however such innovation is not always successful. Suppose the firm can invest in quality improvement at a unit cost $I > 0$. Let the level of investment Z influence the probability of the high quality realization of the product, so that $\psi'(Z) > 0$, while $\psi''(Z) < 0$. Therefore, the firm's expected profit is

$$E\pi = \phi v(A) + \psi(Z)\phi v(A) + (1 - \psi(Z))(1 - \phi v(A))\phi v(A) - IZ \tag{5}$$

Maximizing (5) with respect to Z, yields

$$\psi'(Z)\phi^2 v(A)^2 = I \tag{6}$$

i.e. the marginal benefit of innovation equals the marginal cost.

Naturally the incentive to innovate increases in the marginal product of investment $\psi'(Z)$ and decreases in the investment cost. The incentive to innovate also increases in consumers' marginal valuation of the product quality improvement, i.e. in $v(A)$. Furthermore, it is also increases in ϕ, since a higher ϕ means that more consumers choose to get informed about

the product quality and as a consequence the firm earns a lower profit in the case of a bad quality product.

3 Policy responses

In this section we discuss the policy choices that might be available to regulators. Specifically, we consider three possible policy choices: laissez-faire, taxation and regulation.

3.1 Laissez-faire

The first policy we study is laissez-faire. By laissez-faire we mean a policy regime where there is no regulation and consumers cannot sue firms if the firm sells a low quality product. Think of homeopathic medicine as an example. Although experts generally regard that kind of "medicine" to be ineffective, it is not banned and consumers cannot sue producers of homeopathic medicine, as formally the manufacturer does not commit fraud or others forms of misinformation. However, even under laissez-faire, we (implicitly) allow for the government to provide information about the product after the first consumption period. Note that so far the equilibrium we have computed is an equilibrium under a regime of laissez-faire, thus we write down total and consumer welfare using the already calculated equilibrium values.

Total welfare and consumer welfare under laissez-faire can be written as

$$W^{LF} = \phi v(A) + \psi(Z)\Delta_1 - (1-\psi(Z)) \int_0^{\phi v(A)} e \text{ d}e + \psi(Z)\left(\phi v(A) + \Delta_2\right) + (1-\psi(Z))(1-\phi v(A))\phi v(A) - IZ \tag{7}$$

and

$$CW^{LF} = \psi(Z)(\Delta_1 + \Delta_2) - (1-\psi(Z)) \int_0^{\phi v(A)} e \text{ d}e \tag{8}$$

where $\Delta_t = v(A) - \phi v(A) = (1-\phi)v(A)$ is the consumer surplus enjoyed by consumers consuming high-quality product in period t, where $t = 1, 2$.

3.2 Tort law

In this section we explore the effects of tort law on consumer and firm behavior. We assume that consumers have the opportunity to sue the firm at a fixed cost s (with $s \geq 0$) when the product is of bad quality. Furthermore, we assume that the court might not decide in favour of the plaintiff even though the product is low quality. The probability that the court rules in favor of the firm in case when it produces a low-quality products is η, where $\eta \geq 0$. The compensation awarded to the plaintiff is equal to the price paid for the product, i.e $\phi v(A)$.

If the consumer chooses not to get informed she will never sue the firm. However, a well-informed consumer might launch a lawsuit against the firm if

$$(1-\eta)\phi v(A) > s \tag{9}$$

holds.

Notice that the possibility of starting a lawsuit against the firm alters the incentive of the consumer to learn about the quality of the product. Thus, with tort law consumer i listens to new information if

$$\phi v(A) + (1-\eta)\phi v(A) - s \geq e_i \tag{10}$$

in case when (9) holds. On the other hand, if (9) is not satisfied, then consumers behave as in the case of laissez-faire and listen to new information as long as (**??**) holds. In what follows we assume that $(1-\eta)\phi v(A) > s$ holds.[3]

From (10) follows that the number of informed consumers is $e^* = \phi v(A)(2-\eta) - s$.

The firm's expected profit can be written as follows

$$E\pi = \phi v(A) - (1-\psi(Z))(1-\eta)e^*\phi v(A) + \psi(Z)\max\{e^* v(A), \phi v(A)\} + (1-\psi(Z))(1-e^*)\phi v(A) - IZ \tag{11}$$

[3] Notice that we assume that the consumer will not sue the firm if she is indifferent between suing or not suing.

Simplifying (11) yields

$$E\pi = \begin{cases} \phi v(A)[1-(1-\psi(Z))((2-\eta)e^*-1)] & s < \phi[(2-\eta)v(A)-1] \\ +\psi(Z)v(A)e^* - IZ & \\ \phi v(A)[1-(1-\psi(Z))((2-\eta)e^*-1)] & s \geq \phi[(2-\eta)v(A)-1] \\ +\psi(Z)v(A)\phi - IZ & \end{cases} \tag{12}$$

Maximizing (12) with respect to Z, we get the following first-order conditions

$$\psi'(Z)v(A)[(\phi((2-\eta)e^*-1)+e^*] = I \tag{13}$$

if $s < \phi[(2-\eta)v(A)-1]$,

$$\psi'(Z)\phi v(A)(2-\eta)e^* = I \tag{14}$$

if $s \geq \phi[(2-\eta)v(A)-1]$.

Notice, that the marginal benefit from the innovation unsurprisingly decreases in η and s in both cases. Moreover, the optimal level of innovation increases in ϕ and $v(A)$.

Total and consumer welfare under tort law can be given as follows:

$$W^{TL} = \phi v(A) + (1-\psi(Z))\left[(1-e^*)\phi v(A) - \int_0^{e^*} e \text{ d}e - e^* s\right] - IZ + \\ \psi(Z)\Delta_1 + \begin{cases} \psi(Z)e^* v(A) & s < \phi[(2-\eta)v(A)-1] \\ \psi(Z)(\phi v(A)+\Delta_2) & s \geq \phi[(2-\eta)v(A)-1] \end{cases} \tag{15}$$

while

$$CW^{TL} = \psi(Z)\Delta_1 + (1-\psi(Z))(1-\eta)e^*\phi v(A) - (1-\psi(Z))\left[\int_0^{e^*} e \text{ d}e + e^* s\right] + \\ \begin{cases} 0 & s < \phi[(2-\eta)v(A)-1] \\ \psi(Z)(\Delta_2) & s \geq \phi[(2-\eta)v(A)-1] \end{cases} \tag{16}$$

where again $\Delta_t = (1-\phi)v(A)$ is the consumer surplus enjoyed by consumers consuming high-quality product in period t, where $t = 1, 2$.

3.3 Regulation

Another possible policy response is quality regulation. The regulator may ban the sale of products advertised as having a quality level A when it judges the actual quality level to be 0. Furthermore, we allow for the possibility that the regulator makes a mistake: it may not ban a product advertised as A although its actual quality level is 0. This can happen for various reasons: the regulator might have imperfect information about the product, or the firm may bribe the regulator to allow its product onto the market.[4] We capture all of these possibilities in a single probability parameter: let the probability of regulatory mistake be λ. Furthermore, we assume that consumers have some level of trust in the regulator and as a consequence update their prior belief that the product is a high quality from ϕ to $\hat{\phi}$, where $\hat{\phi} \geq \phi$. Moreover, we also assume that $\hat{\phi}$ decreases in λ and if $\lambda = 0$, i.e. regulation always screens out the bad product, the consumers will have complete trust in the product, i.e. $\hat{\phi} = 1$. On the other hand, if $\lambda = 1$, i.e. regulation never screens out the bad product, then $\hat{\phi} = \phi$, i.e. the existence of regulation will not affect the consumers' beliefs about product quality.

Let us first examine the firm's pricing and investment decisions under regulation. Initially, the firm can always sell any quality at $\hat{\phi}v(A)$. In the second-consumption period the high-quality product is sold at a price of either $v(A)$ (to those who choose to be informed) or $\hat{\phi}v(A)$ (to all consumers). However, notice that $\hat{\phi}v(A)^2$ is never greater than $\hat{\phi}v(A)$, thus as in the case of laissez-faire the firm is always better-off by serving all consumers. Yet, in the second-consumption period if the product is low-quality but the regulator approves it the firm can sell the product only to the consumers who choose to remain ignorant, at a price $\hat{\phi}v(A)$. If the regulator does not approve the low-quality product the firm makes zero profit at this last period.

Thus, the firm's expected profit can be written as

$$E\pi = \psi(Z)(2\hat{\phi}v(A)) + (1 - \psi(Z))\lambda[\hat{\phi}v(A) + (1 - \hat{\phi}v(A))\hat{\phi}v(A)] - IZ \tag{17}$$

Taking the first derivative of equation (17) with respect to Z yields the following first-

[4] One source of mistake might be that the product performs differently in the trial period and after it is brought to the market, as it recently turned out to be the case with some car manufacturers.

order condition:

$$\psi'(Z)\hat{\phi}v(A)[2-\lambda(2-\hat{\phi}v(A))] = I \tag{18}$$

Notice that, the higher the probability of mistaken regulation, the lower the incentive of the firm to innovate. Moreover, the effect of $v(A)$ and ϕ on innovation is positive. Intuitively a higher expected valuation means that more consumers choose to get informed and at the same time if regulation works reasonably well the firm can gain more if it produces a high-quality product. These effects increase the firm's incentive to innovate.

Total welfare and consumer welfare under regulation can be given as

$$W^R = \psi(Z)[2\hat{\phi}v(A) + \hat{\Delta}_1 + \hat{\Delta}_2] + (1-\psi(Z))\lambda\left[\hat{\phi}v(A) + (1-\hat{\phi}v(A))\hat{\phi}v(A) - \int_0^{\hat{\phi}v(A)} e \text{ de}\right] - IZ \tag{19}$$

and

$$CW^R = \psi(Z)[\hat{\Delta}_1 + \hat{\Delta}_2] - (1-\psi(Z))\lambda\left[\int_0^{\hat{\phi}v(A)} e \text{ de}\right] \tag{20}$$

where $\hat{\Delta}_t = (1-\hat{\phi})v(A)$ is the consumer surplus enjoyed by consumers consuming high-quality product in period t, where $t = 1, 2$.

3.4 Comparing policy responses

In the following in order to draw policy relevant conclusions we will compare total and consumer welfare under the above discussed policies and derive comparative statics results for some key variables. To make the analysis more tractable we will consider without loss of generality specific functional forms and variable values. In particular, we normalize the value of $v(A)$ to 1 and assume that $\psi(\cdot) = \sqrt{\cdot}$. Furthermore, we assume that $\hat{\phi} = 1-(1-\phi)\lambda$. Finally, we set the unit cost of innovation, i.e. I, to $\frac{1}{2}$.

Let us first consider the case, when both regulation and the court system is completely competent and/or incorruptible. It then follows that $\hat{\phi} = 1$, that is, consumers have perfect confidence in the product (as they, rightly, have perfect confidence in the regulator). i.e. $\eta = 0$ and $\lambda = 0$.

A well-functioning regulation dominates laissez-faire on total welfare. The main force behind this result is that with an effective regulator only the high-quality product can be sold, thus the firm has a very strong incentive to innovate. Furthermore, in this case consumers will never be 'disappointed' by the product. Regulation welfare-dominates tort law under low values of ϕ, while tort law dominates regulation for sufficiently high values of ϕ. This is because, as $\hat{\phi} = 1$, ϕ does not have an effect on W^R but it increases W^{TL} as a higher ϕ implies a larger number of informed consumers. Thus, for a higher ϕ even with a greater s tort law may welfare-dominate regulation. However, for any given ϕ welfare under tort law decreases in s as a higher litigation costs makes tort law less effective in incentivizing innovation, since fewer consumers will choose to get informed.

Regulation leads to lower consumer welfare than either laissez-faire, which follows from the fact that consumers have perfect confidence in the product and the monopolist will take advantage of this in its pricing behavior. Not surprisingly, under tort law consumer welfare is at least as high as with laissez-faire, since consumers will always get compensation if they happen to consume a low-quality product, provided that they choose to get informed and file a suit against the firm. Interestingly, consumer welfare does not always decrease in s. Instead, it first increases, then decreases in it. Even though a higher s means fewer consumers will choose to get informed which eventually leads to worse expected product quality, it also yields a lower psychic cost. Moreover, notice, that consumer welfare monotonically increases in ϕ only where it decreases in s. Otherwise, it first increases then decreases in it. The mechanism responsible for this is similar to the one we have seen with s. These results are illustrated in Figure 1.

HERE: FIGURE 1

Now let us consider cases where either tort law or regulation works perfectly, however, the other is not effective at all. If, for example, $\lambda = 0$ and $\eta = 1$ then the court system essentially leaves everything unchanged relative to laissez-faire. Hence we essentially compare laissez-faire with regulation. As we had seen it above, regulation is more desirable from a total welfare perspective, yet it is less desirable in terms of consumer welfare. In the reverse case ($\lambda = 1$ and $\eta = 0$), however, tort law most of the time dominates laissez-faire (in lieu of

regulation, which is completely ineffective in this case) on both total welfare and consumer welfare. Interestingly, however, for low values of ϕ coupled with high values of s total welfare is the greatest under laissez-faire. Even though the incentive to innovate is negatively effected by both a low ϕ and a high s, s only takes its effect on tort law. We do not observe this pattern when it comes to consumer welfare. The simple reason for this is that consumers also get compensated for consuming a low-quality product.

Next, consider cases where both regulation and tort law are, to some extent, effective, but highly imperfect. Take, for example, $\lambda = \frac{1}{2}$ and $\eta = \frac{1}{2}$. In this case, consumers will take advantage of tort law if and only if $s < \frac{\phi}{2}$, otherwise to file a case against the firm is prohibitively expensive. Therefore, the number of consumers who choose to be informed under tort law can be given as $e^* = \min\left\{1, \frac{3\phi}{2} - s\right\}$. Furthermore, the innovation level the monopolist is going to implement under tort law is $Z^{TL} = \min\left\{1, \frac{1}{16}(\phi(2 + 9\phi - 6s) - 4s)^2\right\}$, while under regulation it is $Z^R = \min\left\{1, \frac{1}{64}(1 + \phi)^2(5 + \phi)^2\right\}$. As a consequence, we have to differentiate between four subcases:

i) if $\phi < 2\sqrt{3} - 3$. Total welfare is always the greatest under regulation. This is not surprising given the low level of ϕ. Tort law, on the other hand, dominates laissez-faire only for low levels of s. The relative desirability of tort law from a total welfare perspective also increases in ϕ. In essence, if ϕ is relatively low then s has to be low as well in order for tort law to dominate laissez-faire. These second-best options can be important as a decrease in the effectiveness of regulation and/or an increase in its cost may decrease total welfare attainable with regulation. Interestingly regulation is not only the best from the point of view of total welfare but also when it comes to consumer welfare. That is, we arrive at a seemingly surprising conclusion: consumers might gain by regulation only when regulation works imperfectly. See Figure 2.

HERE: FIGURE 2

ii) if $2\sqrt{3} - 3 < \phi \leq \frac{1}{9}(\sqrt{37} - 1)$, then innovation under regulation at is its maximal level, while under tort law it is lower than that. Regulation is always the best from both a total welfare and a consumer welfare point of view. As s decreases, however, welfare

under tort law converges to welfare under regulation, although it never reaches its level. Tort law dominates laissez-faire under sufficiently low values of s. Similar relationships can be uncovered about consumer welfare. The effects of ϕ on welfares are similar as in the previous cases. See Figure 3.

HERE: FIGURE 3

iii) if $\frac{1}{9}(\sqrt{37}-1) \leq \phi < \frac{2}{3}$, then innovation under both regulation and tort law is at the maximum, i.e. $Z^R = Z^{TL} = 1$ even if not every consumer chooses to get informed. Total welfare under regulation is initially strictly greater than welfare under tort law (and laissez-faire), however, as ϕ increases and s decreases, the two converge, and eventually yield the same total welfare. Notice that this increase in total welfare under tort law is not due to more innovation as that is already at its maximum, rather due to an increase in the number of well-informed consumers. Since the firm serves only the well-informed consumers this results in an increase in the total surplus. When it comes to consumer welfare, regulation and tort law generates the same level. Note that this holds for every value of s. Given that product quality is high with certainty this might not come as a surprise, since consumers will never exercise the right to sue the firm, therefore they will not incur the cost s. Laissez-faire always generates a lower level of consumer welfare than the other two regimes, due to a lower level of innovation. These results are illustrated in Figure 4.

HERE: FIGURE 4

iv) if $\phi \geq \frac{2}{3}$, then innovation is maximal (which is unsurprising given Z was equal to 1 even at lower values of ϕ, and we have already established that innovation increases in ϕ under each of the possible policies) and every consumer chooses to be informed under tort law. Because of this, welfare under tort law and regulation is the same, i.e. $W^R = W^{TL} = \frac{2}{3}$, which is above W^{LF} throughout, however, welfare under laissez-faire converges to it as ϕ increases. Consumer welfare is even more interesting. Consumer welfare decreases

in ϕ under all policies, but decreases faster under regulation and tort law than under laissez-faire. Even though consumer welfare is initially larger under the former two policies, consumer welfare under laissez-faire converges to $CW^R = CW^{TL}$ from below. See Figure 5.

HERE: FIGURE 5

Finally, let us consider the case with $\eta = \lambda = 1$, that is, both regulation and tort law are completely ineffectual. Under these conditions, no consumer will make use of tort law, therefore we can safely ignore the existence of tort law. Regulation on the other hand generates the same results as laissez-faire, since it allows every type of products into the market. As consumers cannot trust the regulator their initial belief about product quality is unchanged relative to laissez-faire, i.e. $\hat{\phi} = \phi$. Hence, both pricing and innovation is the same under regulation and laissez-faire. However, if we assume some positive fixed cost of introducing and operating a regulatory system, laissez-faire is always the best policy. Total welfare increases monotonically in ϕ, however, ϕ and consumer welfare has a non-monotonic, inverted U-shaped relationship. We have already seen something similar in the first case, and the intuitive explanation is likewise. This is depicted in Figure 6.

HERE: FIGURE 6

4 Discussion

The main novelty of our results is that tort law has an additional advantage, beside the advantages discussed in the earlier economic literature: it is especially potent in incentivizing consumers to search for or listen to new information about the product. Hence, while results by Glaeser and Shleifer (2003) on the rise of the regulatory state are sound, if the court system is sufficiently well-functioning, tort law can still be better than regulation especially in markets where consumers have incentives to self-deceive. More surprisingly however, we

find laissez-faire to be sometimes optimal from a total welfare perspective even if the court system operates effectively.

In our analysis we analyzed a simple model in order to ensure tractability. We can, however, look at some possible modifications and how these modifications might affect our results. We may, for instance, assume a downward-sloping demand curve at the market level or even at the individual level. Suppose, for instance, that each consumer has a downward sloping demand curve, thus, they would like to consume more than one unit of the good. Pricing in such a case is standard monopoly pricing along the market demand curve. At price p the consumer, by listening to new information, saves not only p, but pQ. In this case consumers have a much stronger incentive to be informed. We may, therefore expect more self-deceiving behavior when consumers, at a given price, consume relatively few units of the good.

Another interesting aspect we have not touched on so far is whether the psychic cost of new information is heterogeneous across industries and if so, which industries we should expect it to manifest itself the most. Our model considered only one given industry, hence this omission. Still, it might be useful to sketch some intuitions on this issue. The first question that may arise is how consumers' preferences against new information might develop in the case of a particular product. We explicitly modeled consumer behavior so that consumers face the information disutility after they first consumed the product. The reason for this assumption is the intuition that while prior beliefs cannot be observed directly by others, consumption choice can be a useful proxy for beliefs. Hence, if consumers choose differently in the second consumption period, they basically signal to others that previously they held false beliefs about the product. For that reason, we expect information aversion to manifest itself more strongly in the case of products whose consumption is more public, either because it is visible to others or because it is a frequent topic of conversations (such as what kind of diet one follows). Also, we expect the information disutility to be greater when there is a connection between consuming the product and the consumer's personal identity. Consumption of clothes, cars or music, for instance, are heavily tied to identity, and increasingly the same is true for food choices.

We could, as we have indicated in our comparison of individual policies, incorporate into our analysis the cost of introducing and operating a regulatory system that deals with

misinformation. If such costs are substantial, then in some of the cases where we found regulation to be optimal it might not be optimal after the inclusion of these costs.

A further generalization of the model would be to consider an oligopoly instead of a monopoly in order to capture the strategic interactions present in such markets. Allowing for strategic interaction, however, would significantly complicate the analysis.

Another extension would be introducing more than two consumption periods, instead of just two. We could further enrich this model by assuming that over time consumers accumulate consumption capital (as in Becker and Murphy, 1988) that influences the disutility they receive from receiving bad news about the product. Intuitively, the more a consumer has already consumed from a product, the greater pain she will feel if it turns out the product is of low quality.

More formally, suppose that the disutility from new (negative) information depends on a consumption stock or consumption capital S, which is built up in previous consumption periods, so that we have a function $e(S)$, where $e'(S) > 0$, and $e''(S) \leq 0$. S may also influence the marginal utility of consuming the product, as in rational addiction models, but here we are more interested in its effect on the disutility from information about the product. In building this extended model we may consider consumers to be myopic with regard to how their present consumption effects their future information costs, however, in our view it is both more realistic and more instructive to assume that they are aware that they are accumulating consumption capital and that will have an effect on their decision of getting or not getting informed. If consumers know that as they increase their consumption of a product, they will become less likely to acquire information about it later on, they will optimally be less trusting toward the product, that is, they will have a lower ϕ. Furthermore, they will have an incentive to procure information early on. Note also that at period t the consumer, if she listens to new information and the product turns out to be low quality, saves $\beta^{n-t}\phi v(A)$, where β is the discount factor. An implication of this is that older consumers and those with terminal illnesses might be less willing to listen to new information, as they rationally expect to consume in a smaller number of remaining periods. Older consumers presumably also have more consumption capital, which again makes them less likely to listen to new information about the product.

Although our paper focuses on ordinary product markets, a particular market where we

would expect rational self-deception to be an especially potent player is the political market. Individuals there have a very low marginal effect as voters on political outcomes, so they can stick to their prior beliefs at a very low price.

Finally, another extension could be to consider naive-Bayesian consumers. In such a case if, for instance, regulation is completely ineffective, consumers might still believe, with some probability, that it is competent, therefore $\hat{\phi}$ would not necessarily be equal to ϕ. It would likely modify our result to some extent, but not our general qualitative predictions.

The results and extensions presented in this article apply regardless of whether the information costs arise due to physical or psychic reasons, that is, regardless of whether consumers face a standard information cost or a disutility when obtaining information. We stressed the role of disutility because in most cases, even if consumers face information costs, there would be businesses or other parties who would have an incentive to provide free information to consumers. In many settings information problems persist only if consumers are unwilling to accept or act on new information. This is, in short, why we focused on this (admittedly special) case in this paper.

5 Conclusion

In this paper we have analyzed the effect of information avoidance in a market setting. We show that consumers' tendency to stay uninformed can persist even with zero physical information costs. However, market as well as institutional forces can dampen the effect of information avoidance. In particular, strict tort liability or ex ante product regulation can increase welfare, however, relying only on market forces (i.e. laissez-faire) can lead to better outcomes in certain cases. Our findings add to the growing comparative literature on tort law and regulation, as we argue that one advantage of tort law, not emphasized in the literature so far, is that it increases consumers' incentives to get informed. To the findings of the previous literature (e.g. Glaeser and Shleifer, 2003) we add another argument as to why ex ante regulation might be necessary in certain markets, however, we also emphasize a so far neglected benefit of relying on tort law: the right to sue strengthens the incentive to acquire information about the product. The relative advantage of tort law, regulation and laissez-faire depends on some key parameter values. Naturally, further research is likely to shed more light on the effect and desirability of these different policies.

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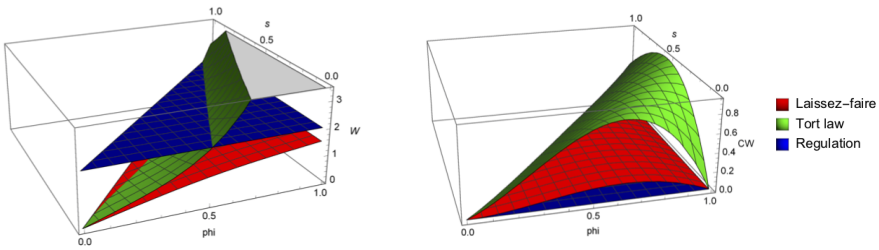
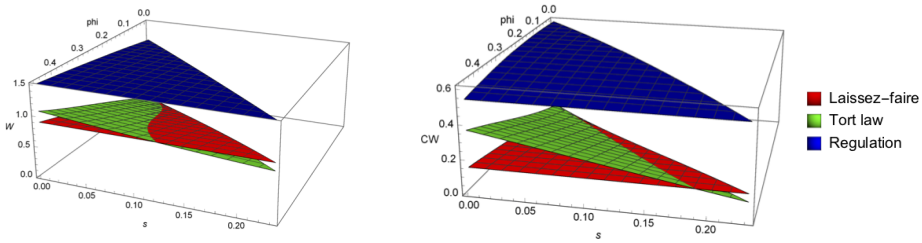


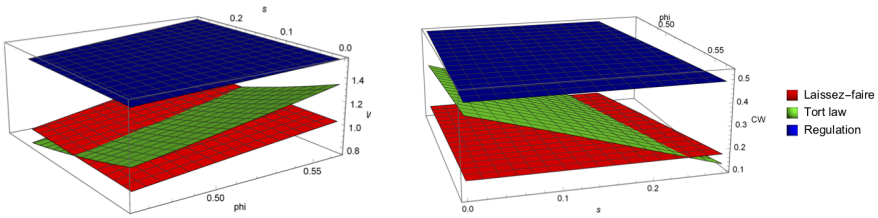
(a) Total welfare (b) Consumer welfare

Figure 1: Total and consumer welfare if $\eta = 0$ and $\lambda = 0$.



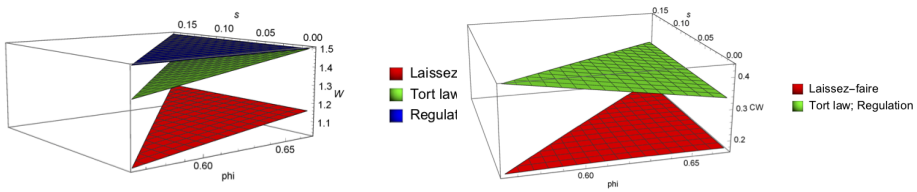
(a) Total welfare (b) Consumer welfare

Figure 2: Total and consumer welfare if $\eta = \frac{1}{2}$ and $\lambda = \frac{1}{2}$, while $\phi < 2\sqrt{3} - 3$



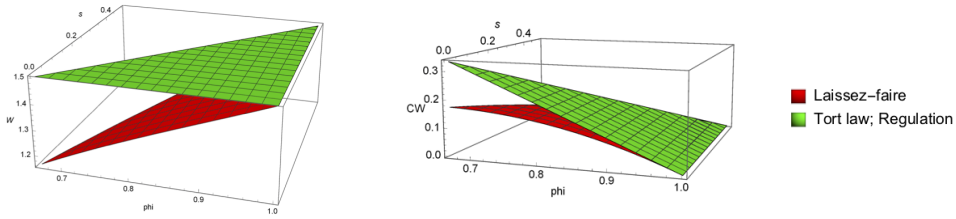
(a) Total welfare (b) Consumer welfare

Figure 3: Total and consumer welfare if $\eta = \frac{1}{2}$ and $\lambda = \frac{1}{2}$, while $2\sqrt{3} - 3 < \phi \leq \frac{1}{9}(\sqrt{37} - 1)$



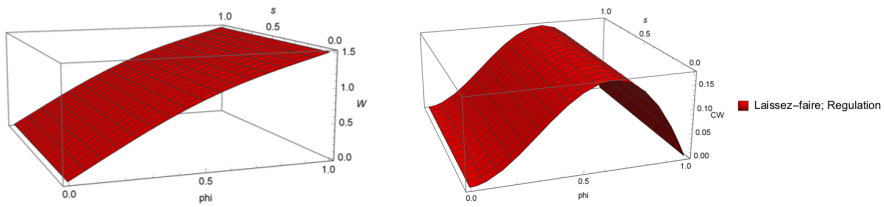
(a) Total welfare (b) Consumer welfare

Figure 4: Total and consumer welfare if $\eta = \frac{1}{2}$ and $\lambda = \frac{1}{2}$, while $\frac{1}{9}(\sqrt{37} - 1) \leq \phi < \frac{2}{3}$



(a) Total welfare (b) Consumer welfare

Figure 5: Total and consumer welfare if $\eta = \frac{1}{2}$ and $\lambda = \frac{1}{2}$, while $\phi \geq \frac{2}{3}$



(a) Total welfare (b) Consumer welfare

Figure 6: Total and consumer welfare if $\eta = 1$ and $\lambda = 1$.