Browsing versus Studying: A Pro-Market Case for Regulation*

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June 29, 2020

Abstract

We identify a competition-policy-based argument for regulating the secondary features of complex or complexly-priced products when consumers have limited attention. Limited attention implies that consumers can only "study" a small number of complex products in full, while—by failing to check secondary features—they can superficially "browse" more. Interventions limiting ex-post consumer harm through safety regulations, caps on certain fees, or other methods induce consumers to do more or more meaningful browsing, enhancing competition. We show that for a pro-competitive effect to obtain, the regulation must apply to the secondary features, and not to the total price or value of the product. As an auxiliary positive prediction, we establish that because low-value consumers are often more likely to study—and therefore less likely to browse—than high-value consumers, the average price consumers pay can be increasing in the share of low-value consumers. We discuss applications of our insights to health-insurance choice, the European Union's principle on unfair contract terms, food safety in developing countries, and the shopping behavior of (and prices paid by) low-income and high-income consumers.

Keywords: limited attention, regulation, search, hidden prices, shrouding
JEL codes: D18, D43, D83

*We thank four referees, Mark Armstrong, Andrzej Baniak, Keith Ericson, Nicola Gennaioli, Jonathan Gruber, Bard Harstad, Alex Imas, Daniel Krähmer, Alexander Morell, Gautam Rao, Antonio Rosato, Joshua Schwartzstein, Amma Panin, and seminar as well as conference audiences for many insightful comments. Heidhues and Kőszegi thank the European Research Council for financial support under Grant #788918. Johnen thanks the Fédération Wallonie-Bruxelles for funding the Action de recherche concerée grant 19/24-101 'PROSEco', and the FNRS and FWO for the Excellence of Science project 30544469 'IWABE'. Anna Vályogos provided research assistance.

1 Introduction

In this paper, we identify a novel competition-policy-based argument for regulating the secondary features of complex or complexly-priced products when consumers have limited attention. Consumers shopping for complex products must decide how much attention to devote to each offer. A mobile-phone buyer, for instance, may spend a little bit of effort to find out an offer's basic features (e.g., the monthly fee and amount of included data), or more effort to also understand the contract's precise conditions, additional fees, and potential traps. A consumer with limited attention can do more of the former "browsing" than the latter "studying," and there may also be a non-trivial tradeoff between the two activities. Because regulating secondary product features—such as the add-on prices or safety of a product, or the working conditions of a job—makes studying less essential in equilibrium, it allows consumers to do more comparison shopping and thereby enhances competition between firms.

After discussing evidence and arguments in favor of our key premises in Section 2, we develop our main insights in Section 3. We assume that firms with identical marginal costs of production sell homogeneous products to rational consumers looking to buy at most one item. Each firm can split the price a consumer must pay for its product into two additive components, a more salient headline price and a less salient additional price. For instance, the total price a consumer pays for a mutual fund is determined by the front load as well as the management fee, and the total price a consumer pays for an appliance is determined by the appliance's price as well as its energy efficiency. To model a tradeoff between studying and browsing in the sharpest possible way, we posit that a consumer can observe either the headline and additional prices of one firm, or only the headline prices of two firms.

In this market, firms charge the monopoly price to all consumers who purchase: consumers must study to guard against price gouging, so they do not have sufficient capacity to meaningfully compare products, eliminating competition. Now consider a cap on the additional price that (for the sake of illustration) is above firms' equilibrium additional prices. We interpret the cap as any regulation—such as a minimum safety standard for physical products or a restriction on certain fees for financial products—that limits how much consumers can be hurt by hidden features after

agreeing to purchase. In a classical model, such a price cap would be irrelevant both because it is not binding, and because it does not restrict a firm's total price at all. In our model, in contrast, the cap induces perfect competition: it is now safe for consumers to redirect their attention from studying to browsing, leading firms to compete.

Natural modifications of our model yield additional important points. First, our policy result also holds when the consumer does not choose which prices to pay attention to—so there is no tradeoff between browsing and studying—but she observes more headline than additional prices. Such situations of "asymmetric shrouding" arise, for instance, if consumers have developed trust with their legacy energy provider, and it would be difficult or impossible for them to obtain full information about other providers. Second, regulation also works if charging an additional price is inefficient—e.g., because it takes the form of shortfalls in product safety consumers value above cost—but it does so only if it is sufficiently strict. Third, however, for our mechanism to be operational, the regulatory cap must apply to the additional price and *not* to the total price, even though it is ultimately the total price that consumers (and firms) care about. A cap on the total price does not prevent firms from using the additional price to price gouge consumers, so it does not make browsing safe. Hence, there is no competitive pressure, and firms charge the highest legal total price at which consumers are willing to buy.

In Section 4, we turn to the (analytically more complicated) setting in which consumers can avoid the additional price of a purchased product, but only if they have studied the product. We distinguish two types of consumers according to whether their cost of avoiding the additional price is low (low-value consumers) or high (high-value consumers). In the context of mobile phones, for instance, the headline and additional prices could be the monthly fee and the fees for extra services (e.g., data above the plan limit, roaming), respectively, where extra services are especially attractive to high-value consumers and the charges for them can be avoided only by studying what is covered in the monthly fee and then paying attention to phone usage.

We begin with identifying outcomes when regulation capping the additional price is in place. In equilibrium, firms charge the maximum additional price. Since high-value consumers prefer not to avoid the additional price, for the range of equilibrium headline prices they browse. More subtlely,

we show that in equilibrium low-value consumers always study and avoid the additional price, as this can save them more money than browsing in the hope of finding a lower headline price. These search decisions in turn imply that the average price consumers pay is *increasing* in the share of low-value consumers. Although high-value consumers pay a higher average price than low-value consumers, their browsing spurs competition and thereby lowers average prices—with the latter indirect effect dominating the former direct effect.

We then return to analyzing the effects of regulatory changes. Replicating the logic from our first model, we show that deregulation lowers competition: if there is no cap on the additional price, then each firm becomes a local monopolist. Motivated by the suggestions of Barr et al. (2008) and Thaler ("Mortgages Made Simpler," New York Times, July 4, 2009), we also ask what happens if firms are required to offer a "plain-vanilla" product with no additional price, they can impose an additional price only if a consumer consents, and a consumer can refuse to consent without studying. Fixing prices and consumers' search behavior, this regulation has no effect—high-value consumers pay and low-value consumers avoid the additional price. Yet because low-value consumers can now simply not consider alternatives to the plain-vanilla product, they can browse, inducing perfect competition between firms.

In Section 5, we outline a few applications of our framework. Consistent with our result that regulation facilitates comparison shopping, a 2010 reform defining minimum coverage levels in the Massachusetts health-insurance exchange led consumers to become more sensitive to the financial characteristics of plans (Ericson and Starc, 2016). Furthermore, our main insights on regulation help make sense of the European Union's principle on unfair contract terms. Much like our cap on the additional price, the principle effectively prohibits standard business-to-consumer contracts from using provisions that are too unclear or surprising relative to how things are normally done, and that are too disadvantageous to the consumer. And consistent with our insight that the additional price rather than the total price must be regulated, the principle applies only to the individual terms in a contract, not to the entire transaction. On the other side, we illustrate the problems with an unregulated market using the example of food safety in developing countries. Although consumers express a demand for, and producers appear capable of supplying, safe food, the market

works rather imperfectly: many or most consumers either buy unsafe food on a competitive market, or safe food from expensive trusted suppliers. More stringent (and properly enforced) regulations would increase the welfare of both types of consumers by making the competitive market more attractive. Finally, our prediction that low-value consumers study more than high-value consumers is consistent with evidence that lower-income consumers buy the same products at lower prices than higher-income consumers shopping at the same stores (e.g., Broda et al., 2009). Our model suggests that lower-income consumers also browse less than higher-income consumers, which helps explain the finding that consumers in lower-income neighborhoods pay higher prices for various goods and services (e.g., Fellowes, 2006).

In Section 6, we discuss related literature on regulation. While previous pro-market arguments for regulation suggest similar interventions in many circumstances, our argument is conceptually distinct from them. In particular, our results that sufficiently tight regulations of secondary features increase competition, but less tight regulations of secondary features may not, and regulations of the total price never do, are not implied by previous models. We conclude in Section 7.

2 Premises

Our main models are based on two central premises. The first, and at this stage of the literature uncontroversial, premise is that many products feature price or contract components that consumers may not fully observe or understand when making purchase decisions. Numerous models in industrial organization starting from Ellison (2005) and Gabaix and Laibson (2006) presume such hidden prices in some form, and researchers have documented them in a variety of markets.[1] We deviate from this literature only in presuming that consumers can devote attention to understanding complex products better.

Our second, more novel premise concerns consumers' capacity to compare options. For most of the paper, we posit that when investigating available products, a consumer faces a tradeoff between

[1] See, e.g., Spiegler (2006), Armstrong and Chen (2009), Grubb (2015a), Gamp and Krähmer (2017), Bachi and Spiegler (2018) and Gamp (2019) for theoretical contributions, and Choi et al. (2010), Anagol and Kim (2012), Duarte and Hastings (2012), Agarwal et al. (2015, 2016) and Grubb and Osborne (2015) for evidence. Heidhues and Kőszegi (2018) provide a review.

browsing and studying. We have not found direct evidence of this tradeoff. But given the self-evident observation that consumers must make decisions on how carefully to evaluate a complex product, the tradeoff arises if consumers exhibit increasing marginal search costs. Consistent with this notion, multiple researchers (De Los Santos et al., 2012, Consumer Financial Protection Bureau, 2015, Honka and Chintagunta, 2017, Alexandrov and Koulayev, 2018) document that consumers' propensity to search for other, readily available alternatives drops off sharply after investigating a few options.[2] Indeed, while search models overwhelmingly assume linear search costs, a few previous authors (e.g., Carlin and Ederer, 2012, Ellison and Wolitzky, 2012) have argued that convex search costs are plausible. Importantly, the possibility that search costs are convex does not mean that a consumer's general cost of time is convex in the relevant range. A consumer may, for instance, quickly get tired or frustrated with reading and comparing health-insurance contracts, even while her best alternative use of time remains catching up on her Facebook news feed.[3]

In Section 3.2, we analyze a model with "asymmetric shrouding": the set of prices a consumer observes is fixed—so there is no tradeoff between browsing and studying—but it includes more headline prices than additional prices. Most importantly, consumers may have learned about or developed trust with a particular provider through personal contact, acquaintances, or having traded previously, with little or no scope for them to obtain information about other providers. This possibility is in the spirit of Gennaioli et al. (2015), where an investor's trust in different fund managers ("money doctors"), and therefore her perceived risk of investment in different funds, are asymmetric.[4] Alternatively, a price-comparison site may allow consumers to look at many headline prices quickly, but it cannot provide the same reassurance regarding additional prices. This possibility is consistent with evidence by Ellison and Ellison (2009), who document that sellers on a price-comparison website charge add-on prices that only become apparent once the

[2] Bolstering the above is evidence from experiments in which the financial costs of search are induced to be linear, yet subjects' behavior exhibits patterns characteristic of convex search costs (Kogut, 1990, Brown et al., 2011). A natural explanation is that subjects have a convex subjective cost of time.

[3] Beyond adding hidden prices and assuming convex search costs, our model also deviates from the vast majority of the search literature by assuming that a consumer directs her attention toward the most valuable information. Other papers that investigate such directed search are De Clippel et al. (2014), Haan et al. (2015), and Armstrong (2016).

[4] Trust is also important in other markets. In the UK electricity market, for instance, 65% of consumers believe that switching suppliers is risky due to the possibility of higher-than-expected costs, double billing, service interruption, or the bankruptcy of the supplier (Office of Gas and Electricity Markets, 2018).

consumer visits the seller's own site.

The browsing-studying tradeoff and asymmetric shrouding yield somewhat different results. Our conclusions regarding policy hold under both assumptions, although they are stronger when there is a browsing-studying tradeoff. Furthermore, the tradeoff is essential for our predictions in Section 4 regarding the behavior of, and prices paid by, different types of consumers.

3 Main Mechanism: Unavoidable Additional Price

In this section, we analyze the effects of regulation when the additional price is unavoidable. In the market for mutual funds, for instance, an investor pays not only the front load, but also the management fee charged by a fund. In the market for electric appliances, a buyer's surplus depends not only on the purchase price, but also on the energy efficiency of a product. And in the labor market, a worker cares not only about the wage, but also about the working conditions—such as safety—of a job. Furthermore, in all of these cases the core price—the front load, appliance price, or wage—is more easily observable to consumers because it is paid earlier and/or it is easier to figure out upon looking at the product.

Throughout the paper, our modeling strategy is to analyze a basic stylized model (Sections 3.1 and 4.1) and then consider a number of variants and extensions. In each case, we fully analyze the regulated and unregulated versions of the basic model by considering both the existence and the uniqueness of equilibria. When analyzing alternative models, however, we merely look for equilibria akin to those we have found in our basic models, and largely do not consider the technically difficult issue of equilibrium uniqueness.

3.1 Basic Model

There are $I \geq 2$ firms selling a homogeneous product with cost c. Each firm i chooses a headline price $f_i \in \mathbb{R}$ and an additional price $a_i \geq 0$. Consumers of mass one are looking to buy at most one product, and value all products at $v > c$. Each consumer sees the (identity and) headline price of one randomly chosen firm automatically. A consumer assigned to firm i can then learn exactly one more thing: either the additional price a_i of firm i—which we refer to as "studying"—or the

(identity and) headline price f_j of a randomly chosen rival j—which we refer to as "browsing." After making these price observations, the consumer can buy from a firm whose headline price she has seen. If a consumer purchases product i, she pays a total price of $f_i + a_i$. To rule out fragile Diamond-paradox-type equilibria that unravel with an arbitrarily small inducement to visit multiple stores, we assume that some (potentially small positive mass of) consumers always browse. We look for perfect Bayesian equilibria.

Our specification corresponds most directly to situations in which a_i is a fee or price. More generally, a_i can be any secondary feature over which the firm and a consumer have conflicting interests. An unsafe product, for instance, benefits the firm in the form of cost savings and hurts the consumer in the form of potential harm. Below, we discuss how our results are qualified when a positive a_i not only transfers money from the consumer to the firm, but is also inefficient.

Our first proposition says that the market does not work for consumers:[5]

Proposition 1. *Suppose that some consumers browse. In any equilibrium in which a positive share of consumers purchase, these consumers pay a total price of v. Such equilibria exist.*

In equilibrium, each firm acts as a monopolist, extracting all rents from all consumers who purchase. Intuitively, consumers who purchase must study, otherwise firms could raise the additional prices on them at will. Being on guard against price gouging, consumers do not have sufficient capacity to compare products, so there is no competition between firms. To make matters worse, consumers may inefficiently browse and give up on purchasing, and firms have no way of inducing them to change their minds. These points imply that although the equilibrium resembles a Diamond-paradox outcome on the surface, it is based on a different economic logic—that purchase requires using one's limited attention to avoid being price gouged—and is therefore not fragile to some consumers visiting multiple firms.

Now suppose that the social planner imposes a cap of $\overline{a} \geq 0$ on the additional price, constraining the extent to which consumers can be hurt after agreeing to purchase. Such a cap is consistent with regulatory limits on fees for financial products, minimum safety standards for physical products

[5] Following common convention, in stating and discussing our propositions we ignore the possibility that firms choose suboptimal prices with probability zero.

or jobs, potential restrictions on labor-market contracts (for instance the elimination of complex arbitration and non-compete clauses), as well as a tort regime of strict liability (in which consumers can obtain compensation for harm through legal action). Consumers know that the regulation is in place, but—fortunately for those with limited attention—they do not need to be aware of any specifics. In particular, there is no need for consumers to think through or understand the potential sources of ex-post harm or how the social planner goes about limiting it. So long as the consumer trusts the social planner, she does not need to know, for instance, the conceivable list of extra fees for a service or the spectrum of illnesses a food item can carry.

Although our result holds for any $\overline{a} \geq 0$, for illustrative purposes it is worth pointing out the special case when $\overline{a}$ exceeds firms' no-regulation additional prices, such as when all firms charge prices f, a satisfying $f + a = v$ and $a < \overline{a}$. In a classical market in which consumers observe all prices, and even in a classical search environment in which consumers observe all characteristics of a searched product, this price cap would be ineffective for two reasons: (i) it is not binding; and, independently of whether it is binding, (ii) it does not restrict a firm's total price at all. In our model, in contrast, the cap turns firms from local monopolists to perfect competitors:

Proposition 2. *Suppose that some consumers browse and the social planner imposes a cap of* $\overline{a} \geq 0$ *on the additional price. In the unique equilibrium, all consumers buy at a total price equal to marginal cost* c*.*

The competition-inducing effect of regulation arises from two mechanisms. First, regulation makes browsing more effective in selecting between products. In an unregulated market, any cut in the headline price can be undone by an increase in the additional price, so the cut is meaningless for a consumer not observing the additional price. In a regulated market, however, there are cuts in the headline price that cannot be fully undone by an increase in the additional price, so the headline price is an informative signal of the total price. This is what undermines the no-regulation equilibrium above.[6]

The second mechanism, our main interest in this paper, centers on the effect of regulation

[6] Suppose all competitors of firm i charge the prices f, a satisfying $f + a = v$, but firm i deviates and instead chooses $f_i = v - \overline{a} - \epsilon, a_i = \overline{a}$ for some $\epsilon > 0$. Then, consumers browsing firm i realize that its total price is at most $f_i + \overline{a} = v - \epsilon$, so that they all buy from firm i. For a sufficiently small ϵ, therefore, firm i's deviation is profitable.

on consumer search behavior. In equilibrium, consumers know that the additional price is at the maximum level, so—not needing to study—they shift to browsing. This is what enforces the perfectly competitive outcome in Proposition 2.

Note that if $\overline{a}$ exceeds firms' no-regulation additional prices, then regulation induces firms to raise their additional prices to $\overline{a}$. Many observers and policymakers have recognized the potential for such a reaction—often interpreted as a collusive focal-point effect—and used it to argue that regulatory caps can backfire and should therefore be avoided. In our model, the regulation is strongly pro-competitive despite the seemingly perverse reaction.[7]

A cap on the total price rather than the additional price has a radically different effect:

Proposition 3. *Suppose that some consumers browse and the social planner imposes a cap of $\bar{t} > c$ on the total price. In any equilibrium in which a positive share of consumers purchase, these consumers pay a total price of* $\min\{\bar{t}, v\}$. *Such equilibria exist.*

Regulating the total price has no competition-enhancing effect: firms charge the highest legal total price at which consumers are willing to buy. As in the unregulated market, any cut in the headline price can be offset by an increase in the additional price, so browsing consumers cannot meaningfully compare prices. It is the additional price—the secondary feature—that the social planner must regulate to encourage competition. An immediate implication is that reducing prices to marginal cost through regulation of the total price requires knowing the cost perfectly and adjusting the regulation whenever these costs change. Achieving marginal-cost pricing through regulation of the additional price, on the other hand, requires neither knowledge of the cost nor adjustment of the regulation when costs change.

[7] The extreme result that a non-binding, even arbitrarily high, cap on the additional price increases competition is unrealistic and not robust to reasonable modifications of our model. First, in many other settings we discuss below, only tighter caps work effectively. Second, a high cap is only consistent with competition if a high additional price can be competed away by decreases in the headline price, and for many reasons this may not be the case (Heidhues and Kőszegi, 2018). Consider, for example, a floor of zero on the headline price. Clearly, the competitive outcome in Proposition 2 is still an equilibrium if $\overline{a} \leq c$, but it is not feasible if $\overline{a} > c$. If $c < \overline{a} < v$—so that consumers cannot regret purchasing if the headline price is zero—then it is safe for consumers to browse, so an equilibrium economically similar to that in Proposition 2 exists: firms charge an additional price of $\overline{a}$, and compete as hard as is feasible on the headline price, charging zero. If $\overline{a}$ is very high, however, even such an equilibrium does not exist, as consumers need to study to protect themselves against price gouging. In this case, purchase can only occur at a total price of v.

3.2 Asymmetric Shrouding

To study situations of asymmetric shrouding, we modify our model by assuming that the set of prices a consumer observes is fixed, with each consumer learning exactly one randomly chosen additional price a_i, the corresponding headline price f_i, and at least one more randomly chosen headline price f_j.

It is easy to see that the equilibria in Propositions 1 and 2 both survive in this version of our model. In an equilibrium of the unregulated market, consumers know that any cut in the headline price is offset by an increase in the additional price, so they only buy from the firm whose additional price they observe and pay a total price of v. While this equilibrium outcome is now not unique, it becomes unique in natural variants in which consumers fear that an additional price they do not observe hides a high total price.[8] And in an equilibrium of the regulated market, consumers know that all firms charge the maximum additional price, so they choose a firm with the cheapest headline price, resulting in perfect competition and a total price of c.

The finding that regulation results in perfect competition under asymmetric shrouding shows that consumers' substitution between studying and browsing is not indispensable for a pro-competitive regulatory effect to arise. But such substitution does make the effect more reliable and powerful. To illustrate, suppose that in the unregulated market consumers only observe one headline price (instead of at least two) and the corresponding additional price. If every consumer sees a fixed set of prices, then regulation has no effect on the total price consumers pay; but if consumers can switch from studying to browsing, then regulation results in perfect competition. More generally, if a positive fraction of consumers sees a fixed set of prices, then regulation cannot result in perfect competition (a firm could profitably deviate to take advantage of consumers not looking at other firms).

An important implicit assumption of our model is that charging an additional price carries no efficiency cost. In some settings, this is clearly unrealistic; for instance, a consumer's loss in

[8] To formalize this fear, suppose that there is, or consumers suspect that there is, a fringe of firms whose additional prices no one observes, or whose costs and therefore total prices are very high ($\gg v$). In this situation, a consumer observing a cut in the headline price may rationally worry that the firm might be such a fringe firm, and therefore she does not buy from the firm.

value from reduced food safety can be much higher than producers' cost savings. To capture such situations, we consider a variant of our asymmetric-shrouding model in which consumers observe all headline prices, there is a cap $\overline{a}$ on the additional price, and a consumer's utility from buying product i at prices f_i, a_i is $v - f_i - ra_i$, where $r > 1$ measures the inefficiency associated with the additional price. Because it is both technically convenient and realistic, we also assume that there is a set of fringe firms whose additional prices no consumer observes. Then, a natural equilibrium involves the following: fringe firms charge $f = c - \overline{a}, a = \overline{a}$, other firms charge $f = \min\{v, c + (r-1)\overline{a}\}, a = 0$, and each consumer buys at the latter prices from the firm she is assigned to. If consumers are heterogeneous in r, then it can also happen that consumers with a low r purchase from a fringe firm, where they can obtain an inefficient version of the product at a competitive price.

Like in our previous models, regulation of the additional price can benefit consumers. But unlike in our previous models, the strictness of the regulation also matters. If $\overline{a}$ is very high, then buying from a firm with an unobservable additional price is unattractive. Hence, competition from these firms does not prevent other firms from exploiting their assigned consumers. As regulation becomes stricter, firms with unobservable additional prices become more attractive to consumers, lowering the prices other firms charge. Even if consumers are heterogeneous in r, all consumers benefit from further decreases in $\overline{a}$: those buying from fringe firms obtain more efficient products, and those buying from their assigned firms obtain cheaper products.[9]

3.3 Regulation versus Certification

We argue that for consumers with limited attention, government certification cannot guarantee the type of reassurance about the additional price that regulation provides in our model. In the most common interpretation adopted in the literature, the role of certification is to disclose information that firms do not (or cannot credibly) disclose. But by positing that all relevant information is available to consumers, our model already assumes that truthful disclosure takes

[9] Curiously, in the range where all consumers' relevant outside option is buying from the fringe (rather than not buying), the set of consumers choosing the two markets is unaffected by $\overline{a}$. To see this, suppose that H_i is the distribution of r among firm i's assigned consumers. Then, assigned consumers buy from firm i if $f_i \leq c + (r-1)\overline{a}$, or $r \geq 1 + (f_i - c)/\overline{a}$. Hence, firm i's profit is $(f_i - c)[1 - H_i(1 + (f_i - c)/\overline{a})]$, which is proportional to $[(f_i - c)/\overline{a}]\,[1 - H_i(1 + (f_i - c)/\overline{a})]$. At the optimum, therefore, $(f_i - c)/\overline{a}$ is independent of $\overline{a}$, and hence so is the set of assigned consumers buying from firm i.

place, implicitly presuming that disclosure regulation is in place. Since the problem is not with the availability of information, but with consumers' ability to digest the information, it is unclear how the government (also) disclosing the information would help. Reading and understanding a certification of additional fees and features—no matter how simple or complex—is not necessarily easier than reading and understanding the features as disclosed by the firm.[10]

In an alternative interpretation, certification amounts to disclosing whether a product meets the government's standards, without elaborating on the specific features of the product. In our formal model, a government may certify that $a_i \leq \overline{a}$ without revealing a_i. Indeed, such seal-of-approval-type certification requires less attention from the consumer, and may be the right policy in some circumstances (e.g., organic foods). Still, checking whether a product is certified requires some attention from a consumer, and for many products and many types of certification, this can add up to a large amount of total attention. Again, therefore, certification does not fully alleviate the limited-attention issue at the heart of our model. Furthermore, a reliable system of certification might be more difficult to manage in practice than across-the-board regulation. Both certification and regulation require monitoring producers. Unlike regulation, however, certification also requires keeping track of approved and not approved products (e.g., safe and unsafe foods) separately in the supply chain. Hence, if sufficiently many people would prefer certified products anyway, regulation is a more efficient or more pro-competitive alternative. For instance, presumably most consumers prefer safe food, so the government not only certifies safe foods, it bans unsafe foods.

4 Avoidable Additional Price

In this section, we consider situations in which the additional price is avoidable, beginning with a regulated market.

[10] Private certification is even less helpful. It is a widely recognized concern that profit-maximizing certifiers do not necessarily help consumers: the certification may not involve everything a consumer cares about, and the certifier may—in exchange for kickbacks—even aid firms in hiding information from consumers (see, e.g., Murooka, 2015, and the references therein). In such an environment, consumers can only be assured about additional prices if they study whether the certifier is trustworthy and what exactly it certifies.

4.1 Setup

Most of our assumptions are the same as in our basic model of Section 3.1. We suppose that there are $I \geq 2$ firms selling a homogeneous product with cost c to consumers looking to buy at most one item, which they value strictly above c. Each firm i offers a contract consisting of a headline price f_i and an additional price $a_i \in [0, \overline{a}]$. Each consumer sees the (identity and) headline price of one randomly chosen firm automatically. A consumer assigned to firm i can then observe either the additional price a_i of firm i (studying) or the (identity and) headline price f_j of a randomly chosen rival j (browsing), and cannot learn anything else. A consumer can only buy from a firm if she has seen that firm's headline price.

We now modify this setup in two ways. First, we posit that a consumer can avoid the additional price of her purchased product, but only if she has studied the product. Second, we suppose that there are two types of consumers. Low-value consumers can costlessly avoid the additional price, so their utility from purchasing product i is $v_L - f_i$ if they have studied product i and $v_L - f_i - a_i$ if they have not studied product i. High-value consumers, in contrast, find it excessively costly to avoid the additional price, so their utility from purchasing product i is $v_H - f_i - a_i$ independently of whether they have studied product i. To capture the idea that high-value consumers always get a greater consumption utility from purchasing, we suppose that $v_H > v_L + \overline{a}$. The share of low-value consumers is α.

A crucial new assumption above is that avoiding the additional price requires studying. In our primary interpretation, this is the case because avoiding the additional price requires knowing when exactly it is charged. For instance, if a consumer wants to avoid additional fees postulated in her mortgage contract, then she has to find out what is in the contract.[11] More simply, the avoidance behavior itself might take attentional resources. For instance, a consumer might use a money order instead of a—significantly more convenient—check to avoid bank overdraft charges.

As a specific application, consider mobile phones. We can think of f_i as the monthly fee and a_i as the additional charges for roaming, extra minutes or data, or other services. To avoid the

[11] In the previous version of our paper (Heidhues et al., 2018), we provide a microfoundation for this assumption by allowing firms to choose the conditions under which the additional price is charged, and find the same results as those below.

additional price, a consumer must know what triggers extra charges and she must pay attention to her phone usage, so it requires studying. While low-value consumers are willing to abide by restrictions on usage, high-value consumers prefer flexibility in when, where, and how they use their phones. The cap $\overline{a}$ on the additional price could come from regulation or the threat of regulation or legal action.[12]

We look for perfect Bayesian equilibria,[13] imposing three mild equilibrium-selection assumptions.[14] First, some (potentially small positive mass of) high-value consumers browse. As before, this allows us to rule out fragile Diamond-paradox-type equilibria, such as the outcome when all firms set $v_L, \overline{a}$ and all consumers study. Second, firms—realizing, by sequential rationality, that studying low-value consumers always avoid a_i—choose a_i to optimally target some mix of studying high-value consumers and browsing (high- or low-value) consumers, and consumers believe firms do so for equilibrium as well as out-of-equilibrium headline prices.[15] This allows us to argue that if a consumer observes an off-equilibrium cut in the headline price, then she does not unreasonably infer that the additional price must be low. Third, whenever a consumer type is indifferent between browsing and studying, the type studies with a fixed probability; and whenever a consumer with a fixed type and search behavior is indifferent between purchasing and not purchasing, she purchases with a fixed probability. This rules out coordination by consumers on a variable that is payoff-irrelevant for themselves.

[12] To abstract from other issues, our model assumes that all consumers have the same set of search strategies available, implicitly imposing that they have the same search costs. The possibility that low-value and high-value consumers face different search costs does not seem to interact with the effects we identify. In addition, it is unclear which type faces higher search costs. For instance, Kaplan and Menzio (2015) document that unemployed consumers shop more than employed consumers, but Mullainathan and Shafir (2013) suggests that low-income consumers have higher search costs because they lead busier lives.

[13] Formally, a perfect Bayesian equilibrium is defined in our setting as follows. A firm's strategy consists of the distribution $G_i(\cdot)$ of its headline price and the set of distributions $A_i(\cdot|f_i)$ of its additional price conditional on each $f_i \in \mathbb{R}$. A firm's equilibrium strategy maximizes expected profits given the behavior of consumers and competitors. A consumer's beliefs are derived from firms' equilibrium strategies using Bayes' Rule whenever possible, and the consumer's strategy maximizes expected utility at each information set.

[14] We offer a mathematical definition of the equilibrium-selection assumptions before the proof of Proposition 4 in the Appendix.

[15] A closely related equilibrium-selection assumption is the notion of wary beliefs proposed by McAfee and Schwartz (1994) and adapted to a consumer-search context similar to ours by Armstrong (2015), whereby consumers who observe out-of-equilibrium offers suppose that firms chose the unobserved features of the offer optimally. As our proof makes clear, in our setting these beliefs coincide with what McAfee and Schwartz term passive beliefs: when consumers observe an out-of-equilibrium headline price, they do not revise their beliefs about the firm's additional price.

While in the text we focus on the above baseline model, in Appendix A we argue that many natural modifications leave our main insights unchanged. One possibility is that studying and browsing occur in different markets, so that studying in one market crowds out browsing in another market. A consumer who studies the local supermarket's sales and coupons to save on food, for instance, ends up with less time and attentional capacity to search for the cheapest bank account or energy provider. Furthermore, as in the case of a consumer who carefully reads her unconventional mortgage contract and still falls for some traps, low-value consumers may be naive about their ability to avoid the additional price; as in the case of a high-income consumer holding a high bank-account balance and therefore never paying an overdraft fee, high-value consumers may automatically avoid the additional price; and as in the case of a person who has limited attention but does not exhaust her limit after observing two prices, consumers may be able to observe further prices at a weakly increasing positive cost.

4.2 Baseline Equilibrium: High Prices for Low-Income Populations

Our model has a unique equilibrium outcome with the following properties:[16]

Proposition 4. *Suppose that there is a cap $\overline{a}$ on the additional price, and the equilibrium-selection assumptions outlined in Section 4.1 hold. In equilibrium, all firms charge an additional price of $\overline{a}$. Low-value consumers study and avoid paying $\overline{a}$, while high-value consumers browse and incur $\overline{a}$. Firms choose headline prices according to a unique continuous distribution with support $[f_{min}, f_{max}]$, and at each price earn expected profits equal to $\alpha(f_{max} - c)/I$. Furthermore, there exists an $\alpha^* \in (0,1)$ such that $f_{max} = v_L$ for $\alpha \geq \alpha^*$ and $f_{max} < v_L$ for $\alpha < \alpha^*$. The average total price that consumers pay is strictly increasing in α.*

To take advantage of browsing consumers, firm i sets $a_i = \overline{a}$. Since high-value consumers prefer to buy and not to avoid the additional price, they browse for any equilibrium headline price. Less obviously, in equilibrium low-value consumers always study. For a rough intuition, note that since

[16] Baye et al. (1992) show that the classic search model of Varian (1980) has infinitely many equilibrium outcomes when there are more than two firms. In Varian's setting, any non-symmetric equilibrium involves a mass point at the consumers' reservation price for at least one firm. As we show in the proof of Lemma 4 in the Appendix, equilibria with mass points do not exist in our setting. The difference arises because in Varian's model informed consumers see all prices, whereas in our model browsing high-value consumers see only two headline prices.

all firms set $a_i = \overline{a}$ for any f_i, a consumer prefers to browse if and only if the headline price she observes is sufficiently high. Now consider the firm that charges the highest equilibrium headline price, supposing that no other firm charges the same price with positive probability. If at this price low-value consumers preferred to browse, then—with all consumers browsing—the firm would lose all consumers to lower-priced competitors with probability one. In an effect reminiscent of the "competition for consumer inattention" in De Clippel et al. (2014), the firm therefore lowers its headline price to the range where low-value consumers study.[17]

The search behavior of the two consumer types in turn implies that the average price consumers pay is *decreasing* in the share of high-value consumers. On the one hand, since high-value consumers do not avoid the additional price, they pay a higher average price than low-value consumers, so they have a direct positive effect on the average price consumers pay. On the other hand, high-value consumers browse and thereby spur competition, so they have an indirect negative effect on the average price firms charge. Proposition 4 establishes that the latter effect always dominates the former effect.

The detailed logic of this result is as follows. The fact that low-value consumers study implies that if α is sufficiently high, a firm can guarantee itself the low-value consumers assigned to it by setting $f_i = v_L$. Similarly to Varian (1980), this option generates a "profit base" that ties down firms' equilibrium profit level. Since the profit base is given by *low-value* consumers, an increase in their share raises profits.

If α is sufficiently low, the competition for consumer inattention described above further reduces firms' prices. Again similarly to Varian, the dual objective of exploiting price-insensitive low-value consumers and attracting price-sensitive high-value consumers leads firms to select a random headline price. When there are many high-value consumers, the motive to compete for them is strong, so firms' expected headline price is quite low. If a firm quoted a headline price of v_L, therefore, a low-value consumer would be better off browsing, forcing the firm to price lower.[18]

[17] Similarly, in classic sequential search models (e.g., Stahl, 1989, Janssen et al., 2005) equilibrium prices are just low enough to discourage consumers with positive search costs from searching a second product.

[18] The main challenge in the proof of Proposition 4 is that consumers' search strategies and firms' pricing strategies are multidimensional and richly interdependent, making it extremely difficult to establish basic necessary facts about equilibrium behavior. This difficulty appears most notably when we derive that high-value consumers browse and low-value consumers study in *any* equilibrium satisfying our selection criteria (see Lemmas 3 and 4). Without restricting

A reassuring thought might be that the profitability of selling when the share of low-value consumers is high will attract entrants to the market, lowering prices for consumers after all. It seems natural to assume, however, that a new entrant is in a disadvantageous position when trying to attract consumers with limited attention. In Appendix B, we formulate a model that captures this disadvantage, and establish that when the share of low-value consumers is high, entry is relatively unprofitable for the same reason—lack of comparative search by consumers—that being in the market is profitable. Worse, if entry occurs, it increases the average price consumers pay. With the entrant in the market, incumbents reorient their pricing strategies toward exploiting low-value consumers, reducing overall competition. As a practical example, this logic provides one account of why liberalization led to high prices in the UK energy market: entrants attracted consumers looking to switch, leading legacy suppliers to raise prices on their remaining, disproportionately non-switching (and disproportionately lower-income) consumers (Office of Gas and Electricity Markets, 2014).

4.3 The Effects of Regulation

We now return to the main message of our paper: that regulation can lead consumers to substitute their search efforts toward browsing, enhancing competition. We demonstrate this as well as a number of additional insights by analyzing how changes in regulations—in both the permissive and restrictive directions—affect the equilibrium we discussed in Section 4.2.

Deregulation Leads to Monopoly. To make our basic point, we ask what happens in the model of Section 4.1 without regulation, i.e., without a cap on the additional price.

Proposition 5. *Suppose that there is no cap on the additional price, and the equilibrium-selection assumptions outlined in Section 4.1 hold. In any equilibrium in which both consumer types buy with positive probability, firms charge* $f_i = v_L$ *and* $a_i = v_H - v_L$*, and such an equilibrium exists.*

attention to a subclass of equilibria with an a priori given structure of prices or exogenously specified search behavior, this requires a complex line of argument. Even taking consumers' equilibrium search behavior as given, low-value consumers must be indifferent between browsing and studying at f_{max} whenever $f_{max} < v_L$. Supposing low-value consumers study up to an exogenously specified headline price f_{max}, the proof derives a candidate equilibrium price distribution, which in turn determines low-value consumers incentives to browse at f_{max}. The proof proceeds by establishing that there is a unique f_{max} at which the induced price distribution makes the low-value consumer indifferent between browsing and studying.

Deregulation leads to a total collapse in competition: without a cap on the additional price, each firm acts as a monopolist, using the two prices to perfectly price discriminate between—and extract all rents from—consumers who purchase. As in Proposition 1, in equilibrium consumers must study to guard against price gouging, so they do not comparison shop, and therefore firms do not compete. Furthermore, there are also equilibria in which all high-value consumers browse and—believing that firms have priced them out of the market ($a_i \geq v_H - v_L$)—then do not buy. In such situations, regulation not only lowers prices, but also increases efficiency.

The competition-enhancing effect of regulation hinges on the regulation being sufficiently strict. Our baseline model requires that $\overline{a} < v_H - v_L$, i.e., it requires a cap on the additional price that is binding when one starts from the equilibrium of Proposition 5. If $\overline{a} > v_H - v_L$ and $\alpha > \alpha^*$, then the equilibrium in Proposition 4 does not survive, as high-value consumers quoted two prices near v_L would not purchase. For $\overline{a}$ sufficiently close to $v_H - v_L$, there is an equilibrium with a similar structure, but it generates lower consumer value both because high-value consumers might not purchase and because consumers who do purchase pay a higher average price.[19] And for sufficiently high $\overline{a}$, even this type of equilibrium fails to exist.[20] At the same time, the equilibrium in Proposition 5 survives for any $\overline{a} > v_H - v_L$. These observations imply that only a binding cap on the additional price ($\overline{a} < v_H - v_L$) is robustly competition-enhancing, and higher caps may produce smaller gains even when they do have an effect. Still, the general insight that the regulation can have a large indirect effect holds: a binding regulation can have a much larger total impact on prices than its direct impact on the additional price.

Plain-Vanilla Regulation Leads to Perfect Competition. Completely different regulations can also engage the mechanism of empowering consumer search. As a potentially important example, we consider an intervention in our basic model with a cap $\overline{a}$ on the additional price. Suppose that

[19] In such an equilibrium, firms (beyond choosing the additional price $\overline{a}$ with probability 1) charge the headline price v_L with positive probability, and with the complementary probability charge a headline price continuously distributed on $[f_{min}, v_H - \overline{a}]$. The latter part of the distribution is similar to that in Proposition 4 and ensures that firms earn $\alpha(v_L - c)/I$ in expectation for all headline prices. If a high-value consumer samples two firms with headline price v_L, then she does not purchase. Since firms earn the same expected profit as in Proposition 4 but consumers do not always purchase, the expected total payment of a consumer conditional on purchase must be higher than in Proposition 4.

[20] For sufficiently high $\overline{a}$, a firm charging a headline price of $v_H - \overline{a}$ makes losses, and hence trying to attract high-value consumers cannot be worth it.

the social planner requires firms to sell a "plain-vanilla" product that has a headline price but no additional price. If a consumer purchases from a firm, the firm can offer her extra services or contract modifications that involve an additional price, but—crucially—the consumer can accept or reject any offer without paying an attention cost. This regulation is roughly consistent with Barr et al. (2008), who propose requiring lenders to offer a simple "plain-vanilla" mortgage contract that consumers can refuse to consider alternatives to. We assume that a high-value consumer pays the additional price in our basic model because she values the services associated with it, so that she finds the plain-vanilla contract undesirable: her utility from purchasing firm i's regular product is $v_H - f_i - a_i$, while her utility from purchasing the firm's plain-vanilla product is $v_H - \kappa - f_i$, where $\kappa > \overline{a}$. Then, holding prices and search behavior fixed, plain-vanilla regulation does not affect any outcomes—low-value consumers avoid the additional price, while high-value consumers do not. Nevertheless, the policy has a drastic effect:

Proposition 6. *Suppose that there is a cap $\overline{a}$ on the additional price, and plain-vanilla regulation is in place. There is an equilibrium in which low-value and high-value consumers pay total prices of $c - (1-\alpha)\overline{a}$ and $c + \alpha\overline{a}$, respectively, and firms make zero expected profits.*

Low-value consumers stick with the plain-vanilla product, and—no longer needing to study to avoid the additional price—they can browse, inducing perfect competition between firms. Both high-value and low-value consumers benefit from this, but because low-value consumers suffered more from the lack of competition, they benefit more.[21]

Efficiency Effects. Although we have noted that the lack of regulation can lead consumers to inefficiently refrain from purchase, our policy results pertain mostly to the *competitiveness* of the market. In natural variants of our model, regulation can enhance efficiency through many channels. If consumers have heterogeneous values or firms have heterogeneous costs, then an increase in competition brought about by regulation can have the classical welfare-enhancing effects of drawing more consumers into the market and forcing inefficient firms out of the market. Furthermore, if

[21] First, within a given population, low-value consumers benefit more from the regulation. Without regulation, they obtain the product at a higher average headline price than high-value consumers. With regulation, they do so at the same headline price. Second, populations in which the share of low-value consumers is higher also benefit more from the regulation. Without regulation, the average total price consumers pay is increasing in the share of low-value consumers. With regulation, it is constant.

firms' base products are horizontally differentiated, then the increase in browsing facilitated by regulation increases efficiency by helping consumers find better matches for their tastes. Notably, regulation can benefit firms in addition to increasing consumer and total welfare. For instance, consumers might use the attentional capacity freed up by regulation to enter more markets, potentially increasing firms' profits there.

Nevertheless, the beneficial effects of regulation we identify must be balanced against classical concerns regarding regulation. For instance, the secondary features of a product may be an efficient response to heterogeneity in consumer preferences, so that regulating them is harmful. To be precise about the tradeoff, it would seem useful to integrate our framework into a model in which possible distortions are explicitly specified. Although a general analysis is beyond the scope of this paper, we give an example of a likely tradeoff in Appendix C: if a consumer needs to study to determine whether she likes the basic or the premium version of a product, then a standardization that bans the premium version enhances competition at the cost of lowering efficiency.

5 Applications

In this section, we present a few empirical applications of our framework.

5.1 Health Insurance

Evidence by Ericson and Starc (2016) on a 2010 reform of the Massachusetts health-insurance exchange—a government-run marketplace for private insurance—confirms the key mechanism of our theory: that regulation of the additional price facilitates comparison shopping and thereby makes consumer purchases more sensitive to product features. In this setting, we think of the headline price as the net-of-premium expected benefit implied by the insurance product's core financial characteristics (deductible, copay, etc.), and of the additional price as the expected disutility from holes in coverage implied by the fine print (what counts toward the deductible, which medications are covered, etc.). Before the reform, insurers had substantial leverage in how to design their plans, resulting in the potential of large additional prices. For instance, a diabetes patient's out-of-pocket annual medical spending could differ by a factor of 4.5 ($960 versus $4,383) under different

plans with the same actuarial value (Pollitz et al., 2009). Furthermore, anecdotal evidence as well as feedback from focus groups indicate that consumers were aware of and worried about such "gotchas" in coverage (e.g., Day and Nadash, 2012). Taking the view that most consumers find it prohibitively costly to understand the fine print but may trust an insurer based on experience or the recommendations of acquaintances, this corresponds roughly to the asymmetric-shrouding version of our model with lax regulation. Hence, the asymmetric-shrouding version of Proposition 1—which says that consumers do not choose a firm with a lower headline price because they expect it to have a higher additional price—applies: consumers are reluctant to switch to an unknown insurer offering a seemingly better plan for fear that something major would not be covered.[22] As a result, consumers are not sufficiently sensitive to plan features.

The 2010 reform regulated the fine print by defining minimum coverage levels, and harmonized the basic financial characteristics of plans with the same actuarial value. Ericson and Starc (2016) document that as a result of this reform, consumers became more sensitive to the financial characteristics of plans, and chose more generous (i.e., higher-actuarial-value) plans.[23] Multiple lines of research suggest that this likely benefited consumers by better aligning their choices with their true preferences. Quite directly, Abaluck and Gruber (2011) document that when navigating insurance options that differ in many aspects, consumers underweight plan generosity relative to the premium. Furthermore, Sydnor (2010) and Bhargava et al. (2017) find that when choosing between plans that differ only in generosity—a situation in which choices plausibly better reflect risk attitudes—consumers prefer very generous plans.[24] From the perspective of our model, the reform allowed consumers to do more comparison shopping on financial characteristics, resulting in

[22] One can describe the situation more fully by going slightly outside our model. Suppose that firms choose not only the additional price, but also the conditions under which the additional price applies. For instance, insurers can include in the fine print an obscure list of medications or conditions that are not covered. While each consumer has an insurer that she trusts covers her conditions appropriately, it is virtually impossible for her to ascertain whether this is the case for an unknown insurer.

[23] The reform also changed the search interface where consumers compare insurance offers. To help disentangle the effects of the two changes, Ericson and Starc run an experiment, which indicates that both the standardization and the change in the interface influenced consumers' choices.

[24] Though the choices likely reflect a strong preference for avoiding risk, in the latter case many consumers might be choosing overly generous plans. Indeed, Bhargava et al. (2017) emphasize that many employees choose plans that are first-order stochastically dominated by less generous plans with larger deductibles. This extreme pattern might reflect a true preference for fixed prices due to loss aversion or a misplaced heuristic to minimize deductibles.

better choices.

Importantly, consumers' reaction is unlikely to be explained by the classical effect of standardization. Under that logic, consumers in the unregulated market are reluctant to switch because they are aware of differences in product features and prefer some features over others. Here, consumers were almost certainly not aware of what the holes in coverage are—that is why they were afraid of gotchas.

While this setting illustrates the consumer response to regulation on which our mechanism relies, the evidence regarding our predictions on firm responses is unclear. Ericson and Starc find that consumers did not become more sensitive to premia after the reform, but the premium is only one component of the total price, so our model does not make a prediction regarding this sensitivity. Regulation did increase consumers' willingness to switch between brands, which suggests greater competition in other aspects of insurance coverage—especially the physician network—but we have not seen direct evidence of such an effect.

5.2 Unfair Contracts Principle

Our framework provides a novel rationale for existing regulation of standard-form contracts, a common arrangement for selling consumer services. A standard-form contract consists of a price to be paid together with non-negotiable fine-print contract terms detailing other terms and obligations of the trade. The German Civil Code's as well as the European Union's principle on unfair terms in standard-form contracts effectively prohibits provisions that are too unclear or surprising relative to how things are normally done, and that are too disadvantageous to the consumer.[25] The main existing justification for this principle is that it reduces the transaction cost of obtaining information about a product. To the extent that consumers cannot or do not read the contract, the principle can also reduce information asymmetries. Consistent with the latter perspective, conventional wisdom in the law-and-economics community is that most consumers do not read standard-form

[25] See Sec. 305c and 307 of the German Civil Code (with Sec. 308-9 spelling out Sec. 307 in more detail) and Articles 3, 5, and 6 of directive 93/13/EEC of the Council of the European Communities. The documents are available at `https://www.gesetze-im-internet.de/englisch_bgb/englisch_bgb.html#p0925` and `http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993L0013:en:HTML`, respectively.

contracts.[26]

While existing arguments can justify the unfair contracts principle, our model strengthens the case for it. Thinking of the price and core features of the product as the headline price and disadvantageous details contained in the fine print as the additional price, the principle corresponds exactly to a cap on the additional price. Hence, our model predicts that the principle facilitates competition. Furthermore, our model provides a justification for a part of the principle that existing arguments do not immediately address. The principle explicitly states that it applies only to individual provisions in a contract, and *not* to the transaction as a whole.[27] From a classical perspective, it may be puzzling why the social planner insists on regulating the fairness of individual terms rather than the fairness of the transaction as a whole; after all, it is the entire transaction that both parties care about. Yet Proposition 3 implies that only individual terms should be regulated: unlike regulation of the additional price, regulation of the total price fails to change consumers' behavior and therefore does not increase competition.

5.3 Food Safety in Developing Countries

Our model also helps understand problems in an insufficiently regulated market. At a general level, it seems widely recognized that the decision environment is more difficult in developing countries than in developed countries (Kremer et al., 2019). Duflo (2012) argues that these difficulties often arise due to a lack of regulation, as consumers in developing countries must pay attention to things residents in developed countries take for granted. A poor mother, for instance, has to worry about whether to boil her infant's drinking water or where to get safe immunizations, and as a result she may not have energy left to think about the older sibling's education.

As a specific example, we discuss the market for food and the associated issue of food safety. While developed countries have seen some well-publicized scares, in developing countries food safety

[26] See the discussions in Becher and Unger-Aviram (2010), Eisenberg (1995), and Luth (2010). For the case of retail software licenses, for instance, Bakos et al. (2014) empirically investigate whether shoppers access the license agreement, which is just one click away. Less than 0,2% of consumers access the agreement, and almost all who do spend far too little time to read it in full (many consumers read it for less than a second).

[27] "Assessment of the unfair nature of the terms shall relate neither to the definition of the main subject matter of the contract nor to the adequacy of the price and remuneration, on the one hand, as against the services or goods supplies in exchange, on the other" (Article 4.2 of directive 93/13/EEC of the Council of the European Communities).

is a constant issue.[28] Consumers recognize the issue and are concerned, with the vast majority listing food safety as a major to most important problem of daily life.[29] Furthermore, many studies indicate that consumers are willing to pay a substantial premium for safe food (Grace, 2015). At the same time, producers are capable of maintaining high standards for food safety; notably, many developing countries export food that passes stringent import requirements in developed nations (Unnevehr, 2015). There is some evidence that one way in which exporters maintain higher standards is by vertically integrating with producers, and not buying from other, especially smaller producers (Schuster and Maertens, 2013). Based on personal conversations, domestic consumers who really care about food safety can engage in a similar practice of buying food from tested and trusted suppliers, although we have not found direct evidence of this behavior.[30]

There is therefore an apparent mismatch: consumers have a demand for food safety, producers seem capable of supplying this demand, yet a lot of food on the market is unsafe. This situation can be described by the insufficiently regulated case of our model in Section 3.2. Suppose that the headline price is the retail price of food, the additional price is the utility loss from unsafe food, and a producer's cost savings from unsafe food are lower than the harm to consumers ($r > 1$). In equilibrium, consumers less concerned with safety buy a product with a high additional price (i.e., unsafe food) in a competitive market, while consumers more concerned with safety buy a product with no additional price (i.e., safe food) from a trusted producer. While the former consumers are getting cheap food, they are not happy, as they would prefer to buy safer food at higher prices. But they are not buying the safe food available from reliable producers because in that market, they would have to pay a double premium: one for the higher cost of production and one for being served by a trusted supplier with monopoly power.

[28] Developing countries probably bear most of the burden of foodborne disease, including from viruses, bacteria, parasites, fungal toxins, agricultural chemicals, and marine toxins (e.g., World Health Organization, 2015, Grace, 2015). These result from unsafe agricultural practices, including improper use of agro-chemicals, fertilizers, and pesticides, a water supply that might be contaminated by sewage or industrial chemicals, and the use of harmful preservatives and additives during processing (e.g., Lam et al., 2013).

[29] For instance, Lam et al. (2013) report that Chinese consumers consider food safety as more worrisome than public safety, traffic safety, health safety, and environmental safety. Only about 7% of consumers are seldom or never concerned about food safety (Liu and Ma, 2016).

[30] For example, according to anecdotal evidence from Nigeria, safety-conscious consumers often refrain from buying food at outdoor markets and instead go to the large South African retailer Shoprite. And some consumers in India buy exclusively from trusted merchants, and have gruesome stories of what happened when they made exceptions.

As we have shown, tightening regulation benefits all consumers: those buying on the competitive market are able to purchase safer food at reasonable prices, and those buying from trusted suppliers can now purchase equally safe food at a lower price. Once again, previous arguments for regulation centered around reducing transaction costs and information asymmetries also justify food safety regulation, but our argument strengthens the case for it in at least two ways. First, our model says that by strengthening competition, regulation benefits even the latter consumers above, who are buying food that they have checked out themselves and that is safer than required by regulation. Second, as we discuss in more detail in Section 6 below, our framework implies that regulation might be justified even if it is costlier to enforce than what it saves citizens in studying costs.

5.4 Shopping Behavior of Different Consumers

Our prediction that low-value consumers study more than high-value consumers is consistent with evidence from supermarket shopping. Aguiar and Hurst (2007) find that lower-income consumers go on more grocery-shopping trips, and pay lower prices for the same items, than do higher-income consumers. This reflects at least in part that lower-income consumers take better advantage of a seller's sales or discounts: Broda et al. (2009) and Handbury and Weinstein (2015) document that lower-income consumers spend less on the same items even *in the same chain* and after controlling for zip-code-level per-capita income or including city dummies. Thinking of the prices that a consumer can obtain using sales and discounts as the headline price, and the savings she foregoes if she does not use sales and discounts as the additional price, this is exactly what Proposition 4 predicts.

Our model also predicts that lower-income consumers devote less attention to browsing than higher-income consumers, leading to high prices when the share of lower-income consumers is high. In our basic model, the reduced browsing occurs in the same market, but in natural extensions, it can also occur in another market.[31] Although we are not aware of evidence for our mechanism, and other factors are surely involved, this implication may help explain the finding that consumers in lower-income neighborhoods pay higher prices for some goods and services (Fellowes, 2006, Hogan, 2016).

[31] We outline such a two-market model in Appendix A.

The most natural standard explanation is that the cost of doing business is higher in lower-income neighborhoods, for instance because these neighborhoods are less safe or consumers living there have higher default rates. But it is not clear that existing stories can provide a full explanation; e.g., the costs of doing business are presumably often lower in lower-income neighborhoods (for instance due to lower wages or property prices).

While consistent with our positive predictions, this setting also points to a limit of our main point regarding regulation. Here, studying is aimed at obtaining deals on groceries, so capping the additional price would amount to limiting sales or discounts for groceries. But this would eliminate supermarkets' ability to flexibly react to market circumstances and prevent possibly efficient price discrimination, so it would likely be inefficient.

6 Related Literature on Regulation

The existing literature identifies several channels through which regulation can improve markets; our argument, however, relies on a novel logic and hence has a number of novel implications.

Most importantly, regulation can mitigate adverse selection when consumers cannot ascertain some dimensions of quality or more generally lack trust in sellers (Shavell, 1980, Christensen et al., 2016), and it can also substitute for costly private solutions to market failures (Shleifer, 2011, Schwartzstein and Shleifer, 2013).[32] In either case, if private parties are able to mitigate market failures through less costly and more effective measures, then regulation is not justified. Because in our model regulation has a beneficial indirect effect through consumer search, it may be justified even in such situations. In the unregulated equilibrium of our model in Section 3.2 with $r > 1$, for instance, consumers are studying to make sure they are not hurt by the additional price, and the

[32] Shleifer (2011) singles out contract regulations, emphasizing that from a classical perspective contracts are a substitute for regulation (e.g., for dealing with externalities), and hence should not themselves be the objects of regulation. To explain why contracts are nevertheless regulated, Shleifer argues that litigation is "expensive, unpredictable, or biased," rendering regulation the more efficient alternative. Schwartzstein and Shleifer (2013) construct a model in which firms decide whether to take safety precautions, and courts make errors in determining whether precautions were ex-ante necessary. This makes litigation following accidents unpredictable, creating a risk that discourages firms from entry. Schwartzstein and Shleifer show that imposing a regulatory standard, and partially or fully exempting firms that comply with the standard from litigation, can induce more entry while still encouraging safety precautions. If the social return from entry is higher than the private return, therefore, regulation increases efficiency.

additional price is zero. Yet capping the additional price at an above-equilibrium level $\overline{a} > 0$—i.e., a regulatory solution that is worse than the private one—has a major positive effect on consumer welfare. This is often true even if the regulation is more costly than what it saves consumers in studying costs (zero).

In the literature on choice complexity (e.g., Carlin, 2009, Piccione and Spiegler, 2012, Chioveanu and Zhou, 2013, Spiegler, 2016), consumers who cannot understand or compare prices choose randomly and thereby lower competition, so that regulations increasing the comparability of prices—e.g., by making them scalars (Grubb, 2015b)—can be pro-competitive. In our model, regulation of secondary features encourages comparative search and hence less random choice by consumers, so in a reduced form it can be understood as increasing comparability. But models of choice complexity specify the comparability of prices exogenously, so they do not make predictions about what kinds of regulations work—and Piccione and Spiegler (2012) emphasize that even regulations that uniformly improve comparability can backfire. In particular, our results that sufficiently tight regulations of the additional price increase competition, but less tight regulations of the additional price may not, and regulations of the total price never do, do not follow from models in the complexity literature.

Perhaps the main message of the large literature on search is that lowering search costs increases competition. Again, in a reduced form regulation in our model can be understood as lowering search costs. But the search literature does not consider the implications of asymmetric shrouding or the tradeoff between studying and browsing, so models in this literature do not imply the above results. In fact, the received wisdom from the search literature is that price caps *lower* consumers' propensity to comparison shop, decreasing competition and potentially increasing prices.[33]

Regulation can also enhance competition by standardizing products and thereby making them closer substitutes (Ronnen, 1991, for example). In this literature, there is no parallel to the insight that additional and not total prices should be regulated, and regulation does not work through influencing consumers' search behavior. Indeed, in our setting regulation can induce competition

[33] In Fershtman and Fishman (1994) and Armstrong et al. (2009), consumers observe the price of only one firm, but can incur a cost to become informed about the prices of other firms. A price cap shrinks price dispersion and thereby reduces consumers' incentive to become informed, decreasing competition. As a result, the price cap can raise the average price consumers pay.

without changing substitutability; for instance, in our first model products are identical in all respects both with and without regulation.

Finally, the case for regulation we make has some parallels with the idea of "managed competition" researchers have proposed in the context of health-insurance markets in the US (e.g., Enthoven, 1993). Managed competition is defined as a group-insurance purchasing strategy that "structures and adjusts the market to overcome attempts by insurers to avoid price competition." Though we are unaware of a formal treatment of this idea and a precise mechanism is not spelled out, one piece of the proposed strategy is the standardization of plans to make consumers more price sensitive, in part by ensuring that consumers are not worried about hidden gaps in coverage.

7 Conclusion

A caveat to our predictions is that if consumers do not trust the government, then government regulation does not eliminate the need to study. For instance, a consumer in a developing country might have to research whether regulations that are on the books are actually being enforced. Hence, our policy results rely on relatively well-functioning public institutions.

Furthermore, one must recognize that learning about and understanding policies requires attention just like learning about and understanding products does. Hence, to really liberate consumers to do more browsing, the regulations motivated by our framework should be simpler to communicate and understand than the market practices they govern, and they are likely to be most effective if distilled into clear, broad principles. Once again, the European Union's principle on unfair contract terms is a potential practical example: it has extremely broad scope (it applies to any business-to-consumer contract), yet its basic idea is easy to understand. But it would be fruitful to develop and analyze a framework incorporating individuals' limitations in understanding policies as well.

While we have focused on prices in this paper, it would seem worthwhile to analyze the effects of our competition-enhancing regulations on other market outcomes. As a notable example, one wonders how such a regulation affects firms' incentives to innovate. In as much as the regulation induces firms to improve products along valuable core dimensions—e.g., thinking about functionality and style rather than cutting costs by skimping on safety—the indirect effect on innovations

could be substantially beneficial. But in as much as the regulation induces firms to think about how to get around it—e.g., by inventing new fees for a mortgage—the indirect effect on innovations can also be detrimental.

References

Abaluck, Jason and Jonathan Gruber, "Choice Inconsistencies among the Elderly: Evidence from Plan Choice in the Medicare Part D Program," *American Economic Review*, 2011, *101* (4), 1180–1210.

Agarwal, Sumit, Changcheng Song, and Vincent Yao, "Banking Competition and Shrouded Attributes: Evidence from the US Mortgage Market," 2016. Working Paper.

_ , Souphala Chomsisengphet, Neale Mahoney, and Johannes Stroebel, "Regulating Consumer Financial Products: Evidence from Credit Cards," *Quarterly Journal of Economics*, 2015, *130* (1), 111–164. Previously NBER Working Paper #19484.

Aguiar, Mark and Erik Hurst, "Life-Cycle Prices and Production," *American Economic Review*, 2007, *97* (5), 1533–1559.

Alexandrov, Alexei and Sergei Koulayev, "No Shopping in the US Mortgage Market: Direct and Strategic Effects of Providing Information," May 2018. Working Paper.

Anagol, Santosh and Hoikwang Kim, "The Impact of Shrouded Fees: Evidence from a Natural Experiment in the Indian Mutual Funds Market," *American Economic Review*, 2012, *102* (1), 576–593.

Armstrong, Mark, "Search and Ripoff Externalities," *Review of Industrial Organization*, 2015, *47* (3), 273–302.

_ , "Ordered Consumer Search," 2016. Working Paper.

_ and Yongmin Chen, "Inattentive Consumers and Product Quality," *Journal of the European Economic Association*, 2009, *7* (2-3), 411–422.

_ , John Vickers, and Jidong Zhou, "Consumer Protection and the Incentive to Become Informed," *Journal of the European Economic Association*, 2009, *7* (2-3), 399–410.

Bachi, Benjamin and Ran Spiegler, "Buridanic Competition," *Games and Economic Behavior*, January 2018, *107* (1), 298–315.

Bakos, Yannis, Florencia Marotta-Wurgler, and David R. Trossen, "Does Anyone Read the Fine Print? Consumer Attention to Standard-Form Contracts," *Journal of Legal Studies*, January 2014, *43* (1), 1–35.

Barr, Michael S., Sendhil Mullainathan, and Eldar Shafir, "Behaviorally Informed Financial Services Regulation," Technical Report, New America Foundation 2008.

Baye, Michael R., Dan Kovenock, and Casper G. de Vries, "It Takes Two to Tango: Equilibria in a Model of Sales," *Games and Economic Behavior*, 1992, *4* (4), 493–510.

Becher, Shmuel and Esther Unger-Aviram, "The Law of Standard Form Contracts: Misguided Intuitions and Suggestions for Reconstruction," *DePaul Business & Commercial Law Journal*, 2010, *199.*

Bhargava, Saurabh, George Loewenstein, and Justin Sydnor, "Choose to Lose: Health Plan Choices from a Menu with Dominated Option," *Quarterly Journal of Economics*, 2017, *132* (3), 1319–1372.

Broda, Christian, Ephraim Leibtag, and David E. Weinstein, "The Role of Prices in Measuring the Poor's Living Standards," *Journal of Economic Perspectives*, 2009, *23* (2), 77–97.

Brown, Meta, Christopher J. Flinn, and Andrew Schotter, "Real-Time Search in the Laboratory and the Market," *American Economic Review*, 2011, *101* (2), 948–974.

Carlin, Bruce I., "Strategic Price Complexity in Retail Financial Markets," *Journal of Financial Economics*, 2009, *91* (3), 278–287.

_ **and Florian Ederer**, "Search Fatigue," 2012. Working Paper.

Chioveanu, Ioana and Jidong Zhou, "Price Competition with Consumer Confusion," *Management Science*, 2013, *59* (11), 2450–2469.

Choi, James J., David Laibson, and Brigitte C. Madrian, "Why Does the Law of One Price Fail? An Experiment on Index Mutual Funds," *Review of Financial Studies*, 2010, *23* (4), 1405–1432.

Christensen, Hans B., Luzi Hail, and Christian Leuz, "Capital-Market Effects of Securities Regulation: Prior Conditions, Implementation, and Enforcement," *Review of Financial Studies*, 2016, *29* (11), 2885–2924.

Consumer Financial Protection Bureau, "Consumers' Mortgage Shopping Experience," Technical Report, Consumer Financial Protection Bureau 2015. `https://files.consumerfinance.gov/f/201501_cfpb_consumers-mortgage-shopping-experience.pdf`.

Day, Rosemarie and Pamela Nadash, "New State Insurance Exchanges Should Follow The Example Of Massachusetts By Simplifying Choices Among Health Plans," *Health Affairs*, 2012, *31* (5), 982–989.

De Clippel, Geoffroy, Kfir Eliaz, and Kareen Rozen, "Competing for Consumer Inattention," *Journal of Political Economy*, 2014, *122* (6), 1203–1234.

Duarte, Fabian and Justine S. Hastings, "Fettered Consumers and Sophisticated Firms: Evidence from Mexico's Privatized Social Security Market," 2012. NBER Working Paper #18582.

Duflo, Esther, "Human Values and the Design of the Fight Against Poverty," 2012. Tanner Lectures.

Eisenberg, Melvin Aron, "The Limits of Cognition and the Limits of Contract," *Standard Law Review*, 1995, *47* (2), 211–259.

Ellison, Glenn, "A Model of Add-On Pricing," *Quarterly Journal of Economics*, 2005, *120* (2), 585–637.

_ **and Alexander Wolitzky**, "A Search Cost Model of Obfuscation," *RAND Journal of Economics*, 2012, *43* (3), 417–441.

_ **and Sara Fisher Ellison**, "Search, Obfuscation, and Price Elasticities on the Internet," *Econometrica*, 2009, *77* (2), 427–452.

Enthoven, Alain C., "The History and Principles of Managed Competition," *Health Affairs*, 1993, *12* (Supplement 1), 24–48.

Ericson, Keith M. Marzilli and Amanda Starc, "How Product Standardization Affects Choice: Evidence from the Massachusetts Health Insurance Exchange," *Journal of Health Economics*, 2016, *50*, 71 –85.

Fellowes, Matt, "From Poverty, Opportunity: Putting the Market to Work for Lower Income Families," Technical Report, The Brookings Institution, Metropolitan Policy Program 2006.

Fershtman, Chaim and Arthur Fishman, "The 'Perverse' Effects of Wage and Price Controls in Search Markets," *European Economic Review*, 1994, *38* (5), 1099–1112.

Gabaix, Xavier and David Laibson, "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets," *Quarterly Journal of Economics*, 2006, *121* (2), 505–540.

Gamp, Tobias, "Search, Differentiated Products, and Obfuscation," 2019. Working Paper.

_ **and Daniel Krähmer**, "Deceptive Products and Comptition in Search Markets," 2017. Working Paper.

Gennaioli, Nicola, Andrei Shleifer, and Robert W. Vishny, "Money Doctors," *Journal of Finance*, 2015, *70* (1), 91–114.

Grace, Delia, "Food Safety in Developing Countries: An Overview," Technical Report, Evidence on Demand 2015.

Grubb, Michael D., "Consumer Inattention and Bill-Shock Regulation," *Review of Economic Studies*, 2015, *82* (1), 219–257.

_ , "Failing to Choose the Best Price: Theory, Evidence, and Policy," *Review of Industrial Organization*, 2015, *47* (3), 303–340.

_ **and Matthew Osborne**, "Cellular Service Demand: Biased Beliefs, Learning, and Bill Shock," *American Economic Review*, 2015, *105* (1), 234–271.

Haan, Marco, José L. Moraga-González, and Vaiva Petrikaite, "Price and Match-Value Advertising with Directed Consumer Search," 2015. Working Paper.

Handbury, Jessie and David E. Weinstein, "Goods Prices and Availability in Cities," *Review of Economic Studies*, 2015, *82* (1), 258–296.

Heidhues, Paul and Botond Kőszegi, "Behavioral Industrial Organization," in B. Douglas Bernheim, Stefano DellaVigna, and David I. Laibson, eds., *Handbook of Behavioral Economics - Foundations and Applications 1*, Elsevier, 2018.

_ **, Johannes Johnen, and Botond Kőszegi**, "Browsing versus Studying Offers: A Pro-Market Case for Regulation," 2018. Working Paper.

Hogan, Patrick, "Paying more to be poor," Technical Report, Citizens Advice Scotland 2016.

Honka, Elisabeth and Pradeep Chintagunta, "Simultaneous or Sequential? Search Strategies in the U.S. Auto Insurance Industry," *Marketing Science*, 2017, *36* (1), 21–42.

Janssen, Maarten C. W., José Luis Moraga-González, and Matthijs R. Wildenbeest, "Truly costly sequential search and oligopolistic pricing," *International Journal of Industrial Organization*, 2005, *23* (5-6), 451–466.

Kaplan, Greg and Guido Menzio, "The Morphology Of Price Dispersion," *International Economic Review*, 2015, *56* (4), 1165–1206.

Kogut, Carl A., "Consumer Search Behavior and Sunk Costs," *Journal of Economic Behavior & Organization*, 1990, *14* (3), 381–392.

Kremer, Michael, Gautam Rao, and Frank Schilbach, "Behavioral Development Economics," in B. Douglas Bernheim, Stefano DellaVigna, and David I. Laibson, eds., *Handbook of Behavioral Economics*, Vol. 2, Elsevier, 2019, chapter 5, pp. 345–458.

Lam, Hon-Ming, Justin Remais, Ming-Chiu Fung, Liqing Xu, and Samuel Sai-Ming Sun, "Food Supply and Food Safety Issues in China," *Lancet*, 2013, *381* (2044-2053).

Liu, Peng and Liang Ma, "Food Scandals, Media Exposure, and Citizens' Safety Concerns: A Multilevel Analysis Across Chinese Cities," *Food Policy*, 2016, *63* (C), 102–111.

Luth, Hanneke A., "Behavioural Economics in Consumer Policy: The Economic Analysis of Standard Terms in Consumer Contracts Revisited," 2010. PhD Thesis, Erasmus University Rotterdam.

McAfee, R. Preston and Marius Schwartz, "Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity," *American Economic Review*, 1994, *84* (1), 210–30.

Mullainathan, Sendhil and Eldar Shafir, *Scarcity: Why Having Too Little Means So Much*, Time Books, Henry Holt & Company LLC, New York, NY, 2013.

Murooka, Takeshi, "Deception under Competitive Intermediation," 2015. Working Paper.

Office of Gas and Electricity Markets, "State of the Market Assessment," Technical Report 2014. Available at `https://www.ofgem.gov.uk/sites/default/files/docs/2014/03/assessment_document_published_1.pdf`.

_ , "Consumer Engagement Survey," Technical Report 2018. available at `https://www.ofgem.gov.uk/publications-and-updates/consumer-engagement-survey-2018`.

Piccione, Michele and Ran Spiegler, "Price Competition under Limited Comparability," *Quarterly Journal of Economics*, 2012, *127* (1), 197–135.

Pollitz, Karen, Eliza Bangit, Jennifer Libster, Stephanie Lewis, and Nicole Johnston, "Coverage When It Counts: How much protection does health insurance offer and how can consumers know?," Technical Report, Center for American Progress Action Fund 2009.

Ronnen, Uri, "Minimum Quality Standards, Fixed Costs, and Competition," *Rand Journal of Economics*, Winter 1991, *22* (4), 490–504.

Santos, Babur De Los, Ali Hortacsu, and Matthijs R. Wildenbeest, "Testing Models of Consumer Search Using Data on Web Browsing and Purchasing Behavior," *American Economic Review*, 2012, *102* (6), 2955–2980.

Schuster, Monica and Miet Maertens, "Do Private Standards Create Exclusive Supply Chains? New Evidence from the Peruvian Asparagus Export Sector," *Food Policy*, 2013, *43*, 291–305.

Schwartzstein, Joshua and Andrei Shleifer, "An Activity-Generating Theory of Regulation," *Journal of Law and Economics*, 2013, *56* (1), 1–38.

Shavell, Steven, "Strict Liability versus Negligence," *Journal of Legal Studies*, 1980, *9* (1), 1–25.

Shleifer, Andrei, "Efficient Regulation," in Daniel P. Kessler, ed., *Regulation vs. Litigation: Perspectives from Economics and Law*, University of Chicago Press, 2011, chapter 2.

Spiegler, Ran, "Competition over Agents with Boundedly Rational Expectations," *Theoretical Economics*, 2006, *1* (2), 207–231.

_ , "Choice Complexity and Market Competition," *Annual Review of Economics*, 2016, *8*, 1–25.

Stahl, Dale O., "Oligopolistic Pricing with Sequential Consumer Search," *American Economic Review*, 1989, *79* (4), 700–712.

Sydnor, Justin, "(Over)insuring Modest Risks," *American Economic Journal: Applied Economics*, 2010, *2* (4), 177–99.

Unnevehr, Laurian, "Food Safety in Developing Countries: Moving Beyond Exports," *Global Food Security*, 2015, *4*, 24–29.

Varian, Hal R., "A Model of Sales," *American Economic Review*, 1980, *70* (4), 651–659.

World Health Organization, "WHO's First Ever Global Estimates of Foodborne Diseases Find Children Under 5 Account for Almost One Third of Deaths," 2015. News Release.