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Consumer Protection in Economies with Limited Attention

Paul Heidhues Johannes Johnen Botond Kőszegi

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Paul Heidhues
DICE

Johannes Johnen
CORE/LIDAM, UCLouvain

Botond Kőszegi
U Bonn

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Abstract

We investigate the effects of consumer-protection regulations limiting post-purchase harm when there are many markets and consumers have limited attention to examine prices or product features. Such regulation lowers the attention necessary for valuable purchases, which can allow a consumer to purchase in more markets, or serve to induce competition. The first benefit is most important when few markets are regulated, while the second emerges when regulatory scope is sufficiently broad to create "spare" — i.e., in equilibrium unused — attention. Because little spare attention can enforce competition in many markets, consumer welfare can be highly non-linear in regulatory scope. The benefits of regulating a market often accrue in other markets, and there is a sense in which overly tight regulation outperforms overly lax regulation. Broad consumer protection can help the economy reach productive efficiency, and when this is achieved less regulation may suffice.

Keywords: consumer protection, regulation, competition, participation, limited attention

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1 Introduction

"Consumers rightly feel ripped off, let down and frustrated. They should not have to be constantly 'on guard' or spend hours negotiating to get a good deal. This erodes people's trust in markets ..." (Competition & Markets Authority, 2018, page 5)

Researchers and policymakers have identified roles for consumer-protection regulation that arise because consumers have limited attention for understanding purchase options. For instance, since comprehending all contracts we consider signing is beyond our capacity, regulation banning provisions that most consumers would not want can help in two ways. First, it can lower the adverse selection or distrust created by consumers' inability to check all terms, expanding market activity. Second, it can simplify the comparison of alternatives, facilitating competition.[1] Existing theories, however, make these arguments in a single-market framework — while both consumers and regulators face many interconnected decisions across markets. Consumers must decide which contracts to pay attention to, and regulators often evaluate specific interventions in the context of broader regulatory principles.

In this paper, we study the effects of consumer-protection regulation on outcomes and welfare when there are many valuable and complex products sold in different markets, and consumers have limited attention to examine product features. Our analysis yields several novel insights. First, the benefits of regulating a market often accrue in other markets, so that regulation can be beneficial even if it is not binding in equilibrium and does not change prices and volume in the regulated market. Second, when the social planner regulates only a few markets, the main benefit of regulating an additional market is often an increase in participation. Third, in contrast, when regulation reaches a sufficiently broad scope, additional regulation can greatly increase competition. As a result, consumer welfare can be highly non-linear in regulatory scope. Fourth, overly tight regulation often outperforms overly lax regulation. Fifth, it is optimal to prioritize intervention in easy-to-regulate markets

[1] See below for references.

at low regulatory scope and in hard-to-regulate markets at high regulatory scope. Sixth, broad consumer protection can help the economy reach productive efficiency, and when this is achieved such broad regulation may become unnecessary.

We begin in Section 2 by laying out and discussing our formal model. We consider an economy that consists of N ex-ante symmetric markets, each of which houses two firms with identical marginal costs selling homogeneous products. 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 credit-card borrowing is determined by the annual fee as well as interest and fees, and the total price a consumer pays for an appliance is determined by the appliance's price as well as its energy efficiency. In J of the markets, consumer-protection regulation is in place: the additional price is capped at a level known to consumers. The cap could correspond, for instance, to limits on interest and fees for credit cards, or to minimum efficiency or safety standards for physical products.

Rational consumers are looking to buy up to one product in each market, and initially observe one randomly chosen headline price per market. Afterward, a consumer can sequentially make $K < N$ further observations, each time either "browsing" the other headline price in a market or "studying" the additional price of a product whose headline price she already checked. As a reduced-form way of incorporating a need to safeguard against very costly post-purchase surprises, we assume that the consumer must study an unregulated product before purchase. We look for perfect Bayesian equilibria in which firms deploy pure strategies, making plausible equilibrium-selection assumptions to rule out no-trade and no-competition traps.

Section 3 identifies how the scope of regulation J influences the number of trades a consumer makes and the prices she pays. When $J = 0$ — i.e., the economy is entirely unregulated — consumers are limited to participating in K markets due to the attention required to purchase within each one. Since they have no attention left to comparison shop, firms do not compete, and all products are sold at the monopoly price.

Now suppose that the planner introduces regulation in $J < N - K$ markets. We show that in the unique equilibrium outcome, firms in the regulated markets charge the maximum additional price. Consumers can then infer the total price from the headline price, and hence they can buy without studying. This frees up their attention to participate in other markets, so they now participate in $K + J$ markets. But they still use all their attention for entering markets rather than comparison shopping, so firms charge the monopoly price.

Once the scope of regulation reaches $J = N - K$, the consumer has sufficient attention to enter all markets, and the mechanism changes drastically. If one more market is regulated, consumers end up with "spare" — in equilibrium unused — attention, transforming all regulated markets from monopolistic to perfectly competitive. Indeed, if a firm deviates from competitive pricing, its consumers browse and buy from its competitor. Furthermore, if one more market is regulated, consumers are left with two units of spare attention, making unregulated markets competitive too. Now if an unregulated firm deviates from competitive pricing, its consumers browse, study, and buy from its competitor. After this point, more regulation creates more spare attention, but this does not change outcomes.

Several economic implications follow from the above insights. At a broad level, whether regulation increases participation or generates competition is determined endogenously, and depends on the scope of regulation. Relatedly, regulation can have a sharply non-linear effect on consumer welfare. To increase participation in many markets at low scope, a regulator must free up many units of attention. This is because one unit of attention can only be used to participate in one unregulated market. But to increase competition in many markets at the intermediate scope, it is sufficient to free up one or two units of attention. This is because the same attention can be used as a threat to enforce competition in many markets. Finally, the benefits of regulating one market can often be seen in other markets, either through an increase in participation or through an increase in competition. This cross-market externality implies that even if regulation does not increase participation or lower prices in the regulated market — a common argument against intervention — it could still increase overall welfare.

In Section 4, we extend our model by allowing for various asymmetries between markets or firms. We first assume that in some markets, charging an additional price not only redistributes money from consumers to firms, but also has efficiency implications. Then, non-binding regulation can improve outcomes by lowering firms' incentives to deviate from the efficient additional price, and thereby lowering the amount of attention necessary to deter misbehavior. Furthermore, regulation set at an inefficiently tight level often results in higher consumer welfare than regulation set at an inefficiently lax level. Under overly lax regulation, consumers may use their attention to enforce an efficient additional price, resulting in a non-competitive outcome at little increase in efficiency. The same is not possible under overly tight regulation.

We also consider the possibility that some products are more difficult to study as well as regulate than others. For instance, evaluating the quality and safety of clothing is simpler than deciphering the terms of a mortgage contract; and by the same token, developing and enforcing regulation is easier for the former than for the latter. Such differences raise the natural question of which markets should be regulated. At low scope, the role of regulation is to open up more markets for consumers, which is best served by regulating as many markets as possible. Hence, it is optimal to focus on easy-to-regulate markets. At broad scope, however, the aim of regulation is to ensure competition, which is fully successful if consumers have sufficient spare attention to check out the competitor in any one regulated *or* unregulated market. Since the competitors are most difficult to check out in high-cost unregulated markets, it is optimal to focus regulation on high-cost markets. Indeed, to the extent that developing nations regulate markets, they often focus more on the heavy control of simple products than more developed nations. For instance, simple transparent prices for basic services such as gas or electricity (enforced through state monopolies) are more common in developing nations.

Finally, we allow for cost differences across firms, and study the role of attention and regulation in weeding out inefficient firms. At low regulatory scope, all firms participate and charge monopoly prices. At intermediate scope, there can be multiple equilibria, one with and one without inefficient firms participating. Intuitively, an inefficient firm wants to participate if and only if the others do, as this ensures that consumers do not have sufficient spare attention to reliably find the efficient firms. Continuing the same logic, at high regulatory scope, there is no equilibrium with inefficient firms participating. Now the consumer has many units of spare attention, so she could find an efficient firm even if all inefficient firms participated. Hence, broad regulation can ensure productive efficiency, and once this is achieved, less regulation may be sufficient. At that point, it is unlikely that inefficient firms coordinate to enter the market.

We conclude in Section 5 with some questions for future research. While our analysis centers on restrictions on products and contracts, many real-life regulations aim to improve disclosure. We argue that our framework can be readily used to study such regulations. In addition, while we have assumed that consumers perfectly understand the regulations in place, in reality learning about and understanding these also requires attention. This suggests that overarching, easy-to-understand regulations are likely to have greater effects, and fine-tuning interventions too much to individual market conditions may be counterproductive.

Related Literature No other work studies consumer protection in a multi-market framework — ingredients critical to all of our main predictions — but several previous contributions relate to ours. In terms of consumer choices, we incorporate the choice between browsing and studying that we have introduced for single-market environments in Heidhues et al. (2021). Our previous paper predicts that regulation generates competition by facilitating browsing, which our multi-market setting both modifies and qualifies. On the one hand, at low regulatory scope the pro-competitive effect of regulation is non-existent or less important than its market-expansion effect. On the other hand, in some situations the pro-competitive effect can apply to many markets simultaneously, so it can be very powerful.

In terms of modeling the economy, we build on the multi-market framework of De Clippel et al. (2014). They suppose that consumers first see the leader's (single-dimensional) price in each market, and can then check a limited number of rivals. Their main result establishes that market leaders effectively compete for consumer *inattention* across markets. By lowering its price, a leader increases the chance that the consumer ignores its rival.

Although typically not studied in a framework with limited attention, the two main effects of consumer protection driving our results, expanding markets and inducing competition, both have close precursors in the literature. Related to the former, researchers argue that regulation can mitigate adverse selection when consumers cannot ascertain some dimensions of quality or lack trust in sellers (Shavell, 1980, Bar-Gill and Warren, 2008, Christensen et al., 2016). Related to the latter, researchers argue that regulation may make offers more comparable and thereby generate competition (Enthoven, 1993, Piccione and Spiegler, 2012, Grubb, 2015b, Heidhues et al., 2021, Johnen and Leung, 2023). But because they focus on single-market settings, these papers do not make any of our main predictions, such as those on the relative importance of the two effects at different scopes of regulation or the potentially non-linear benefit of regulation.[2]

A small literature studies the positive and normative properties of consumer protection when consumers are "fallible" in that they do not necessarily make optimal decisions (Armstrong, 2008, Heidhues and Kőszegi, 2010, Armstrong and Vickers, 2012, Inderst and Ottaviani, 2012, Grubb, 2015a).[3] In developed countries, consumer protection affects almost every economic transaction, often not only mandating transparency, but also significantly restricting what can be traded. Relative to the practical importance of this kind of inter-

[2] Consumer protection is often captured in reduced form as lowering search or transaction costs, thereby benefiting market participation and competition. Since these papers consider neither the choice between studying and browsing nor multi-market settings, they do not imply our results. In fact, received wisdom from the search literature is that price caps *lower* consumers' propensity to comparison shop, decreasing competition and potentially increasing prices (Fershtman and Fishman, 1994, Armstrong et al., 2009).

[3] Schwartzstein and Shleifer (2013) develop a case for regulatory standards when instead courts are fallible in that they make errors in tort litigation cases.

vention, surprisingly little research provides broad theoretical foundations for it.

Our view contrasts with the "nanny-state" concern, a common argument against interventions aimed at improving individuals' decisions. Just like an overprotective nanny can hurt the long-run health of a child by preventing her from learning when to be careful, the argument goes, an overly paternalistic policymaker can hurt consumers by lowering their incentives to protect themselves.[4] While such an outcome is possible in a version of our model with very inefficient regulation, our more important message is the opposite: consumer protection can free up consumer attention to be used for economically valuable activities.

2 A Model of Multi-Market Regulation

2.1 Setup

There are $N \geq 1$ markets, and in each market n, there are two firms n_i, $i \in \{1, 2\}$ selling identical products. A firm operates in only one market, and all firms have the same marginal cost c. Firms simultaneously choose headline prices $f_{n_i} \in \mathbb{R}$ and additional prices $a_{n_i} \in \mathbb{R}$. In $J \leq N$ markets, a_{n_i} is commonly known to be bound by the regulatory cap $\overline{a}$.

A representative consumer first observes one f_{n_i} (and n_i) chosen randomly and with equal probability in each market. She then makes up to $K \geq 1$ other price observations, sequentially choosing either to "browse" the other headline price in a market, or to "study" the additional price of a firm whose headline price she has already observed. Finally, she buys up to two units of one product per market. She cannot buy any product whose headline price she did not observe, or any unregulated product she did not study. She values the first and second units of any product at v_H and v_L, respectively, where $v_H > v_L > c$, and the unique monopoly price is v_L (i.e., $2(v_L - c) > v_H - c$). If she buys product n_i, she pays a

[4] Besides being a regular question in seminars, this argument is commonly made in the popular press (e.g., "The avuncular state", Economist, April 6th, 2006) as well as scholarship in law (Klick and Mitchell, 2006, 2016) and economics (Fershtman and Fishman, 1994, Armstrong et al., 2009).

total price of $f_{n_i} + a_{n_i}$ per unit.

We look for perfect Bayesian equilibria in which firms play pure strategies, making three equilibrium-selection assumptions. First, if a firm deviates, the consumer does not infer anything about other firms' prices. This assumption is in the spirit of sequential equilibrium, and variants of it are often part of the definition of perfect Bayesian equilibrium.[5] Second, the consumer believes that firms with no demand in equilibrium set a total price of v_L. We can think of such a firm as catering to an infinitesimal portion of fully informed consumers who have no other purchase option. This assumption rules out Diamond-paradox-type no-trade traps in which a consumer with leftover attention does not study because she believes that prices are too high, and firms therefore have no incentive to charge lower prices. Third, on the equilibrium path, the consumer achieves her equilibrium level of utility with the lowest possible amount of attention, and then proceeds in the following way. If she has at least one unit of attention left over, she uses a continuation strategy in which in any regulated market she browses the competitor with positive probability. And if she has at least two units of attention left over, she uses a continuation strategy in which in any unregulated market she browses and studies the competitor with positive probability. This rules out Diamond-paradox-type no-competition traps where firms do not compete because the consumer does not comparison shop, even though she has sufficient attention to do so.

2.2 Discussion

Our model starts from the widely accepted premise 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

[5] For instance, Fudenberg and Tirole (1991, page 333) include a closely related condition in their definition of perfect Bayesian equilibrium for games with observable actions. They call it the "no signaling what you do not know" condition.

have documented them in a variety of markets.[6] Consumers may, for instance, underestimate the management fees for investment products or out-of-pocket expenses for insurance contracts. Furthermore, a_i can represent not just unexpected payments, but any secondary feature over which a firm and a consumer have conflicting interests. An unsafe product, for instance, lowers the firm's cost and hurts the consumer.

We also posit that the consumer can study the additional price. She may, for instance, read a financial contract, ask around for experiences with a durable good, or negotiate to find out the seller's actual price when the headline price is unserious. Analogously, the cap $\overline{a}$ on the additional price in regulated markets is consistent with regulatory limits on fees for financial products, minimum safety or efficiency standards for physical products, or price-posting regulation for simple retail products.[7]

Following Heidhues et al. (2021), we suppose that the attention consumers can devote to understanding products is limited. Consistent with this notion, research documents that consumers' propensity to search for other, readily available alternatives drops off sharply after investigating a few options (De Los Santos et al., 2012, Consumer Financial Protection Bureau, 2015, Honka and Chintagunta, 2017, Alexandrov and Koulayev, 2018), and there are attentional spillovers across tasks (Altmann et al., 2021, 2024, Archsmith et al., 2023). To illustrate the potential highly non-linear effects of regulation most cleanly, we assume that consumers have the same attentional limit, i.e. the same K.

Our model also makes some technically convenient, but economically less central assumptions. First, consumers cannot buy a product in an unregulated market without studying

[6] See, e.g., Spiegler (2006), Armstrong and Vickers (2012), Grubb (2015a), Bachi and Spiegler (2018) and Gamp and Krähmer (2022) 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.

[7] We assume that consumers know 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.

it. A simple microfoundation is that in an unregulated market, the consumer must protect herself from (unbounded) post-purchase surprises by unscrupulous or very inefficient firms. For simplicity, we do not explicitly incorporate such a microfoundation in the model.

Second, our assumptions regarding the consumer's values for two units of a good (v_H and $v_L < v_H$) and the monopoly price (v_L) serve to create a situation in which the consumer values entering a market even if she faces a monopolist. Other assumptions, for instance that consumers are heterogeneous in their valuations, would serve the same purpose.

Third, we have set up our model so that we can demonstrate our insights using pure-strategy equilibria. In our setting with multidimensional pricing strategies and many markets — some regulated, some not — mixed-strategy equilibria appear intractable in general. Nevertheless, based on (restrictive) special cases we have analyzed, our insights continue to hold in mixed-strategy settings. For instance, if even the first K units of attention were costly for some consumers, then a situation with spare attention would never arise, and a perfectly competitive outcome could not be enforced. But with low attention costs, a mixed-strategy equilibrium enforcing low average prices in many markets would still exist, again giving rise to a non-linear benefit from regulation.

3 Regulatory Scope and the Effects of Regulation

3.1 Theorem and Intuition

The main result of the basic model is the following:

Theorem 1. *For any J, all equilibria are equivalent in terms of the number of trades a consumer makes and the prices she pays. Furthermore:*

I. If $J \leq N - K$, then a consumer participates in $J + K$ markets, which include all regulated markets and K unregulated markets. She pays a total price equal to the monopoly price v_L for each product she buys.

II. If $J = N - K + 1$, then a consumer participates in all markets, pays a total price equal to the monopoly price v_L in the unregulated markets, and pays a total price equal to the competitive price c in the regulated markets.

III. If $J \geq N - K + 2$, then a consumer participates in all markets, and pays a total price equal to the competitive price c in all of them.

To appreciate Theorem 1, we describe the comparative statics of outcomes as the scope of regulation, J, widens. This also provides economic intuition for key steps in our proof.

Suppose first that $J = 0$ — the economy is fully unregulated. In order to purchase in a market, a consumer must study in that market. This means that she is limited to participating in $K < N$ markets, with two implications. First, she does not have attentional capacity left for comparison shopping, so all markets are monopolistic. Second, she stays away from some markets in which it would be valuable for her to participate, lowering consumer as well as producer welfare.

Now suppose that a social planner introduces small-scale regulation ($J \leq N - K$). Our proof establishes that as a result, all regulated firms charge an additional price of $\overline{a}$. Hence, a consumer seeing a headline price of $v_L - \overline{a}$ is assured that the total price does not exceed v_L, so she does not need to study to purchase. This frees up attentional capacity for something else. How does the consumer use this extra attention? In our single-market model (Heidhues et al., 2021), she switches to browsing in the same market, generating perfect competition between the firms. Crucially, however, this is not an equilibrium in the multi-market model. In such a candidate equilibrium, the consumer browses even though she can buy from her assigned firm at a competitive price. But she is better off using her attention to enter an additional unregulated market, and obtain positive consumer surplus, by studying.

In equilibrium, then, all firms charge the monopoly total price v_L, and a consumer buys from her assigned firms in J regulated markets and K unregulated markets, participating in $J + K$ markets. If a regulated firm charges a headline price above $v_L - \overline{a}$ or an unregulated firm charges a total price above v_L, the consumer reduces her demand, ensuring that firms do not deviate.

Once the scope of regulation reaches $J = N - K$, the consumer has sufficient attentional capacity to enter all markets. Then, if one more market is regulated ($J = N - K + 1$), she is left with one unit of "spare" attention that she does not need to use for the mere purpose of participating in the markets. Theorem 1 says that at this point, *all* regulated markets suddenly turn from monopolistic to perfectly competitive. If this was not the case, each consumer would use her spare attention to browse in a market in which she found the worst price relative to the competitor. As a result, firms charging such high prices would be pressured to lower them, a contradiction. This logic makes clear that a little spare attention is sufficient to enforce widespread competition, generating a potentially sharp non-linear regulatory effect. It also means that the private and social values of attention diverge greatly, with the former being zero and the latter being large. We are unaware of a former model that identifies this central role of spare attention in market competition.

In the above case with $J = N - K + 1$, all unregulated markets remain monopolistic. If one more market is regulated, however, these also become competitive. The logic is similar to that above. In equilibrium, the consumer studies her assigned firm to ensure that she can participate in the market. If she then sees that the firm charges a total price above c, she uses her two units of spare attention to browse and study, and buy from, the competitor.

After regulating $J = N - K + 2$ markets, further regulation in our model has no effect on payoff-relevant outcomes. Such regulation does free up more attention, and it is plausible that consumers can use such attention for purposes outside our model.

3.2 Economic Implications

Cross-Market Externality Our model features a novel cross-market externality, due to which the benefits of regulating a market often accrue in other markets. Suppose that the economy is at a low scope of regulation ($J < N - K$), and all consumers buy in the unregulated market n. If the planner regulates market n, outcomes in market n remain unchanged: all consumers continue to participate and to pay the same (monopoly) price. This is the type of observation that many analysts or policymakers might use against regulation. Nevertheless, both consumers and firms benefit from the regulation, as consumers enter more markets. More generally, the total benefit of regulating an active market is always strictly lower than its market-specific benefit.

While it is present at a low scope of regulation, the cross-market externality is perhaps greatest at the next stage. Regulating the $N - K + 1$-st market turns that market from monopolistic to competitive, so it is extremely beneficial for consumers in the regulated market. Even so, the within-market accounting can again drastically underestimate the effect of the regulation: now the regulation enables competition in all previously regulated markets. Similarly, regulating the $N - K - 2$-nd market enforces competition in all unregulated markets, not only the newly regulated market.

Potential Non-Linear Benefits of Regulation Our model says that the incremental benefit of regulating an additional market can be highly non-linear in regulatory scope. In particular, the incremental benefit for consumers is (i) positive at low scope, where it derives from entering one new market; (ii) potentially tremendous when regulation becomes sufficiently broad to induce competition; and (iii) zero at higher scope.

The benefits under points (i) and (ii) above provide a rationale for broad legal principles that apply to many markets and are easy for consumers to understand. For instance, the EU's principle of unfair terms in standard business-to-consumer contracts regulates additional prices in many markets, including warranties, subscriptions, holidays, car or home rentals, and standard goods. Emerging regulation against "dark patterns" in digital services partly serves the same purpose.[8] Our model says that such regulations allow consumers to enter the

[8] For instance, the EU's Consumer Rights Directive gives consumers the right to reimbursement if a trader

affected markets, and if sufficiently broad, they can help induce competition. While we are unaware of causal evidence for this prediction, it is consistent with one correlational pattern. Duflo (2012) argues that due to the lack of regulation, consumers in developing countries are often overwhelmed with having to pay attention to basic things like food and drug safety. At the same time, Atkin et al. (2021) review evidence that retail markets are generally less competitive in developing than in developed countries.

The lack of a benefit under point (iii) above says that a planner can stop short of regulating all markets. This is fortunate since there are likely to be markets where regulation is too costly or for another reason undesirable. As a case in point, in Section 4.1 we allow for the possibility that in a few markets the additional price has efficiency implications. We show that if $\overline{a}$ is far from the efficient level, it may be better to leave these markets unregulated.[9]

Effects on Firms and Self-Regulation In addition to the benefits for consumers, the incremental effect of regulation on firms is (i) positive at low scope; (ii) negative when the scope for competition is reached; and (iii) zero afterwards.[10] Similarly to other research on the market-creating effect of regulation, the benefit under point (i) suggests that at least at this stage, firms may be willing to self-regulate. Our multi-market model, however, provides a reason for why self-regulation is a poor substitute for public regulation. Since a seller organization does not internalize the externalities on other markets, its motive to

used "default options which the consumer is required to reject in order to avoid additional payment," and prohibits traders from charging consumers above cost for their means of payment. Other examples abound.

[9] As another example, suppose that in some markets, consumers have very heterogeneous tastes for additional features, and understanding these features requires studying. It can then be efficient to leave the market unregulated and for consumers to study and find the product they want. There may also be markets, such as new markets that are not yet well understood, where the planner does not have sufficient knowledge or technical capacity for effective regulation. New markets might also be best left alone for the purpose of encouraging innovation and allowing consumer attention to select the most valuable innovations.

[10] In our model, the only effect of competition is to redistribute surplus from firms to consumers. Of course, it is natural to assume that consumer surplus is socially more valuable than profits, in which case the net effect is positive. In addition, if consumers are heterogeneous in their valuations, the decrease in prices induced by competition also has the classical welfare-increasing effect of drawing more consumers into the market.

self-regulate is always inefficiently low. And firms would of course be strongly opposed to further regulation once regulatory scope nears point (ii) above.

4 Extensions and Modifications

In this section, we analyze natural variants of our basic model. In doing so, we consider the technically difficult issue of uniqueness only selectively, and mostly look for the types of equilibria we have identified previously.

4.1 Inefficient Additional Prices

So far, we have assumed that paying an additional price merely redistributes money from consumers to firms. In reality, however, an additional price can also have efficiency implications, for instance in the form of a shortfall in quality or safety that consumers value above cost. We incorporate this possibility into our model.

Suppose that in M of the markets, the consumer's total disutility from paying prices f_{n_i}, a_{n_i} is not $f_{n_i} + a_{n_i}$, but $f_{n_i} + r(a_{n_i})$. The function $r(\cdot)$ is strictly increasing and strictly convex, and satisfies $r(0) = 0$, $\lim_{a_{n_i} \to -\infty} r'(a_{n_i}) = 0$, and $\lim_{a_{n_i} \to \infty} r'(a_{n_i}) > 1$. In the quality example, $r(a_{n_i})$ would be a consumer's utility loss if the firm saves marginal cost a_{n_i} by skimping on quality. The efficient level of the additional price is a^* (i.e., $r'(a^*) = 1$), and the unique monopoly headline price with additional price a^* is $v_L - r(a^*)$. This implies that it is optimal for a monopolist in a full-information environment to sell two units.

We first study the role of attention and regulation in enforcing efficiency and competition. For this question, we suppose that $N = M = 2$ and $K = 1$. With no regulation, we get:

Observation 1. *If $J = 0$, there is an equilibrium in which firms charge the efficient additional price a^* and the corresponding monopoly headline price $v_L - r(a^*)$, and each consumer purchases two units in one market. There is no equilibrium in which consumers purchase in* *both markets, or in which consumers or producers receive a higher surplus.*

In the most efficient equilibrium, consumers study and purchase one product. Because buyers are studying but not browsing, firms offer efficient terms but monopoly prices.

Now consider regulating both markets ($J = 2$), with the cap $\overline{a}$ satisfying $v_L > c - \overline{a} + r(\overline{a})$. This means that $\overline{a}$ is sufficiently low for trading two units to be optimal even if the consumer pays an additional price of $\overline{a}$. Such a relatively efficient cap makes sense from a regulatory point of view, and also ensures the existence of a pure-strategy equilibrium.

Proposition 1. *The following types of equilibria are possible.*
I. [Efficient Monopolies.] *If $\overline{a} > a^*$ but $\overline{a}$ is sufficiently close to a^*, there is an equilibrium in which firms set $f = v_L - r(a^*), a = a^*$ and consumers purchase two units in both markets.*
II. [Competition.] *There is an equilibrium in which firms set $f = c - \overline{a}$, $a = \overline{a}$ and consumers purchase two units in both markets. If $\overline{a} \leq a^*$, there is no other equilibrium.*
III. [Hybrid.] *If $\overline{a} > a^*$ but $\overline{a}$ is sufficiently close to a^*, there is an equilibrium in which firm behavior in one market is as in I, and in the other it is as in II.*

Part I implies that non-binding but sufficiently tight regulation can expand activity while maintaining efficiency. In all of our previous examples, in contrast, whenever the regulatory cap improved outcomes, it was binding in the post-regulation equilibrium. Roughly, regulation lowers the extra profit a firm can obtain by deviating and exploiting inattentive consumers, and hence lowers the attention necessary to deter misbehavior. More precisely, to enforce efficiency with one unit of attention per consumer ($K = 1$), about half of a firm's assigned consumers study, and the rest buy blindly. If a firm raises its additional price to exploit the latter consumers, it loses the former consumers, so for $\overline{a}$ sufficiently close to a^* the deviation is unprofitable.[11] In a rental market, for instance, sufficiently many tenants

[11] In this equilibrium, browsing consumers who see a decrease in f assume that the deviating firm sets the maximum additional price $\overline{a}$, so they can only be attracted with a discrete cut in f. Because this entails an efficiency loss, for a sufficiently small portion of browsers it is unprofitable.

may be reading their leases that — in combination with regulatory constraints — landlords do not want to deviate from efficient terms.

The equilibrium in Part II is similar to that in our basic model. Regulation allows consumers not to study, which induces firms to charge the maximum additional price, but also creates spare attention that enforces competition. Unlike in the basic model, however, charging the maximum additional price is inefficient, so the welfare effect of regulation is ambiguous. In particular, if the inefficiency $r(\overline{a}) - \overline{a}$ from the maximum additional price is sufficiently high — e.g., terribly low amount of care from landlords is mandated — then regulation harms both consumers and firms.[12] It does so by inducing consumers to rely on the overly lax regulation instead of their own studying.[13]

Part II also says that if regulation is at least as tight as the efficient level, then only the competitive equilibrium exists. In combination with Part I, this implies that to maximize consumer welfare, it may be better to err on the side of overly tight rather than overly lax regulation. This is because slightly inefficient overly lax (but not overly tight) regulation may result in monopoly prices with little increase in efficiency. To see the intuition behind the asymmetry, suppose that the additional price is not at the maximal level. Then, limited consumer attention limits competition: if a firm lowers its headline price, a consumer can harbor a suspicion that it raised its additional price. To credibly signal that it has a better deal, therefore, the firm can lower its headline price discretely, and raise the additional price to the cap. This results in a loss of efficiency with lax regulation but a gain in efficiency with tight regulation. Hence, the limit to competition is stronger with lax regulation.

[12] Without regulation, consumers participate in one market, and because firms charge the monopoly price equal to the consumer's value from the second unit, they derive a surplus of $v_H - v_L$. With regulation, consumers participate in two markets, and derive consumer surplus of $v_H + v_L - 2f - 2r(\overline{a}) = v_H + v_L - 2(c - \overline{a}) - 2r(\overline{a}))$ in each. Hence, their welfare is higher without regulation if $r(\overline{a}) - \overline{a} > (v_H + 3v_L)/4 - c$.

[13] The concern that a badly chosen price cap can hurt consumers also appears in Fershtman and Fishman (1994) and Armstrong et al. (2009). There, the price cap compresses prices and thereby induces fewer consumers to become informed, lowering competition and raising the average price.[14] In our setting, in contrast, regulation makes the markets more competitive, and consumers can potentially be harmed due to a decrease in efficiency.

Finally, Part III says that with lax regulation, a hybrid between the two equilibria above also exists. In one market, firms offer an efficient deal at the monopoly price, and sufficiently many consumers study for firms not to raise the additional price to $\overline{a}$. In the other market, firms set the maximum additional price, and choose the headline price competitively. If a firm deviates, its consumers browse in this market instead of studying in the other market. Hence, one unit of attention simultaneously enforces efficiency in one and competition in the other market.

For our second question, we assume that $0 < M < N$, and ask whether the $N - M$ "transfer" markets (in which the additional price is a transfer) or the M "distortable" markets (in which the additional price has efficiency implications) are more important to regulate. One may think that to reduce the potential for inefficiencies, distortable markets are the better targets for regulation. We provide an example in which the opposite is the case.

Proposition 2. *Suppose that $\overline{a} > a^*$, $M \leq K - 2$, and $J \geq N - K + 2$.*
I. If at least $N - K + 2$ transfer markets are regulated, then there is an equilibrium with the efficient and competitive outcome in all markets.
II. Suppose M_r distortable markets are regulated. If $J \leq N - K - 1 + M_r$, then there is no equilibrium in which the efficient and competitive outcome obtains in all markets.

The proposition says that with sufficient attention and regulatory scope, regulation should focus on transfer markets. More precisely, the efficient and competitive outcome obtains if sufficiently many transfer markets are regulated (Part I); but without abundant regulatory scope, the same may not obtain if distortable markets are regulated (Part II). Intuitively, to ensure both efficiency and competition in a distortable market, consumers must study to prevent firms from raising the additional price. Since this is the case with and without regulation, regulation does not save any consumer attention. Ensuring efficiency and competition in a regulated transfer market, in contrast, does not require consumers to study. Since studying is necessary without regulation, regulation saves a unit of attention. As a result, using regulation on a distortable market is wasteful.

4.2 Different Costs of Studying and Regulating Additional Prices

Our baseline model assumes that browsing as well as studying in any market has the same cost. While the cost of browsing — looking at a single transparent price — may indeed be similar across markets, the cost of studying — which often involves more in-depth research and understanding — can vary significantly across markets. For instance, bargaining to find out the price at which a seller is willing to sell is relatively simple, while understanding a credit-card or mortgage contract is difficult. We now incorporate this possibility into our model, which both has positive implications and raises normative questions.

Formally, instead of assuming that studying always costs one unit of attention, we posit that it costs one unit in N_l markets and $s > 1$ units in $N_h = N - N_l$ markets, where s is an integer. We refer to the former as l-markets and the latter as h-markets. Abstracting from the obvious point that more valuable markets are more important to enter or regulate, we continue to assume that all markets have the same value for consumers and cost to firms.

Positive Implications Theorem A.1 in the Appendix identifies outcomes for any N_l, N_h, and pattern of regulation. The theorem implies that the key insights from our basic model continue to apply. These messages include that (i) at low regulatory scope, regulating an additional market is beneficial because it raises participation; (ii) at a sufficiently high regulatory scope, all markets become competitive, creating a potentially highly non-linear effect; and (iii) the benefits of regulating a market can accrue partly or fully in other markets. One difference, however, is that in the current model regulated markets can become competitive even at low regulatory scope. This can happen when all unregulated markets are h-markets. Then, the consumer may have spare attention that is sufficient to enforce competition in regulated markets, but not sufficient to enter another unregulated market. The economy therefore divides into up to three parts: regulated competitive markets, unregulated monopolistic markets in which (some) consumers participate, and potentially also dormant markets in which no consumer participates.

Optimal Consumer-Protection Regulation When markets differ in studying costs, a natural question is which markets should be prioritized for regulation. To start, notice that if it is equally easy to regulate all markets, then regulating an h-market generates greater total surplus than regulating an l-market. Since participating in h-markets is more costly without but equally costly with regulation, regulating these markets allows consumers to enter more markets.

Markets that are difficult for consumers to navigate, however, are plausibly also difficult for planners to regulate. Returning to our examples from the beginning of the subsection, enforcing price posting regulation that obviates the need for bargaining is relatively simple, but running effective contract law is difficult. We assume, therefore, that a set of markets whose studying costs total J are regulated, so that regulation costs are proportional to studying costs. Where does the regulator want to concentrate its regulatory effort?

Proposition 3.

I. **Low Regulatory Scope.** *If* $J + K \leq N_l$*, then regulating as many* l*-markets as possible uniquely maximizes consumer and total surplus.*

II. **High Regulatory Scope.** *If* $N_l + sN_h + 1 + s > J + K \geq N_l + sN_h + 2$*, then regulating as many* h*-markets as possible maximizes total and uniquely maximizes consumer surplus.*

III. **Abundant Regulatory Scope.** *If* $J + K \geq N_l + sN_h + 1 + s$*, then any pattern of regulation maximizes consumer and total surplus.*

At low scope (Part I), the role of regulation is to open up more markets for consumers, which is best served by regulating as many markets as possible. Hence, it is optimal to focus regulation on l-markets. At high scope (Part II), however, regulation also aims to ensure competition. This is fully successful if consumers have sufficient spare attention to check out the competitor in any one regulated *or* unregulated market. Since the competitors are most difficult to check out in unregulated h-markets, these are the markets that should be regulated. And at an abundant scope (Part III), any pattern of regulation ensures participation and competition in all markets, so regulatory choices make no difference.

Proposition 3 does not cover the intermediate case between low and high scopes. We have found that in this case, results depend in subtle and non-robust ways on the tradeoff between the consumer benefits of competition and opening up markets. Indeed, unlike in the cases stated in the proposition, now the regulator may prefer to decrease J (i.e., not to use all regulatory capacity) to generate spare attention and thereby competition.

As one potential illustration, developing countries often regulate the contractual terms for essential services such as gas or electricity through state monopolies. In contrast, many developed nations have deregulated retail markets for the same services in which various difficult-to-understand pricing structures are permitted and used. At the same time, developed nations regulate many complex products and services more heavily than do developing nations.

4.3 Heterogeneous Firm Productivity

We consider what happens when there can be inefficient firms in the market, modifying our model in the following ways. In one of the N markets, there are $M \geq 2$ inefficient firms in addition to the previously specified efficient ones. The inefficient firms have marginal cost $c' > c$ such that $c' - c < v_H - v_L$ and the monopoly price with cost c' for fully informed consumers is still v_L. Each inefficient firm first decides whether to be in the market, staying out if it expects zero demand. Entry decisions are observed before firms set prices, and a consumer also knows whether she is assigned to an efficient or inefficient firm. Furthermore, markets are partially segregated: if a consumer assigned to an efficient (resp. inefficient) firm browses, she finds the other efficient firm (resp. inefficient firms) first. Finally, the inefficient market is regulated.[15] We find:

Proposition 4.

I. If $J \leq N - K$, then inefficient firms participate, and consumers can only purchase at the monopoly price.

II. If $N-K < J < N-K+M$, there are two equilibrium outcomes in the inefficient market.

1. *Inefficient firms participate. The efficient regulated firms charge a total price of c, and the inefficient firms charge a total price of c'.*

2. *Inefficient firms are out of the market. The efficient firms charge a total price of c.*

III. If $J \geq N - K + M$, then inefficient firms do not participate, and consumers buy at the competitive price c in all markets.

As in the discussion of Theorem 1, we walk through possible outcomes as the scope of regulation expands. Part I says that at low scope of regulation, all firms charge monopoly prices, which also implies that the inefficient firms participate. This is a version in our setting of the classical concern that market power allows inefficient firms to survive.

Part II says that as the scope of regulation expands, there is a range in which two equilibria exist. In a new type of equilibrium, inefficient firms participate in the market and price at their higher cost c'. Consumers enter all markets, and have $J+K-N < M$ units of spare attention. This attention is insufficient for a consumer assigned to an inefficient firm to find an efficient firm, so the inefficient firms survive. At the same time, a competitive equilibrium akin to that in our basic model also exists. If only efficient firms are in the market, then an inefficient firm cannot attract consumers by unilaterally entering. If it did enter, a consumer assigned to it would use a unit of spare attention to find an efficient firm. In other words, the inefficient firms require each other to relax competition.

[15] The last assumption simplifies the statements of our results, while the preceding one ensures the existence of pure-strategy equilibria.

Part III says that when the scope of regulation becomes sufficiently large, it is no longer part of an equilibrium for the inefficient firms to participate. Since the consumer has at least M units of spare attention, she could find an efficient firm even if all inefficient firms stayed in, leaving the latter with no demand.

At a general level, this version of our model implies that consumer protection can engage consumers in eliminating inefficient firms, and thus has a role in ensuring productive efficiency. In addition, Proposition 4 suggests that obtaining productive efficiency requires an initially broad regulatory scope that can later be scaled back. As the scope of regulation expands, it is plausible that equilibrium 1 in Part II is played, since firms have been in the market and may naturally stay there. Hence, productive efficiency obtains only when regulatory scope reaches that in Part III. At this point, however, it is plausible that inefficient firms cannot coordinate on entering or re-entering, so equilibrium 2 in Part II results even with lower regulatory scope.

5 Conclusion: Further Issues

Implications for Transparency Regulations Our paper focuses on regulations that limit the ex-post harm a consumer can suffer if she purchases without studying. Another key approach to consumer protection is disclosure regulation, which mandates firms to truthfully inform consumers about relevant product attributes. From the perspective of our attention framework, we can think of disclosure regulation as facilitating browsing or studying. For example, standardized nutrient labels make it easier for a consumer to find relevant information, arguably lowering studying costs, and government-run price comparison sites can lower browsing costs. Furthermore, there are restrictions on products and fees that are also best understood as lowering studying costs rather than imposing a binding cap on the additional price. For instance, if the government bans some but not all fees, this can make it easier for the consumer to learn about possible ex-post harm, but she still needs to study the remaining fees. The effect of such interventions can be readily studied in simple variants of our framework. One can ask, for instance, which type of transparency or partial regulations policymakers should focus on. We conjecture that it is those that reduce studying costs in unregulated markets or browsing costs in uncompetitive regulated markets. The former can facilitate participation in more markets, and the latter can help leverage existing spare attention to enforce competition.

Knowledge about Regulations Our model also assumes that consumers know which markets are regulated. An interesting question for future research — which however requires non-trivial modifications of our formal framework — is what happens when consumers are only partially informed about regulations. As one possibility, consumers may know the scope J of regulation, but not which markets are the regulated ones. A natural conjecture, then, is that a multiplier on regulatory scope arises. At low scope, consumers do not feel protected enough to purchase without studying a product's additional price (or perhaps the regulations in place), so the regulation does not liberate much attentional capacity. At sufficiently high scope, consumers may start purchasing blindly in many markets, suddenly freeing up a lot of attention. Now the problem is that firms can exploit trusting consumers in unregulated markets, so it would seem important to either close holes in the regulation or explicitly warn consumers of unregulated markets.

Alternatively, consumers may know which markets are regulated, but not the particulars of the regulation, for instance not the precise cap on the additional price. Such a situation can naturally arise, for instance, if regulations are very different across markets. Again, uncertainty in $\overline{a}$ creates an incentive to study, so that it may defeat the attention-saving role of regulation. From this perspective, fine-tuning consumer protection too much to specific markets can be counterproductive — policies should instead be coordinated to allow for easy understanding by consumers.

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A Proof of Main Theorem

We refer to $f_{n_i} + a_{n_i}$ as the total price t_{n_i}. Consider the setup of Section 4.2. Let $N_l^u \geq 0$ be the number of unregulated low-studying-cost markets and $N_h^u \geq 0$ be the number of unregulated high-studying-cost markets. Below $\mathbb{I}_{\{\}}$ refers to the indicator function. We prove the following generalization of Theorem 1:[16]

Theorem A.1. *I. If $K < N_l^u + sN_h^u + 2 + \mathbb{I}_{\{N_h^u \geq 1\}}(s-1)$, we have:*

(a) If either $K < N_l^u$ or $(K - N_l^u) \mod s = 0$, the consumer studies in as many unregulated low-studying cost markets as possible, and uses any additional attention $K - N_l^u$ to study in high-cost unregulated markets. All firms set total prices equal to v_L.

(b) If $K > N_l^u$ and $(K - N_l^u) \mod s = 1$, the consumer studies in all low-cost unregulated markets and in $\lfloor (K - N_l^u)/s \rfloor$ unregulated high-cost studying markets. Firms in regulated markets charge a total price of c and in unregulated markets a total price of v_L.

(c) If $K > N_l^u$ and $(K - N_l^u) \mod s > 1$, the consumer studies in all low-cost unregulated markets and in $\lfloor (K - N_l^u)/s \rfloor$ unregulated high-cost studying markets. Firms in regulated and unregulated low-cost studying markets charge a total price of c, and in unregulated high-cost studying markets a total price of v_L.

[16] For integers a and $s > 0$, we write $a \mod s = r$ if $0 \leq r < s$ and $(a - r)$ is divisible by s.

II. If $K \geq N_l^u + sN_h^u + 2 + \mathbb{I}_{\{N_h^u \geq 1\}}(s-1)$ then firms in all markets charge a total price of c.

Proof of Theorem A.1. We refer to any history h_a in which the consumer has enough attention left to look at another (headline or additional) price as an attention history. We call histories h_p in which the consumer does not have enough attention to look up another price purchase histories. An attention strategy $\sigma_a(h_a)$ is a mapping from all possible attention strategies into a probability distribution over the remaining prices the consumer may look up. A purchase strategy $\sigma_p(h_p)$ maps the prices the consumer has observed into feasible purchases. (Appendix B provides a formal definition of these intuitive notions.)

Next, we establish necessary conditions for equilibria in which firms play pure strategies in a sequence of Lemmas.

Necessary Conditions. The following Lemmas collect necessary conditions for an equilibrium independently of the amount of attention.

Lemma 1. *A firm in an unregulated market charges a total price $t_{n_i} \leq v_L$.*

Proof. Suppose otherwise, i.e. that there exists a firm n_i that charges a total price above v_L in the unregulated market n. Without loss of generality, suppose $t_{n_i} \geq t_{n_j}$ where $j \neq i$.

In case the firm n_i has zero demand in equilibrium, our second equilibrium-selection assumption implies that $t_{n_i} = v_L$.

Thus, we are left to consider the case in which the firm n_i has positive demand in equilibrium. Suppose first that $t_{n_i} > t_{n_j}$. Then, all of n_i's demand comes from consumers who purchase from n_i without having seen both of n_j's prices. Consider only such consumers from now on. We argue that if n_i lowers its total price to $v_L - \epsilon$ for a sufficiently small $\epsilon > 0$, it strictly increases profits from these consumers. To do this, we argue that if it was optimal for a consumer to use attention strategy σ_a that does not involve studying n_j's additional price for any history h_k on the path of play, then it is strictly suboptimal for this consumer to use a continuation attention strategy σ'_a that involves studying the additional price of firm n_j for any history h' that differs from an on path history h_k only in that the candidate equilibrium a_{n_i} is replaced by the observed deviation $a'_{n_i} = a_{n_i} + v_L - \epsilon - t_{n_i}$. Intuitively, observing a lower additional price makes it weakly less attractive to study the rival because beliefs about other firms' prices are unaffected (by our first equilibrium-selection assumption).

Formally, note that if the consumer follows an attention strategy $\sigma_a(h')$ that does not involve studying a_{n_j}, then following the deviation she purchases two units from firm n_i, which increases her payoff by $t_{n_i} - v_L + 2\epsilon$ relative to that in the candidate equilibrium. Suppose that there were an alternative attention strategy σ'_a that involves studying a_{n_j} following a history h' (that differs from an on path equilibrium history only in that the candidate equilibrium a_{n_i} is replaced by an observed above deviation to a'_{n_i}) and increases payoffs by more than $t_{n_i} - v_L + 2\epsilon$. Let $P(h''_p)$ be the set of products (and their prices) that is induced when all firms other than i play their equilibrium pricing strategy, i deviates as specified above, and the consumer uses the attention strategy σ'_a. Note that absent the deviation, if the consumer would follow the attention strategy σ''_a that prescribes the same attention allocation as σ'_a for all histories in which a'_{n_i} is replaced by the original candidate equilibrium additional price a_{n_i}, it would induce a set of $P(h'''_p)$ that differs from $P(h''_p)$ only in the additional price for product n_i. Hence, the optimal purchase behavior in all markets other than n would be identical; we are left to consider the change in the induced consumer surplus in market n. If the consumer purchases from firm n_i following σ'_a, then the consumer's reduction in surplus when buying from firm n_i is bounded by $t_{n_i} - v_L + 2\epsilon$. Hence, it would be an optimal deviation to adopt σ''_a in the candidate equilibrium. If it is optimal to buy from firm n_j under σ'_a after the deviation it remains optimal for σ''_a absent the deviation, so again there is a profitable deviation. This contradicts that σ_a is optimal in the candidate equilibrium.

Now because the consumer does not study n_j after having observed the deviation, conditional on the consumer studying a_{n_i}, firm n_i's profits are $2(v_L - 2\epsilon - c)$, which increases profits for sufficiently small ϵ since $2(v_L - c) > v_H - c$.

Now suppose that $t_{n_i} = t_{n_j}$. In this case, any consumer who studied the additional price of firm n_i will buy from it following the deviation independently of whether or not she is also aware of firm n_j's prices. Thus, firm n_i earns profits $2(v_L - 2\epsilon - c)$ following the deviation, which is profitable for sufficiently small ϵ. $\square$

Lemma 2. *A firm in a regulated market charges a total price $t_{n_i} \leq v_L$.*

Proof. Suppose otherwise, i.e. that there exists a firm n_i that charges a total price $t_{n_i} > v_L$ in a regulated market n. Without loss of generality, suppose $t_{n_i} \geq t_{n_j}$.

In case firm n_j with $j \neq i$ charges $t_{n_j} < v_L$, then n_j can strictly increase profits by charging $f_{n_j} = v_L - \overline{a} - \epsilon$, $a_{n_j} = \overline{a}$ for a sufficiently small $\epsilon > 0$. To see this, note that before the deviation, consumers initially assigned to n_j and consumers initially assigned to n_i who browse purchase from n_j. Because $t_{n_i} > v_L$ and all consumers who observed n_j's headline price know that its total price continues to be below v_L, demand from these consumers stays the same. Hence, despite the fact that consumers who observe the deviation of n_j might change how they allocate attention after observing n_j's headline price, this does not affect demand for firm j. Furthermore, since the deviation by n_j cannot affect the browsing choice of consumers assigned to n_i, n_j's overall demand remains unaffected. We conclude that the deviation strictly increases profits.

In case n_j with $j \neq i$ charges $t_{n_j} \geq v_L$, we consider two cases: (i) $t_{n_j} < t_{n_i}$ and (ii) $t_{n_j} = t_{n_i}$. In case (i), firm n_i earns strictly less than monopoly profits from its own assigned consumers: n_j's assigned consumers do not buy from firm n_i even if they browse, and consumers who purchase from n_i buy only one unit. By charging $(v_L - \overline{a} - \epsilon, \overline{a})$, firm n_i attracts all of its assigned consumers and earns $2(v_L - \epsilon - c)$ on them. As $\epsilon \to 0$ this approaches the monopoly profits on its assigned consumers, and hence for sufficiently small ϵ, this deviation strictly increases profits. Next, consider case (ii) in which $t_{n_j} = t_{n_i} > v_L$. Observe that in the candidate equilibrium any consumer who purchases from firm i buys at most a single unit. Consider a deviation by firm i to $(v_L - \overline{a} - \epsilon, \overline{a})$. Then any consumer who observes firm i's headline price must purchase two units from it. Hence, for sufficiently small ϵ the deviating firm earns strictly greater profits from all consumers initially assigned to it. Furthermore, any consumer initially assigned to i's rival that browses must purchase two units from firm i following the deviation. Because the probability that a consumer assigned to i's rival browses is independent of i's prices, thus, for sufficiently small ϵ this deviation strictly increases profits. We conclude that $t_{n_i} \leq v_L$. □

Lemma 3. *Total prices in all markets n are symmetric, i.e. $t_{n_i} = t_{n_j}$.*

Proof. Suppose otherwise, i.e. there exists some market n in which in equilibrium $t_{n_i} < t_{n_j}$. Since by our second equilibrium-selection assumption a firm with no demand sets a total price of v_L, firm n_i must have positive demand in equilibrium, and thus also $t_{n_i} \geq c$. We consider two cases: (a) market n is an unregulated market and (b) market n is regulated. In case (a), suppose firm n_i deviates and raises a_{n_i} to a'_{n_i} in such a way that $f_{n_i} + a'_{n_i} < t_{n_j} \leq v_L$. This cannot affect the probability that the consumer observes the headline price or that she studies firm n_i at any point in the search process. And once she studied firm n_i, it remains strictly optimal to purchase from firm n_i independently of how the consumer spend her attention otherwise. Hence, this deviation does not affect the firm n_i's demand and therefore increases its profit. In case (b), consider a deviation by firm n_i to $(f'_{n_i}, \overline{a})$ such that $t_{n_i} < f'_{n_i} + \overline{a} < t_{n_j} \leq v_L$. This deviation does not affect when the consumer first becomes aware of firm n_i's headline price, and whenever she observed firm n_i's headline price the consumer strictly prefers to purchase from firm n_i independently of her beliefs regarding a_{n_i} in case she did not study it and independently of how she spends her attention otherwise. Thus, this deviation cannot decrease firm n_i's demand and is therefore profitable. We conclude that $t_{n_i} = t_{n_j}$ in all markets. □

Lemma 4. *In equilibrium, the consumer studies in as many unregulated markets as possible.*

Proof. Because in equilibrium firms in any market n deterministically set the same total price, the consumer on the path of play has no benefit of browsing. Because becoming active by studying the initially-assigned firm in any unregulated market n gives the consumer an additional surplus of at least $v_H - v_L$, the consumer is only willing to browse in any market in case reallocating her attention does not allow her to study more unregulated markets. $\square$

We next specify further necessary conditions that rely on the amount of attention the consumer has in three steps.

Step (i): If $K \leq N_l^u$, all firms charge total prices of v_L. By Lemma 4, the consumer uses all her attention to study in unregulated low-cost markets. Suppose for the sake of contradiction that there exists a market n in which firms charge prices $t_{n_i} = t_{n_j} < v_L$. If the market is unregulated, by the second equilibrium-selection assumption the firms must have positive demand. Then, the firm n_i can deviate from its equilibrium offer (f_{n_i}, a_{n_i}) to (f_{n_i}, a'_{n_i}) such that $0 < a'_{n_i} - a_{n_i} < (1/2)\min\{v_L - t_{n_i}, v_H - v_L\}$. Following such a price increase, the consumer could save $2(a'_{n_i} - a_{n_i})$ by browsing and studying a_{n_j} once she becomes aware of it. Doing so, however, requires to study in one less unregulated market, which lowers her utility by at least $v_H - v_L$ in an unregulated low-cost studying market and therefore is suboptimal following the deviation. Hence, the deviation is profitable, a contradiction. Similarly, if the market is regulated and $t_{n_i} = t_{n_j} < v_L$, a firm n_i can deviate and charge $(t_{n_i} + \epsilon - \overline{a}, \overline{a})$ for some $\epsilon \in (0, \min\{v_L - t_{n_i}, (1/2)(v_H - v_L)\})$. In that case, browsing in market n saves the consumer less than $v_H - v_L$ and requires her to study in at least one less unregulated low-cost market. The latter generates utility of $v_H - v_L$, so browsing in market n following the deviation is suboptimal. Because the consumer does continue to buy from n_i, we conclude that firm n_i has a profitable deviation.

Step (ii): If $N_l^u < K < N_l^u + sN_h^u + 2 + \mathbb{I}_{\{N_h^u \geq 1\}}(s-1)$, we distinguish three cases: (a) $(K - N_l^u) \mod s = 0$; (b) $(K - N_l^u) \mod s = 1$; and (c) $(K - N_l^u) \mod s > 1$. For each case, we now prove the statement in the theorem.

For Case (a), Lemma 4 implies the consumer studies in all unregulated low-cost studying markets and in as many unregulated high-cost studying markets as possible. When doing so the consumer uses all her attention, and as a result she browses with probability zero in equilibrium. By essentially the same argument as in the case where $K \leq N_l^u$ (where the consumer now forgoes studying in some unregulated market not necessarily a low-cost one), all firms charge a total a price of v_L. Thus, any equilibrium satisfies Statement I(a).

In Case (b), she has one unit of attention left when studying in all unregulated low-cost markets and studying in as many unregulated high-cost markets as possible. Conversely, for $s > 2$, any attention allocation in which the consumer does not study in all low-cost markets leads her to participate in less markets, contradicting Lemma 4. In case $s = 2$, the consumer could potentially study in all but one unregulated low-cost studying market n' and use all remaining attention (i.e. $K + 1 - N_l^u$) to study in an additional high-cost market without violating Lemma 4; since in Case (b) $K + 1 - N_l^u \mod 2 = 0$, she then has no attention left to browse. Any such attention strategy, however, violates our third equilibrium-selection assumption as we establish next. First, we observe that the total price in an unregulated high-cost studying market must be v_L; suppose otherwise, i.e. it is $t_n < v_L$. Then a firm n_i can increase a_{n_i} by $\epsilon \in (0, \min\{v_H - v_L, v_L - t_n\}/2)$. Note that upon studying firm n_i following the deviation, a consumer does not want to browse and study its rival n_j. Doing so would cost $s + 1 = 3$ units of attention, and would require the consumer to study in at least one less unregulated market. Because, however, all firms set prices weakly below v_L, not participating in an unregulated market reduces the consumer surplus by $v_H - v_L$, so the consumer is strictly better of not browsing and studying firm n_j. Thus, increasing the additional price by ϵ does not decrease firm n_i's demand and hence increases its profits. Given that firms in unregulated high-cost markets charge v_L, however, the consumer can reach her equilibrium utility by not studying in a high-cost market and studying in all unregulated low-cost markets (including the one n' she did not do so in the candidate equilibrium). This uses one unit less of attention, and since firms in n' charge a price weakly below v_L does not reduce her expected consumer surplus. Hence, the consumer must do so by our third equilibrium-selection assumption, a contradiction. We conclude that also in Case (b) the consumer studies in all unregulated low-cost markets and in $\lfloor (K - N_l^u)/s \rfloor$ unregulated high-cost markets. Thereafter, she has one unit of attention left. Because she then must use this unit of attention to browse in any regulated market with positive probability by our third equilibrium-selection assumption, firms in equilibrium cannot set an identical total price above c. We conclude that firms set a total price of c in all regulated markets. Furthermore, because at any total price below v_L in an unregulated market a firm could deviate and increase the additional price by $\epsilon \in (0, \min\{v_H - v_L, v_L - t_n\}/2)$ without inducing the consumer to browse and study its rival, by the same logic as above, firms in any unregulated market also charge a total price of v_L. Thus, any equilibrium satisfies Statement I(b).

In Case (c), the consumer has $(K - N_l^u) \mod s > 1$ units of attention left when studying in all unregulated low-cost markets and studying in as many unregulated high-cost markets as possible. Conversely, for $(K - N_l^u) \mod s \neq s - 1$, any attention allocation in which the consumer does not study in all low-cost markets leads her to participate in less markets, contradicting Lemma 4. In case $(K - N_l^u) \mod s = s - 1$, the consumer could also study in all but one unregulated low-cost studying market n' and use all remaining attention (i.e. $K + 1 - N_l^u$) to study in high-cost markets without violating Lemma 4; since in this case $(K + 1 - N_l^u) \mod s = 0$, she then has no attention left to browse. Any such attention strategy, however, violates our third equilibrium-selection assumption by the same argument as in Case (b): because the consumer uses all her attention in this candidate equilibrium, firms in an unregulated high-studying cost market must charge a price of v_L and then the consumer could reach her candidate equilibrium utility faster by studying in all low-cost studying markets and one less high-cost studying market. By our third equilibrium-selection assumption she must do so, and then use her $s - 1 \geq 2$ units of attention to browse with positive probability in all regulated markets as well as browse and study the rival in all unregulated low-cost studying markets. This, in turn, implies that firms cannot have a mass point on the same total price of $t_n > c$ in regulated or unregulated low-cost studying markets.

We conclude that in Case (c), firms charge a total price of c in all regulated or unregulated low-cost studying markets, and a total price of v_L in all unregulated high-studying cost markets. Thus, any equilibrium satisfies Statement I(c).

Step (iii): if $K \geq N_l^u + sN_h^u + 2 + \mathbb{I}_{\{N_h^u \geq 1\}}(s-1)$ all firms charge a total price of c. By Lemma 4 the consumer must study in all unregulated markets, and because by Lemma 3 total prices are symmetric in all markets, the consumer can reach her equilibrium level of utility if and only if she studies in all unregulated markets; by our third equilibrium-selection assumption she hence must do so and then use her remaining units of attention (which are weakly greater than $s+1$) to browse in all regulated markets with positive probability as well as browse and study in all unregulated markets with positive probability. Hence, firms cannot set the same total price $t_n > c$ in any market. We conclude that all markets are perfectly competitive in this case. Hence, any equilibrium satisfies Statement II.

Finally, we prove the existence of an equilibrium satisfying our selection criteria by explicitly constructing it for each case in the Appendix B. Doing so involves specifying behavior and beliefs for a large set of on- and off-path histories in a standard way that induces the outcomes specified in the theorem. □

Proof of Theorem 1 The theorem is a special case of Theorem A.1 in which $N_h = 0$. □

B Further Proofs

B.1 Consumer's Strategy

We partition the consumer's strategy into her attention and purchase strategy. Let $I \equiv \{f_{1_1}, a_{1_1}, f_{1_2}, a_{1_2}, f_{2_1}, a_{2_1}, ...f_{n_i}, a_{n_i}, ..., f_{N_2}, a_{N_2}\}$ be the set of all prices set by firms. For any $x \in I$, let $s(x)$ be the attention cost of learning the price x. Denote the set of all possible initially-learned headline price vectors as $I_0 \equiv \{(f_{1_j}, f_{2_k}, ..., f_{n_i}, ..., f_{N_l})| \, \forall n \; f_{n_i} \in \{f_{n_1}, f_{n_2}\}\}$, and let $\theta_0 \in I_0$ be the headline-price vector to which the consumer has been randomly assigned. In step 1 of the consumer's search, the set of all possible attention allocations upon seeing θ_0 is

$$I_1(\theta_0) \equiv \{x|\ x \in I \backslash \{\theta_0\} \cup \{\emptyset\},\ s(x) \leq K,\ x = a_{n_i} \Rightarrow f_{n_i} \in \theta_0,\ x = \emptyset \Rightarrow s(x) > K\ \forall x \in I \backslash \{\theta_0\}\}.$$

Let $\theta_1(\theta_0) \in I_1(\theta_0)$ be one such attention allocation in step 1. A behavioral strategy at step one, $\sigma_1(\theta_0)$, is thus a mapping from the history θ_0 to $\Delta[I_1(\theta_0)]$, that is to probability distributions over the finite number of possible prices the consumer can learn next (where with slight abuse of notation we do not distinguish between the price the consumer wants to learn and its realization).

Denote by h_k the history of observed prices by the consumer up to step k. Then $h_1 = \theta_0$ and $h_2 = (\theta_0, \theta_1(\theta_0))$. Let $K_0 = K$ and $K_k = K_{k-1} - s(\theta_k(h_k))$ be the remaining attention at step k. To inductively define the history of observed prices $h_k = (h_{k-1}, \theta_{k-1}(h_{k-1}))$, note that in step $k > 1$ of her search, the set of all possible attention allocations is $I_k(h_k) \equiv \{(h_{k-1}, x)|\ x \in \{\varnothing\} \cup I \setminus (h_{k-1}),\ s(x) \leq K_k,\ x = a_{n_i} \Rightarrow f_{n_i} \in I_{k-1}(h_{k-1}),\ x = \emptyset \Rightarrow s(x) > K_k\ \forall x \in I \setminus (h_{k-1})\}$. Let $\theta_k(h_k) \in I_k(h_k)$ be one such feasible attention allocation in step k and $\sigma_k(h_k)$ be the behavioral attention strategy in step k, which is a mapping from the history h_k to $\Delta[I_k(h_k)]$. The consumer search ends in step k' if $\theta_{k'}(h_{k'}) = \emptyset$; we call such a history a purchase history h_p. An attention strategy $\sigma_a(h_k)$ specifies the consumer's behavior for any non-purchase history that can be reached.

Denote the set of feasible purchases of a consumer with history h_p in market n by $\Lambda_n(h_p) \equiv \{x \in \{n_1, n_2\}|\ x \in \{n_1, n_2\} \Rightarrow f_x \in h_p \text{ and } a_x \in h_p\}$ if market n is unregulated and $\Lambda_n(h_p) \equiv \{x \in \{n_1, n_2\}|\ x \in \{n_1, n_2\} \Rightarrow f_x \in h_p\}$ if market n is regulated. Denote by $\lambda_n(h_p) \in \Lambda_n(h_p)$ the purchase from a given feasible firm, and denote the choice of not buying by $\lambda_n(h_p) = \emptyset$. In market n, thus, a consumer selects $\lambda_n(h_p) \in \Lambda_n(h_p) \cup \{\emptyset\}$. Combining these purchase decisions over all markets for all possible histories h_p leads to the purchase strategy $\sigma_p(h_p) = (\lambda_1(h_p), \lambda_2(h_p), ..., \lambda_N(h_p))$. The consumer's strategy $\sigma = (\sigma_a, \sigma_p)$.

B.2 Perfect Bayesian Equilibria and Irrelevant Histories

Throughout the Appendix, we specify essentially perfect Bayesian equilibria (EPBEa) (Blume and Heidhues, 2006), which avoids having to specify behavior following irrelevant histories that do not affect the incentives on the path of play. Below, we declare off-path histories irrelevant in which more than one firm deviated at the pricing stage; obviously they do not affect on-path incentives. Similarly, for the histories in which at most one firm deviated, we specify the consumer's sequential search behavior so that she gets the maximal possible surplus (given her equilibrium beliefs and past observed prices). This implies that histories in which the consumer deviated from her specified search strategy are also irrelevant because no matter what continuation strategy she follows after those histories, she believes that she cannot reach a higher payoff.

To see that the set of EPBE and PBE outcomes coincide, we show that following every irrelevant history in our game a pair of consistent beliefs and best response (for the consumer) exists: Consider first any history in which the consumer completed her sequential search and has to make her purchase decisions. Given her beliefs, the consumer selects among finite action profiles, so trivially a best response exists for any such purchase history. For any such purchase history, calculate the consumer's expected payoff. Now consider a history in which the consumer has a single unit of attention left. She can select among a finite number of prices to uncover. For any price information she finds, expected payoffs are well defined by the previous step. Hence, given her beliefs at any history where she has one unit of attention left, she can calculate the expected payoff for any price she decides to look at. Because there are a finite number of prices, an optimal action exists. Specifying such an action together with the optimal continuation play following a purchase history gives an optimal continuation strategy, which is a best response to her beliefs. Using the same argument iteratively, a consumer's best response exists following any history in which she is called to act upon. Since firms only act following the null history, which is on the path of play, our

EPBE specifies their best responses explicitly. Thus, PBE and EPBE outcomes coincide.

B.3 Proofs

Equilibrium Existence in Theorem A.1. To prove existence of a PBE, we specify an EPBE for the relevant histories as explained in Appendix B.2.

Strategies: firms. In all cases, all firms charge an additional price of $\overline{a}$. Furthermore, in Case I(a) all firms charge headline price $v_L - \overline{a}$. In Case I(b) in regulated markets, all firms charge headline price $c - \overline{a}$. In unregulated markets, all firms charge headline price $v_L - \overline{a}$. In Case I(c) in regulated and unregulated low-cost studying markets, all firms charge headline price $c - \overline{a}$. In unregulated high-cost studying markets, all firms charge headline price $v_L - \overline{a}$. Finally, in Case II all firms charge headline price $c - \overline{a}$.

Strategies: consumers. We begin by specifying the consumers' purchase strategy σ_p following relevant histories in which at most one firm deviated. Below, we specify point beliefs regarding any price the consumer has not observed yet. Furthermore, we group histories based on the beliefs they induce, so we simply specify the consumers' purchase behavior given her expected total prices and set of feasible purchases $\Lambda_n(h_p)$ for all n. Finally, we specify it in a way in which the behavior in market n does not depend on other markets.

In case the consumer can only purchase from one firm in market n (i.e. $\Lambda_n(h_p) = \{n_i\}$ for $i = 1, 2$), she purchases two units from this firm if its total price is weakly below v_L, one unit if its total price is in $(v_L, v_H]$, and zero units otherwise. If she can purchase from both firms (i.e. $\Lambda_n(h_p) = \{n_1, n_2\}$), the lowest total price must be weakly below v_L in any history in which at most one firm deviated. In this case, she buys from a firm with the lowest total price breaking ties in favor of the firm she was initially assigned to.

In each case, we first describe what the consumer does when encountering equilibrium prices, and then what she does if she sees a deviation.

I(a). On path: consumers study their assigned firms in the unregulated low-cost studying markets in order of n and then in the unregulated high-cost studying markets in order of n.

Following the observed deviation of a single firm: In case the consumer observes a headline price other than $v_L - \overline{a}$ in an unregulated low-cost studying market, she proceeds to first study in all other unregulated low-cost studying markets in the order of n and then, if she has attention left over, studies the deviant low-cost-studying firm. If thereafter she has further attention left over, she studies her assigned firms in unregulated high-cost studying markets in the order of n. In case the consumer observes a headline price other than $v_L - \overline{a}$ in an unregulated high-cost studying market, she first studies in unregulated low-cost markets in the order of n; if she has attention left over she then studies in all other unregulated markets in the order of n, and if thereafter she still has sufficient attention, she studies the deviant firm last. If upon studying, a consumer observes a total price in an unregulated market other than v_L, she keeps on studying the remaining markets in the same order. Finally, if the consumer observes a headline price other than $v_L - \overline{a}$ in a regulated market, the consumer continues to study the unregulated markets in the same order.

I(b). On path: the consumer studies her assigned firms in the unregulated low-cost markets in order of n. Whenever she has more than s units of attention left over, she studies an additional unregulated high-cost market proceeding in the order of n. Eventually, this process ends with the consumer having one unit of attention left over. She uses this unit of attention to browse in any regulated market with equal probability.

Following the observed deviation of a single firm: If the consumer observes the deviation by firm n_i (in either the headline, the additional price or both) in an unregulated market, the consumers' attention strategy is the same as for corresponding histories in case I(a) above. If the consumer observes a headline price other than $c - \overline{a}$ in a regulated market, the consumer continues to study the unregulated markets in the same order as above and then browses in the market of the deviant firm.

I(c). Following any history in which the consumer did not observe a deviation or observed a deviation by one firm only, the consumer first studies all unregulated low-cost studying markets in the order of n; whenever she has more than s units of attention left over and already studied all low-cost studying markets, she studies her assigned firm in an additional unregulated high-cost market proceeding in the order of n. Thereafter the consumer has two units of attention left over. We next specify her behavioral attention strategy from this point on for three relevant cases. If she (i) did not observe a deviation up to this point or a deviation in a high-cost studying market, she with equal probability selects to browse in either a regulated market or an unregulated low-cost studying market. If she selected an unregulated low-cost studying market, then independently of whether she observed a deviation she proceeds to study the newly browsed firm's additional price. If she selected a regulated market, then independently of whether she observed a deviation she browses in any other market with equal probability. If she (ii) did observe a deviation in a regulated market when having two units of attention left, she browses in the market in which she observed a deviation and then in any other market with equal probability. If she (iii) did observe a deviation in low-cost studying market when having two units of attention left, then she browses in that market and thereafter studies in that market.

II. Initially, the consumer studies her assigned firms in unregulated markets in order of n. After studying her assigned firm in all unregulated markets, she has at least $s + 1$ units of spare attention left; if she did not observe a deviation, she randomizes over all possible continuation attention strategies. If she observed a deviation by a single firm, we distinguish two cases: (i) she observed a different headline price in a regulated market n; (ii) she observed a different headline price or additional price in an unregulated market n. Following the history in which the consumer studied her assigned firm in all unregulated markets, in case (i) she browses the rival market n and in case (ii) she browses and studies the rival in market n. Thereafter she randomizes over all possible continuation attention strategies with equal probability.

Beliefs: consumer. The consumer believes that all hitherto unobserved headline prices are equal to their equilibrium level, and that all additional prices of firms whose headline price she either did not observe or whose headline price was equal to the equilibrium level are $\overline{a}$. Thus, her beliefs follow Bayes rule on the path of play.

In Case I(a), when observing an out-of-equilibrium headline price $f_{n_i} \neq v_L - \overline{a}$ in an unregulated market, the consumer believes that $a_{n_i} = v_L - f_{n_i}$. When observing an out-of-equilibrium headline price $f_{n_i} \neq v_L - \overline{a}$ in a regulated market, the consumer believes that $a_{n_i} = \overline{a}$. In Case I(b), when observing an out-of-equilibrium headline price $f_{n_i} \neq v_L - \overline{a}$ in an unregulated market, the consumer believes that $a_{n_i} = v_L - f_{n_i}$. When observing an out-of-equilibrium headline price $f_{n_i} \neq c - \overline{a}$ in a regulated market, she believes that $a_{n_i} = \overline{a}$. In Case I(c), when observing an out-of-equilibrium headline price $f_{n_i} \neq v_L - \overline{a}$ in an unregulated high-cost studying market, she believes that $a_{n_i} = v_L - f_{n_i}$. When observing an out-of-equilibrium headline price $f_{n_i} \neq c - \overline{a}$ in an unregulated low-cost studying market or in a regulated market, she believes that $a_{n_i} = c - f_{n_i}$. In Case II, when observing an out-of-equilibrium headline price $f_{n_i} \neq c - \overline{a}$ in an unregulated market, she believes that $a_{n_i} = c - f_{n_i}$. When observing in a regulated market an out-of-equilibrium headline price $f_{n_i} \neq c - \overline{a}$, she believes that $a_{n_i} = \overline{a}$.

Optimality: firms. Case I(a): In an unregulated market, no firm can increase the chance of being studied by the consumer through changing its headline price. Thus, we only need to consider whether changes in the total price can raise profits. Clearly, lowering the total price reduces profits as it cannot attract extra demand. Raising the price above v_H leads to zero profits, and setting a total price strictly in $(v_L, v_H]$ leads the firm to sell one unit less per consumer that studies it without attracting new consumers, which reduces profits since $2(v_L - c) > v_H - c$.

A firm in a regulated market loses profits when lowering its headline price below $v_L - \overline{a}$ independently of the (feasible) additional price it charges. If a firm in a regulated market increases its headline price strictly above $(v_L - \overline{a}, v_H - \overline{a}]$, the firm sells one unit less per consumer without attracting new consumers, which is unprofitable. At headline prices above $v_H - \overline{a}$ the firm makes no sales, which reduces profits. Any deviation that reduces the total price below v_L earns the firm profits weakly below $2(v_L - c)$ from its assigned consumers and does not increase profits.

Case I(b): The same argument as in case I(a) implies there is no profitable deviation for unregulated firms. A firm in a regulated market that lowers its headline price earns negative profits with any feasible additional price, which makes these deviations unprofitable. If a firm in a regulated market increases its headline price strictly above $c - \overline{a}$, the firm loses all its customers, which is unprofitable. A deviation that keeps the headline price at $c - \overline{a}$ but changes the additional price can only reduce the total price, which induces negative profits and is unprofitable.

Case I(c): By the same argument as in Case I(b) firms in a regulated market cannot profitably deviate. Similarly, a firm that deviates in low-cost studying market induce the consumer to browse and study its rival. By essentially the same argument as above, this induces the consumer to learn the rival's price and the firm can only retain the consumer in case she sets a weakly lower total price. Furthermore, to attract a consumer initially assigned to her rival, the firm must set a loss-making total price. Thus, there is no profitable deviation for a firm in an unregulated low-cost studying market.

A firm in an unregulated high-cost studying market cannot induce more consumers to study its additional price. Furthermore, when setting the equilibrium price she sells her product to consumer who study its additional price at the monopoly total price and hence she cannot earn greater profits from these. We conclude that firms have no profitable deviation.

II. By the same argument as in Case I(b) firms in a regulated market cannot profitably deviate. In an unregulated market, if a firm deviates the consumer browses and studies its rival. Hence she can only make a sale if she charges a total price weakly below c, which cannot be part of a profitable deviation.

Optimality: consumer. Following the relevant histories in which at most one firm deviated, the consumer's purchase strategy is trivially optimal.

I(a). On path: All firms charge the same total price v_L. In each regulated market, the consumer spends no attention and earns surplus $v_H - v_L$ from their assigned firm. In unregulated low-cost studying markets, the consumer purchases in any market where she uses one unit of attention, and each unit of attention inducer her to purchase and earn a surplus $v_H - v_L$. In any unregulated high-cost studying market, she uses s units of attention and receives a surplus of $v_H - v_L$. Redirecting attention from unregulated to regulated markets, or from unregulated low-cost studying to unregulated high-cost studying markets reduces the amount of markets she can purchase in and hence consumer surplus. We conclude that the consumer's attention strategy is optimal following on-path histories.

Following an observed deviation of a single firm: suppose the consumer observes a deviation in the headline price from a firm assigned to it in an unregulated high-cost studying market. Since she believes this and all other firms charge a total price of v_L, it is optimal for her to first study in all low-cost studying markets and then in all other high-cost studying markets. Similarly, if she observes a deviation in the headline price from a firm assigned to it in an unregulated low-cost studying market, she believes that all firms charge a total price of v_L. Hence, it is optimal to first study all other low-cost studying firms, then the deviant and thereafter in high-cost studying markets.

Suppose upon studying, the consumer observes a total price other than v_L in an unregulated market. It is optimal for her not to redirect attention to browsing in this market, as doing so requires her to study in one less unregulated market. Because the consumer thinks that all firms from whom she did not observe a deviation set a total price of v_L, she cannot benefit from redirecting attention to browsing in this market.

Suppose the consumer observed a deviation in a regulated market. Since she does not study in these market, following any history we specified as relevant, the observed deviation must be a deviation in the headline price. Note she thinks the rival in this market sets a total price of v_L. Browsing in this regulated market would cost the consumer one unit of attention, and hence she could study in one less unregulated market in which she believes firms charge a total price of v_L. Hence, it is a best response not to browse in this market and purchase two units whenever the headline price is below $v_L - \overline{a}$, one unit in case it is in $(v_L - \overline{a}, v_H - \overline{a})$, and nothing in case it is strictly greater than $v_H - \overline{a}$.

I(b). On path: All regulated firms charge the same total price c, which is why it is optimal to purchase from assigned regulated firms, earning the consumer a surplus $v_L + v_H - 2c$. All unregulated firms charge the same total price v_L, which is why studying her assigned unregulated firms and purchasing two units earns the consumers a surplus $v_H - v_L$.

Note first that the consumer purchases in all competitive markets and in as many monopolistic markets as possible. We now argue that the consumer cannot benefit from allocating additional attention to markets where she purchases in the candidate equilibrium. In all markets where she buys in equilibrium, she purchases two units. Furthermore, in each such market, both firms charge the same total price (c in regulated and v_L in unregulated markets), which is why using additional attention in these markets cannot increase her surplus. Thus, studying first in all low-cost studying markets ensures that she achieves the maximal consumer surplus. Hence, changing her attention strategy cannot make her better off.

Following an observed deviation of a single firm: If the consumer first sees a deviation in the headline price in an unregulated market, she continues to believe that the total price is unaltered and hence following her specified continuation strategy is optimal by essentially the same argument as in I(a). If she first sees a deviation in the additional price, then by the same logic as above in I(a) the specified attention and purchase strategies are optimal.

If the consumer first observed a deviation in a regulated market, she believes with probability one that all unregulated firms set monopoly prices and hence that she obtains the maximal consumer surplus (given monopoly prices) in all unregulated market in which she studies; and she does not have enough attention to study more unregulated markets by reallocating her attention across the markets she studies because she starts with the low-studying-cost markets first. Furthermore, she believes with probability one that firms set a total price of c in regulated markets and that she obtains the maximal possible consumer surplus (given this price) in all other regulated markets. Hence, it is optimal for her to browse in the market with the deviant firm. Furthermore, since she thinks all firms she did not study set an additional price of $\overline{a}$, it is optimal for her to buy from any firm in this market that sets the lowest headline price.

I(c). On path: All regulated firms charge the same total price c, which is why it is optimal to purchase from assigned regulated firms, earning the consumer a surplus $v_L + v_H - 2c$. Unregulated firms in low-cost studying markets charge the same total price c, and the consumer needs to study to buy in such a market and earn a consumer surplus of $v_L + v_H - 2c$. Unregulated firms in high-cost studying markets charge the same total price v_L, which is why studying her assigned unregulated firms and purchasing two units earns the consumers a surplus $v_H - v_L$.

Note first that the consumer purchases in all competitive (regulated and unregulated low-cost studying) markets and in as many remaining monopolistic markets as possible. We now argue that the consumer cannot benefit from allocating additional attention to markets where she purchases in the candidate equilibrium. She purchases two units in all competitive markets where all firms charge the same total price, which is why using additional attention in competitive markets cannot increase her surplus. Similarly, in all unregulated high-cost studying markets all firms charge the same total price v_L, which is why using additional units of attention cannot increase her surplus in these markets. Thus, studying first in all unregulated low-cost studying markets ensures that she not only purchases in as many markets as possible but also that she purchases in all competitive markets that generate greater consumer surplus than monopolistic ones. Hence, changing her attention strategy cannot make the consumer better off.

Following an observed deviation of a single firm: If the consumer first sees a deviation in the headline price in an unregulated market, she continues to believe that the total price is unaltered and hence following her specified continuation strategy remains optimal as she anticipates the same consumer surplus from following it (by essentially the same argument as in I(a)). If she first sees a deviation in the additional price in an unregulated high-cost market, then by the same logic as above in I(a) the specified continuation attention strategy remains optimal. Similarly, if in an unregulated high-cost studying market she observes a deviation by firm n_i in the additional price following a deviation of the same firm in its headline price, she does not have enough attention left to study in one extra unregulated (high-cost) market or to browse and study the rival in this market. And since she believes that all firms in all other markets set the same price, she cannot use her attention to increase her surplus in another market. Thus, any continuation attention strategy is optimal.

If in an unregulated low-cost studying market the consumer first observes a deviation in the additional price or observes the deviation in the additional price by the firm n_i that previously deviated in the headline price, then since in all other markets the consumer believes that all firms set the same price, she cannot benefit from browsing or browsing and studying in those markets. Furthermore, she cannot study in one more high-cost studying market than she already does without studying in at least one less other low-cost studying market. Since she believes the consumer surplus to be strictly higher in low-cost studying markets, such a reallocation is suboptimal. Furthermore, once she completed studying in high-cost markets, she has at least two (but strictly less than s) units of attention left over. Because she believes that firms in all other markets set the same price, spending her attention in other markets does not further increase her surplus. Hence, browsing and thereafter studying the rival in the deviant firm's market is optimal (following the history in which she used her prescribed continuation strategy and studied in as many high cost-studying markets as possible). If once she browsed and studied the rival the consumer has further attention left over, then she is indifferent between any continuation attention strategy since she knows prices in the deviant firm's market and believes all other prices are the same.

If the consumer observed a deviation in a regulated market then following any history we specified as relevant it must be a deviation in the headline price. Since she believes that in all other markets competing firms set the same prices, and she cannot purchase in more markets or in more other competitive markets by reallocating her attention and not browsing in this market, her attention strategy is optimal by essentially the same argument as in I(b).

II. The consumer believes that all but possibly the deviant firm set a total price of c. Her attention strategy ensures that she can purchase in all markets in which she did not observe a deviation at a price of c. If she observed a deviation in an unregulated market, she becomes fully informed about total prices in this market and hence gets the maximal consumer surplus in this market also in relevant off-path histories. Following a deviation in a regulated market, the consumer browses the competitor and hence can purchase at a price of no more than c; furthermore, since she has point beliefs regarding the additional price of both firms in this market, it is optimal for her not to study the additional price(s) in this market since she thinks she can purchase at the lowest total price with probability one. $\square$

Proof of Observation 1. We construct an EPBE with the features specified in the observation. We do not specify strategies or beliefs following irrelevant histories in which more than one firm deviated.

Strategies. All firms charge prices $(f, a) = (v_L - r(a^*), a^*)$. On the equilibrium path, the consumer studies with equal probability one of the two firms to which she has been assigned. Upon observing prices $(v_L - r(a^*), a^*)$, the consumer buys two units. Following histories in which the consumer observes one of her assigned firms charging the headline price $v_L - r(a^*)$ and the other charging a headline price $f' \neq v_L - r(a^*)$, she studies the firm setting the equilibrium headline price. Following any history in which the consumer studied, she purchases two units if $v_L \geq f + r(a)$, one unit if $v_H \geq f + r(a) > v_L$, and zero units otherwise. Recall that following any history in which the consumer browsed, she cannot purchase.

Beliefs. Upon observing an equilibrium headline price, the consumer believes that $a = a^*$. For any other headline price $f' \leq v_L$, she believes the deviant firm sets an additional price of $a' = r^{-1}(v_L - f')$ and for any $f' > v_L$ she believes $a' = 0$.

Optimality. Since a firm setting a different headline price attracts no demand, firms cannot profitably deviate in the headline price. And because the consumer only purchase from a firm she studied, a firm faces full-information demand; thus, by assumption, setting $(v_L - r(a^*), a^*)$ yields the highest possible monopoly profits conditional on being studied by the consumer. A consumer who studied is fully informed about prices and we specified an optimal purchase rule following these histories. When seeing one out of equilibrium headline price, the consumer believes that total cost of buying from the deviant firm $f' + r(a')$ is weakly greater than $f + r(a)$, so it is optimal to study the firm that made the equilibrium offer. Finally, beliefs are consistent with equilibrium behavior in that the consumer believes a firm sets $a_n = a^*$ when seeing an equilibrium-headline-price offer $f_n = v_L - r(a^*)$.

To rule out equilibria, note that a consumer who browses cannot purchase, and hence the consumer purchases at most in one market. Thus, trivially she buys at most two units in one market in any equilibrium. Furthermore, because a consumer only buys after studying, in equilibrium a firm with positive demand cannot make an offer with $f_n + r(a_n) < v_L$; for this firm could then deviate and slightly increase the additional price to a' such that $f_n + r(a') < v_L$ and the consumer continues to buy two units whenever she studied the firm, a contradiction. Hence, the consumer surplus cannot be greater than $v_H - v_L$. Finally, there cannot be an equilibrium with higher producer surplus because the consumer must study and hence is fully informed whenever she purchases; by assumption then, when the consumer is informed and purchases optimally, the maximal producer surplus is $2[v_L - r(a^*) + a^* - c]$. $\square$

Proof of Proposition 1. We establish Part II first, followed by Parts I and III.

Part II. We first construct an EPBE.

Strategies. All firms set $f = c - \overline{a}$, $a = \overline{a}$. We now specify the consumer's strategy. Take any $\epsilon \in (0, \frac{1}{2})$. If the consumer observes that both firms she has been initially assigned to set the equilibrium headline price $c - \overline{a}$, she browses with probability $(1 - \epsilon)/2$ in market $n \in \{1, 2\}$, and studies with probability $\epsilon/2$ in market $n \in \{1, 2\}$ the additional price from the firm she has been initially assigned to.

Following a history in which the consumer observes that one of his initially assigned firms n_i' deviated to a headline price $f \neq c-\overline{a}'$ while the other firm n_i charges the candidate equilibrium headline price, the consumer browses in the deviator's market n'. If the consumer browsed in any market and observed only candidate-equilibrium headline prices f in each market, she purchases two units from her initially-assigned firm in each market. If she browsed and observed a single deviation $f' \neq c - \overline{a}$ in market n, she purchases two units from the deviator in market n if and only if $f' + r(\overline{a}) < c - \overline{a} + r(\overline{a}) < v_L$; otherwise she purchases two units in market n from the firm who sets the candidate-equilibrium headline price. In market $n' \neq n$, the consumer buys two units from her initially assigned firm.

If the consumer observed two candidate-equilibrium headline price offers from her initially assigned firms and studied one of these, she purchases two units from the initially assigned firm she did not study; in addition, she purchases two units from the firm n_i she studied. If the consumer observed one candidate-equilibrium headline price offer and studied this firm n_i, she buys two units from n_i. For the initially assigned firm in the other market $n_i' \neq n_i$, she buys two units from firm n_i' if $f_{n_i'} + r(\overline{a}) \leq v_L$; one unit from firm n_i' if both $v_L < f_{n_i'} + r(\overline{a}) \leq v_H$; otherwise, she does not purchase from n_i'. If the consumer observed one candidate equilibrium headline price offer and studied the offer of the deviating firm n_i', she buys two units from the deviator if and only if $f_{n_i'} + r(a_{n_i'}) \leq v_L$, buys one unit from the deviator if $v_L < f_{n_i'} + r(a_{n_i'}) \leq v_H$, and no units from the deviator otherwise.

Any other purchase history can only be reached if more than one firm deviated.

Beliefs. For any firm the consumer did not study, she believes that $a_{n_i} = \overline{a}$ for any headline price f_{n_i}. If the consumer has not seen the headline price of a given firm, she believes that it is $c - \overline{a}$.

Optimality. In the candidate equilibrium, firms earns zero profits. Consider a firm n_i' that deviates to (f', a') while all other firms make equilibrium offers. Any deviation in which $f' > c-\overline{a}$ induces the consumer initially assigned to n_i' to browse and purchase from the rival in market n'. Also a browsing consumer initially assigned to n_i''s rival will not purchase from n_i'. Hence, such a headline price cannot be part of a profitable deviation. When deviating to a lower headline price $f' < c - \overline{a}$, this induces a strictly negative margin $f' + \overline{a} - c < 0$ and therefore cannot be part of a profitable deviation.

We are left to consider deviation by firms in which $f' = c - \overline{a}$ and $a' \neq \overline{a}$. The only possible deviations are to a lower additional price $a' < \overline{a}$. But these deviations induce strictly negative margins $f' + a' - c = c - \overline{a} + a' - c < 0$ and therefore cannot be part of a profitable deviation.

Since the consumer has point beliefs regarding all unobserved prices on and off the equilibrium path, she does not anticipate learning anything from studying or browsing. As long as she observed her initially assigned firms both setting headline prices weakly below the equilibrium level, she is hence indifferent between browsing in either of the markets or studying in either of the markets. If she observed her initially assigned firm in market n setting a headline price above the equilibrium level (and the initially assigned firm in market $n' \neq n$ setting the equilibrium headline price), she strictly prefers browsing in market n in order to be able to purchase at a lower price. Taking her observed prices and beliefs regarding unobserved prices as given, it is trivial to check that the purchase strategy of the consumer is optimal.

Hence, an EPBE inducing the competitive outcome exists. We use the following four steps to show that if $a^* \geq \overline{a}$, then in any equilibrium all firms charge $(f - \overline{a}, \overline{a})$. Throughout the proof, we refer to $f_{n_i} + r(a_{n_i})$ as the *consumer's total purchase cost.*

Step (i): $f_{n_i} + r(a_{n_i}) \leq v_L$. Suppose otherwise, i.e. that there exists a firm n_i for which $f_{n_i} + r(a_{n_i}) > v_L$. Without loss of generality, suppose the total purchase costs $f_{n_i} + r(a_{n_i}) \geq f_{n_j} + r(a_{n_j})$.

In case firm n_j with $j \neq i$ charges $f_{n_j} + r(a_{n_j}) < v_L$, we next show that n_j can strictly increase profits by charging $f_{n_j} = v_L - r(\overline{a}) - \eta$, $a_{n_j} = \overline{a}$ for a sufficiently small $\eta > 0$. We first argue that for any $\eta > 0$ this does not reduce firm n_j's demand. To see this, note that before the deviation, if the consumer is either initially assigned to n_j or initially assigned to n_i and browses, she purchases two units from n_j. Following the deviation, because $f_{n_i} + r(a_{n_i}) > v_L$

and all consumers who observed n_j's headline price know that firm n_j's total purchase costs $v_L - r(\overline{a}) - \eta + r(\overline{a}) < v_L$, demand from all consumers who observe firm n_j's headline price stays the same. Hence, despite the fact that consumers who observe the deviation of n_j might change how they allocate attention after observing n_j's headline price, this does not affect demand for firm j. Furthermore, since the deviation by n_j cannot affect the browsing choice of consumers assigned to n_i, n_j's overall demand remains unaffected. Furthermore, using that $f_{n_j} + r(a_{n_j}) < v_L$, rewriting, and using that $r'(a) \leq 1$ for all $a \leq \overline{a} \leq a^*$ respectively, one has

$$v_L - r(\overline{a}) + \overline{a} > f_{n_j} + r(a_{n_j}) + [\overline{a} - r(\overline{a})] = f_{n_j} + a_{n_j} + [\overline{a} - r(\overline{a})] - [a_{n_j} - r(a_{n_j})] > f_{n_j} + a_{n_j}.$$

Thus, for sufficiently small $\eta > 0$ the deviation earns strictly more per customer. We conclude that the deviation strictly increases profits.

In case n_j with $j \neq i$ charges $f_{n_j} + r(a_{n_j}) \geq v_L$, we consider two cases: (i) $f_{n_j} + r(a_{n_j}) < f_{n_i} + r(a_{n_i})$ and (ii) $f_{n_j} + r(a_{n_j}) = f_{n_i} + r(a_{n_i})$. In case (i), firm n_i earns strictly less than monopoly profits from its own assigned consumers: n_j's assigned consumers do not buy from firm n_i even if they browse, and consumers who purchase from n_i buy only one unit. By charging $(v_L - r(\overline{a}) - \eta, \overline{a})$, firm n_i attracts all of its assigned consumers and earns $2(v_L + \overline{a} - r(\overline{a}) - \eta - c)$ on them. As $\eta \to 0$ this approaches the monopoly profits on its assigned consumers, and hence for sufficiently small η, this deviation strictly increases profits. Next, consider case (ii) in which $f_{n_j} + r(a_{n_j}) = f_{n_i} + r(a_{n_i}) > v_L$. Observe that in the candidate equilibrium any consumer who purchases from firm i buys at most a single unit. Consider a deviation by firm i to $(v_L - r(\overline{a}) - \eta, \overline{a})$. Then any consumer who observes firm i's headline price must purchase two units from it. Hence, for sufficiently small η the deviating firm earns strictly greater profits from all consumers initially assigned to it. Furthermore, any consumer initially assigned to i's rival that browses must purchase two units from firm i following the deviation. Because the probability that a consumer assigned to i's rival browses is independent of i's prices, for sufficiently small η this deviation strictly increases profits.

We conclude that $f_{n_i} + r(a_{n_i}) \leq v_L$.

Step (ii): in any market with positive demand, $f_{n_i} + r(a_{n_i}) = f_{n_j} + r(a_{n_j})$ for $n_i \neq n_j$. Suppose toward a contradiction that there is a market n with positive demand and unequal total purchase costs; let the firm with the lower total purchase cost be n_i, i.e. $f_{n_i} + r(a_{n_i}) < f_{n_j} + r(a_{n_j})$.

First, note that n_i has positive demand. To see this, we argue that if only n_j had positive demand, consumers behave sub-optimally on the equilibrium path. Intuitively, we exchange the consumer's strategy so she treats the firm with the lower total purchase cost in exactly the same way as she did the firm with the larger total purchase cost in the candidate equilibrium, and vice versa. Formally, denote the equilibrium strategy of the consumer, which leads to purchase only from n_j, by σ. For any on path history h, consider a history h' in which any equilibrium f_{n_i} is replaced by the equilibrium f_{n_j}, any equilibrium a_{n_i} is replaced by the equilibrium a_{n_j}, and vice versa. Now consider the strategy $\sigma' = (\sigma'_a, \sigma'_p)$, which we construct from $\sigma = (\sigma_a, \sigma_p)$ as follows: at any step k, following history h'_a assign to f_{n_i} (respectively a_{n_i}) the probability σ_a assigns to f_{n_j} (respectively a_{n_j}) following history h_a, and to f_{n_j} (respectively a_{n_j}) the probability σ_a assigns to f_{n_i} (respectively a_{n_i}) following history h_a. Do the exact same construction for the purchase strategy σ_p. This leads the consumer to purchase only from n_i in market n keeping the probability of purchase as well as gross values from purchase in market n the same, and also holding the surpluses from purchases in all other markets fixed. But the consumer now has lower total purchase cost in market n, making this deviation profitable for the consumer. We conclude that n_i has positive demand.

Now we identify profitable deviations for n_i. Consider a deviation such that $a'_{n_i} = \overline{a}$ and $f'_{n_i} = f_{n_i} - [r(\overline{a}) - r(a_{n_i}) + \eta]$ for a sufficiently small $\eta > 0$ such that

$$f'_{n_i} + r(\overline{a}) < \min\{f_{n_j} + r(a_{n_j}), v_L\}, \tag{1}$$

which exists by Step (i). This deviation cannot affect whether the consumer learns about

f'_{n_i}, and once she did, she continues to purchase two units from n_i by (1). Furthermore, using the definition of f'_{n_i}, rearranging, and that $r'(a) \leq 1$ for all $a \leq \overline{a} \leq a^*$, respectively, we get

$$f'_{n_i} + \overline{a} > f_{n_i} - [r(\overline{a}) - r(a_{n_i})] + \overline{a} = f_{n_i} + a_{n_i} + [\overline{a} - r(\overline{a})] - [a_{n_i} - r(a_{n_i})] \geq f_{n_i} + a_{n_i}.$$

Hence the firm earns more per customer, and thus the deviation is profitable.

Step (iii): all firms set $a_i = \overline{a}$. Towards a contradiction, suppose a firm n_i charges some (f_{n_i}, a_{n_i}) such that $a_{n_i} < \overline{a}$. By Step (i), independently of the attention decisions it is optimal for the consumer to purchase in all markets on the path of play. Thus, all markets must have positive demand. Hence, Step (ii) implies firm n_i has strictly positive demand. Now consider a deviation by firm n_i in which $a' = \overline{a}$ and $f' = f_{n_i} + r(a_{n_i}) - r(\overline{a}) - \eta$ for $0 < \eta < [\overline{a} - r(\overline{a})] - [a_{n_i} - r(a_{n_i})]$. Because $f' + r(\overline{a}) < \min\{f_{n_j} + r(a_{n_j}), v_L\}$, any consumer who observes the deviant firm's headline price must purchase two units from it. Because if the consumer initially observed n_j's headline price, she cannot condition her browsing decision on f_{n_i}, this must weakly increase firm n_i's demand. Furthermore,

$$f' + \overline{a} > f_{n_i} + r(a_{n_i}) - r(\overline{a}) - [\overline{a} - r(\overline{a})] + [a_{n_i} - r(a_{n_i})] + \overline{a} = f_{n_i} + a_{n_i},$$

and hence firm n_i earns more per consumer who purchases.

Step (iv): all firms set $f_i = c - \overline{a}$. Towards a contradiction, suppose a firm n_i charges $f_{n_i} \neq c - \overline{a}$. First, suppose $f_{n_i} < c - \overline{a}$. Because both firms have positive demand, firm n_i earns strictly negative profits. But firm n_i can deviate to $(f'_{n_i}, a_{n_i}) = (c - \overline{a}, \overline{a})$ and earn zero profits, contradicting that $f_{n_i} < c - \overline{a}$. Second, suppose $f_{n_i} > c - \overline{a}$. By Steps (ii) and (iii), both firms charge prices such that $f_{n_i} + r(\overline{a}) = f_{n_j} + r(\overline{a})$ for $i \neq j$. Similarly, both firms in the other market $n' \neq n$ must charge $f_{n'_i} = f_{n'_j}$. Because the consumer wants to purchase in both markets by Step (i), and in each market the firms charge the same total purchase costs, the consumer is indifferent between all attention strategies. Hence, by our third equilibrium-selection assumption, the consumer must play all possible attention strategies with positive probability; thus, with positive probability the consumer browses in each market. But then some firm n_i can offer a marginally lower headline price to attract these browsing consumers and strictly raise profits, contradicting that $f_{n_i} > c - \overline{a}$. We conclude that all firms charge headline prices $c - \overline{a}$.

Part I. For any $\overline{a}$ in the non-empty interval $(a^*, \min\{r^{-1}(v_H - v_L + r(a^*)), \frac{v_L - r(a^*) + a^* - c}{3} + a^*\})$, consider the following candidate equilibrium.

Strategies. All firms charge $(f, a) = (v_L - r(a^*), a^*)$. On the equilibrium path, consumers study their initially-assigned firm in each market with probability $\frac{1-\epsilon}{2}$, and browse in each market with probability $\frac{1}{2}\epsilon$, for some ϵ such that

$$0 < \epsilon < \min\left\{\frac{1}{2}, 2\frac{[a^* - r(a^*)] - [\overline{a} - r(\overline{a})]}{v_L - r(\overline{a}) + \overline{a} - c}, \frac{[v_L - r(a^*) + a^* - c] - 3(\overline{a} - a^*)}{v_L - r(a^*) + \overline{a} - c}\right\}, \qquad (2)$$

where the right hand side is strictly positive since by assumption

$$\overline{a} < \frac{v_L - r(a^*) + a^* - c}{3} + a^*.$$

Following a history in which the consumer observes that one of her initially assigned firms n'_i deviated to a headline price $f' \neq v_L - r(a^*)$ while the other n_i made the candidate equilibrium headline-price offer $f = v_L - r(a^*)$, the consumer browses in the deviator's market n'. If the consumer observed two candidate-equilibrium headline price offers from her initially assigned firms and studied one of these, she always purchases two units from the initially assigned firm she did not study; in addition, she purchases two units from the firm n_i she studied if and only if $f_{n_i} + r(a_{n_i}) \leq v_L$, she purchases one unit from firm n_i if $v_L < f_{n_i} + r(a_{n_i}) \leq v_H$, and she purchases zero units from n_i otherwise. If the consumer observed one candidate-equilibrium headline price offer and studied this firm n_i, she buys two units from n_i if $f_{n_i} + r(a_{n_i}) \leq v_L$; one unit from firm n_i if $v_L < f_{n_i} + r(a_{n_i}) \leq v_H$; and zero units from n_i otherwise. She buys two units from firm n'_i if $f_{n'_i} + r(\overline{a}) \leq v_L$; one unit from firm n'_i if both $v_L < f_{n'_i} + r(\overline{a}) \leq v_H$; otherwise, she does not purchase from n'_i. If the consumer observed one candidate-equilibrium headline price offer and studied the offer of the deviating firm n_i', she buys two units from the deviator if and only if $f_{n_i'} + r(a_{n_i'}) \leq v_L$, buys one unit from the deviator if $v_L < f_{n_i'} + r(a_{n_i'}) \leq v_H$, and no units from the deviator otherwise. If the consumer browsed and observed only candidate-equilibrium headline prices f, she purchases two units from her initially-assigned firm in each market. If she browsed and observed a single deviation $f' \neq f$ in market n, she purchases two units from the deviator in market n if and only if $f' + r(\overline{a}) < f + r(a^*) = v_L$; otherwise she purchases two units in market n from the firm who set the candidate-equilibrium headline price. In market n', the consumer buys from her initially assigned firm.

Beliefs. For any firm the consumer did not study, she believes that $a_{n_i} = a^*$ if she observed $f_{n_i} = v_L - r(a^*)$ and $a_{n_i} = \overline{a}$ if she observed $f_{n_i} \neq v_L - r(a^*)$. For any firm whose headline price she did not see, the consumer believes that $f_{n_i} = v_L - r(a^*)$.

Optimality. Consider a firm n_i' that deviates to (f', a') while all other firms make equilibrium offers. Any deviation in which $f' \geq v_L - r(\overline{a})$ induces the consumer to browse and induces any consumer who browsed in market n' to buy from her rival. Hence, such a headline price cannot be part of a profitable deviation. When deviating and setting $f' < v_L - r(\overline{a})$, the consumer buys two units from the deviator whenever she observed f'. Hence, in this case the deviator's profits are bounded by

$$2[f' + \overline{a} - c]\left(\frac{1}{2} + \frac{\epsilon}{4}\right) < [v_L - r(\overline{a}) + \overline{a} - c]\left(1 + \frac{\epsilon}{2}\right).$$

These are less than the candidate equilibrium profits if

$$[v_L - r(\overline{a}) + \overline{a} - c]\left(1 + \frac{\epsilon}{2}\right) \leq v_L - r(a^*) + a^* - c.$$

This simplifies to

$$\epsilon \leq 2\frac{[a^* - r(a^*)] - [\overline{a} - r(\overline{a})]}{v_L - r(\overline{a}) + \overline{a} - c},$$

which holds by assumption.

We are left to consider deviations in which f' is equal to the candidate-equilibrium headline price offer f and $a' \neq a^*$. Deviating to an additional price $a' < a^*$ is suboptimal as the deviation does not affect the consumer's studying or browsing decision, and if the consumer decided to study firm n_i' she buys on path with probability one from firm n_i'. Hence the deviation cannot increase demand, and thus is unprofitable. Deviating to an additional price $a' > a^*$ leads all consumers who study firm n_i' to buy one unit if $v_L - r(a^*) + r(a') \leq v_H$, and zero units otherwise; consumers who purchase from n_i' without studying, i.e consumers initially assigned to firm n_i' who browse, or browse or study in the other market $n \neq n'$, continue to buy two units. Thus, the profits from such a deviation are bounded by

$$\max\left\{\frac{1}{2}\left(\frac{1-\epsilon}{2} + \left(\frac{1-\epsilon}{2} + \frac{\epsilon}{2} + \frac{\epsilon}{2}\right)2\right)\left[v_L - r(a^*) + \min\left\{r^{-1}(v_H - v_L + r(a^*)), \overline{a}\right\} - c\right],\right.$$
$$\left.\frac{1}{2}\left(\frac{1-\epsilon}{2} + \frac{\epsilon}{2} + \frac{\epsilon}{2}\right)2[v_L - r(a^*) + \overline{a} - c]\right\},$$

which is equivalent to

$$\max\left\{\frac{3+\epsilon}{4}\left[v_L - r(a^*) + \min\left\{r^{-1}(v_H - v_L + r(a^*)), \overline{a}\right\} - c\right], \frac{1+\epsilon}{2}\left[v_L - r(a^*) + \overline{a} - c\right]\right\}.$$

Whenever $\overline{a} \in (a^*, r^{-1}(v_H - v_L + r(a^*)))$, the above deviation profits simplify to $\frac{3+\epsilon}{4}\left[v_L - r(a^*) + \overline{a} - c\right]$. These are less than the candidate equilibrium profits $[v_L - r(a^*) + a^* - c]$ if

$$\frac{3+\epsilon}{4}(v_L - r(a^*) + \overline{a} - c) \leq v_L - r(a^*) + a^* - c,$$

which is equivalent to

$$\epsilon \leq \frac{[v_L - r(a^*) + a^* - c] - 3(\overline{a} - a^*)}{v_L - r(a^*) + \overline{a} - c}. \tag{3}$$

Hence, by (2) the deviation is unprofitable. We conclude that for any $\overline{a} \in (a^*, \min\{r^{-1}(v_H - v_L + r(a^*)), \frac{v_L - r(a^*) + a^* - c}{3} + a^*\})$ firms play a best response.

The consumer has point beliefs regarding all unobserved prices on and off the equilibrium path, so she does not anticipate learning anything from studying or browsing. Additionally, products are regulated, so she does not need to study to purchase a product. As long as she observes her initially-assigned firms both setting equilibrium headline prices, she is hence indifferent between browsing and studying in either of the markets. If the consumer observes her initially-assigned firm in market n deviates to a headline price f' such that $f'+r(\overline{a}) > v_L$, she strictly prefers to browse in that market and purchases two units from the non-deviating firm in market n. If the consumer observes her initially-assigned firm in market n deviates to a headline price f' such that $f'+r(\overline{a}) \leq v_L$, she is indifferent between browsing and studying in either of the markets. Taking her observed prices and beliefs about unobserved prices as given, it is easy to check that the consumer's purchase strategy is also optimal.

Part III. Without loss of generality, we describe the hybrid equilibrium with the efficient monopoly outcome in market 1 and the competitive outcome in market 2. For any $\overline{a}$ in the non-empty interval $(a^*, \min\{r^{-1}(v_H - v_L + r(a^*)), \frac{v_L - r(a^*) + a^* - c}{3} + a^*\})$, consider the following candidate equilibrium.

Strategies. In market 1, all firms charge $(f_1, a_1) = (v_L - r(a^*), a^*)$. In market 2, all firms set $(f_2, a_2) = (c - \overline{a}, \overline{a})$. On the equilibrium path, the consumer studies her initially-assigned firm in market 1 with probability $(1-\epsilon)/2$, and browses in market 1 with probability $\epsilon/2$, for some ϵ that satisfies (2). (Such an ϵ exists for every $\overline{a}$ in the interval we consider.) On path, she browses in market 2 with probability $(1-\epsilon)/2$ and studies with probability $\epsilon/2$ the additional price of the firm she has been initially assigned to. Following a history in which the consumer observed that one of her initially assigned firms n'_i deviated to a headline price $f'_{n'_i} \neq f_{n'}$ while the other initially-assigned firm n_i with $n \neq n'$ made the candidate equilibrium headline-price offer f_n, the consumer browses in the deviator's market n'. If the consumer observed candidate-equilibrium headline price offers from her initially-assigned firms in both markets and studied in market n, she purchases two units from her initially assigned firm in market $n' \neq n$. In addition, if she studied in market 1 she purchases two units from the firm 1_i she studied if $f_{1_i} + r(a_{1_i}) \leq v_L$, one unit from firm 1_i she studied if $v_L < f_{1_i} + r(a_{1_i}) \leq v_H$, and no units from firm 1_i otherwise. If she studied in market 2, she purchases two units from the firm 2_i she studied. If the consumer upon observing one candidate-equilibrium headline price offer from firm $n_i = 1_i$ and a non-equilibrium headline price offer in market 2, studied this firm 1_i, she buys two units from 1_i if $f_{1_i} + r(a_{1_i}) \leq v_L$, one unit from firm 1_i

if $v_L < f_{1_i} + r(a_{1_i}) \leq v_H$, and zero units from 1_i otherwise. In addition, she buys two units from firm 2_i if $f_{2_i} + r(\overline{a}) \leq v_L$; one unit from firm 2_i if both $v_L < f_{2_i} + r(\overline{a}) \leq v_H$; otherwise, she does not purchase from 2_i. If the consumer upon observing one candidate-equilibrium headline price offer from firm $n_i = 2_i$ and a non-equilibrium headline price offer in market 1, studied this firm 2_i, she buys two units from 2_i. In addition, she buys two units from firm 1_i if $f_{1_i}+r(\overline{a}) \leq v_L$; one unit from firm 1_i if $v_L < f_{1_i}+r(\overline{a}) \leq v_H$; otherwise, she does not purchase from 1_i. If the consumer observed one candidate-equilibrium headline price offer and studied the offer of the deviating firm n'_i, for $n' \in \{1, 2\}$, she buys two units from the deviator if and only if $f_{n'_i} + r(a_{n'_i}) \leq v_L$, buys one unit from the deviator if $v_L < f_{n'_i} + r(a_{n'_i}) \leq v_H$, and no units from the deviator otherwise. In market $n \neq n'$, she buys two units from her initially assigned firm. If the consumer browsed and observed only candidate-equilibrium headline prices, she purchases two units from her initially-assigned firm in each market. If the consumer browsed and observed a single deviation $f'_n \neq f_n$ in market n, she purchases two units from the deviator in market n if and only if $f'_n + r(\overline{a}) < f_n + r(a_n) = v_L$; otherwise she purchases two units in market n from the firm who sets the candidate-equilibrium headline price. In market $n' \neq n$, the consumer buys two units from her initially-assigned firm.

Beliefs. In market 1, she believes that $a_{1_i} = a^*$ if she either did not observe firm 1_i's headline price or if she observed the candidate-equilibrium headline price $f_{1_i} = v_L - r(a^*)$ and did not study firm 1_i; and she believes that $a_{1_i} = \overline{a}$ if she observed $f_{1_i} \neq v_L - r(a^*)$ and did not study firm 1_i. If the consumer has not seen the headline price of a firm in market 1, she believes it is $v_L - r(a^*)$. In market 2, for any firm the consumer did not study, she believes that $a_{2_i} = \overline{a}$. If the consumer has not seen the headline price of a firm in market 2, she believes it is $c - \overline{a}$.

Optimality. We first consider optimality for firms in market 1. Consider a firm 1_i that deviates to (f', a') while all other firms make equilibrium offers. Any deviation in which $f' \geq v_L - r(\overline{a})$ induces the consumer to browse and induces any consumer who browsed in market 1 to buy from her rival. Hence, such a headline price cannot be part of a profitable deviation. When deviating and setting $f' < v_L - r(\overline{a})$, the consumer buys two units from the deviator whenever she observed f'. Hence, in this case the deviator's profits are bounded by

$$2[f' + \overline{a} - c]\left(\frac{1}{2} + \frac{\epsilon}{4}\right) \leq [v_L - r(\overline{a}) + \overline{a} - c]\left(1 + \frac{\epsilon}{2}\right).$$

This is the same condition as in Part I, and by the argument in Part I is less than the candidate-equilibrium profits. Next, we consider deviations in which f' is equal to the candidate-equilibrium headline price offer f_1 and $a' \neq a^*$. By the exact argument as in Part I, such deviations are unprofitable. Thus, for any $\overline{a} \in (a^*, \min\{r^{-1}(v_H - v_L + r(a^*)), \frac{v_L - r(a^*) + a^* - c}{3} + a^*\})$, firms in market 1 have no profitable deviation. Now, consider a deviation of a firm in market 2. In the candidate equilibrium, firms in market 2 earns zero profits. Consider a firm 2_i that deviates to (f', a') while all other firms make equilibrium offers. By the exact same argument as the one for Part II, firm 2_i has no such profitable deviation. We conclude that firms in both market play a best response if $\overline{a} \in (a^*, \min\{r^{-1}(v_H - v_L + r(a^*)), \frac{v_L - r(a^*) + a^* - c}{3} + a^*\})$.

The consumer has point beliefs regarding all unobserved prices on and off the equilibrium path, so she does not anticipate learning anything from studying or browsing. Additionally, products are regulated, so she does not need to study to purchase a product. As long as she observes her initially-assigned firms both setting equilibrium headline prices, she is hence indifferent between browsing and studying in either of the markets.

Next we consider only histories in which the consumer observed a single firm deviation. In market 1, if the consumer observed that her initially-assigned firm deviated to a headline price f' such that $f' + r(\overline{a}) > v_L$, she strictly prefers to browse in that market and purchases two units from the non-deviating firm in market 1. In market 1, if the consumer observed that her initially-assigned firm deviated to a headline price f' such that $f' + r(\overline{a}) \leq v_L$, she is indifferent between browsing and studying in either of the markets. In market 2, if she observed her initially-assigned firm setting a headline price weakly below the equilibrium level, she is indifferent between browsing and studying in either of the markets. In market

2, if she observed her initially-assigned firm setting a headline price above the equilibrium level, she strictly prefers browsing in market 2 in order to purchase two units at a lower price.

Taking her observed prices and beliefs about unobserved prices as given, it is straightforward to check that the purchase strategy of the consumer is optimal in both markets. □

Proof of Proposition 2. Part I. We begin by specifying a candidate EPBE.

Strategies. In transfer markets, firms charge $(f, a) = (c - \overline{a}, \overline{a})$. In distortable markets, firms charge $(f, a) = (c - a^*, a^*)$. We now specify the consumer's strategy for relevant histories in which at most one firm deviated and for which the consumer herself did not deviate from her specified attention strategy. Following any history in which she observed at most one firm deviating, the consumer first studies her initially assigned firm in unregulated markets in the order of n. Thereafter, she has used $N - J$ units of attention and any market she did not study yet is a regulated market. Next, she studies regulated distortable markets in the order of n. Using that $J \geq N - K + 2$ and $M \leq K - 2$, we now argue that the consumer has at least two units of attention left after studying all unregulated as well as regulated distortable markets. To do so, we derive an upper bound for the number of unregulated markets plus regulated distortable markets. By assumption, at least $N - K + 2$ transfer markets are regulated, and hence the number of regulated distortable markets is $M_r \leq J - [N - K + 2]$. Rewriting yields $J \geq M_r + N - K + 2$, which implies that the number of unregulated markets $N - J \leq -M_r + K - 2$. Hence, to study in all unregulated markets and in all regulated distortable markets, the consumer needs at most $N - J + M_r \leq K - 2$, units of attention. Thus, the consumer has at least two units of attention left after studying in all unregulated and regulated distortable markets.

We now distinguish two cases: (i) the consumer has observed only equilibrium prices and (ii) the consumer has observed a deviation in market n' by firm n'_i.

Case (i). After the consumer studied in all unregulated and regulated distortable markets, she uses her two or more remaining units of attention to randomize with (equal) positive probability over the largest set of attention continuation strategies in which the consumer either browses in a regulated market, or browses and studies the competitor in an unregulated market; she puts zero probability on any other attention continuation strategy.

Observe that the behavior on the path of play is in line with our third equilibrium-selection assumption: on path, to achieve her equilibrium utility the consumer needs to study in all unregulated markets, which she does first. And while thereafter she uses her attention to study in regulated distortable markets in which the additional price is below $\overline{a}$ first, she does so in a way that entails browsing in any regulated market, and browsing and studying in any unregulated market with positive probability before her attention capacity is exhausted; thus her strategy satisfies ourthird equilibrium-selection assumption.

Case (ii). After the consumer studied in all unregulated and regulated distortable markets, she uses the next two units of attention to browse and study in the market n' in which she already observed a deviation. Thereafter, she uses any remaining attention to randomize over all possible continuation attention strategies with equal probability. In case she observed a deviation only after having studied in all unregulated and regulated distortable markets, she studies the deviating firm in case she both has attention left and did not do so before; thereafter she randomizes over all available attention continuation strategies.

We next specify the consumers purchase behavior for the subset of histories in which the consumer followed her equilibrium attention strategy and at most one firm deviated. We distinguish again between histories (i) in which the consumer observed no deviation and (ii) in which she observed one firm deviating in market n'.

Case (i). If the consumer only observed equilibrium prices and followed the above search strategy, she purchases two units from her initially assigned firm in each market.

Case (ii). If the consumer observed a deviation in market n', she purchases two units from her initially assigned firm in any market $n \neq n'$. In market n', we distinguish between the case (a) in which she observed the deviating firm's additional price $a_{n'_i}$ and (b) in which she did not observe the deviator's additional price. In case (a) she purchases from the non-deviating firm n'_j unless $f_{n'_i}+r(a_{n'_i}) < c-a^*+r(a^*) < c$ in a distortable market or $f_{n'_i}+a_{n'_i} < c$ in a transfer market. In case (b), if the deviation took place in a regulated transfer market, the consumer must have browsed both firms and observed a deviation in the headline price. If the deviator charges a headline price $f_{n'_i} < c - \overline{a}$, the consumer purchases two units from the deviator. Otherwise, she purchases two units from the deviator's rival. If the deviation took place in a distortable market or an unregulated transfer market, the deviator cannot be the initially assigned firm. If the market is unregulated the consumer cannot buy from the deviator and hence buys two units from the initially assigned firm. If it is regulated, the consumer buys two units from the deviator only if $f_{n'_i} + r(\overline{a}) < c - a^* + r(a^*) < c$ in a distortable market or $f_{n'_i} + \overline{a} < c$ in a transfer market.

Beliefs. In any transfer market, for any headline price the consumer did not observe, she believes it is equal to $c - \overline{a}$; if she did not observe firm n_i's headline price or observed the candidate-equilibrium headline price, she beliefs $a_{n_i} = \overline{a}$. If the consumer observes an off-equilibrium headline price $f' \neq c - \overline{a}$ of firm n_i, she beliefs the associated additional price is $a_{n_i} = v_L - f'$ if the market is unregulated, and $a_{n_i} = \overline{a}$ if the market is regulated.

In any distortable market, for any headline price the consumer did not observe, she believes it is equal to $c - a^*$; if she did not observe firm n_i's headline price or observed the candidate-equilibrium headline price, she beliefs $a_{n_i} = a^*$. If the consumer observes an off-equilibrium headline price $f' \neq c - a^*$ of firm n_i, she beliefs the associated additional price is $a_{n_i} = r^{-1}(v_L - f')$ if the market is unregulated, and $a_{n_i} = \overline{a}$ if the market is regulated.

Optimality. We begin with showing that firms behave optimally. Any firm n'_i that deviates sells to the consumer only if $f_{n'_i} + r(a_{n'_i}) < c - a^* + r(a^*) < c$ in a distortable market or $f_{n'_i} + a_{n'_i} < c$ in a transfer market, and thus cannot make positive profits.

Next consider the consumer. Consider any relevant history in which the consumer did not observe a deviation (and followed her specified attention strategy). Then, she believes that all firms set the equilibrium prices. Since she studies any remaining unregulated market, she expects to get the $v_H + v_L - 2c$ in all transfer markets and $v_H + v_L - 2(c - a^* + r(a^*))$ in all distortable markets. As this is the maximal surplus available in each market according to her beliefs, her attention strategy is (sequentially) optimal given her beliefs. Next consider the remaining relevant histories in which the consumer observed a deviation in market n' and followed her specified attention strategy. If she observed a deviation by her initially assigned firm in an unregulated or regulated distortable market n', then she browsed and studied the competitor's price in that market when following the above attention strategy. Furthermore, she studied the initially assigned firm and being fully informed makes the optimal purchase decision in market n'. Given her beliefs, she also achieves the maximal surplus in all other markets $n \neq n'$. Hence, her strategy is optimal in this case. If she observes a headline-price deviation by her initially-assigned firm in a regulated transfer market, then she browsed and studied in market n' directly after having studied the assigned firm in all unregulated and distortable regulated markets; hence, she has observed the non-initially assigned firm's total price and purchases from the initially assigned firm if and only if either (i) $f_{n'_i} + a_{n'_i} < c$ when having observed $a_{n'_i}$ or (ii) $f_{n'_i} + \overline{a} < c$ when not having observed the deviating firm's additional price. This is trivially optimal given her beliefs. If she observed a deviation in the additional price of her initially-assigned firm in a regulated transfer market but not the headline price, then the deviator charges a total price less than c and it is optimal to purchase from the deviator, which the consumer does.

Next consider histories in which the consumer observed a deviation by a non-initially assigned firm. Then she must have studied (and observed equilibrium prices) of her initially assigned firm in all unregulated and regulated distortable markets. Furthermore, the assigned firm must be charging equilibrium prices and the consumer observed equilibrium headline prices in all regulated transfer markets. Given that the consumer has studied in all unregulated markets, she thinks she gets the maximal surplus in any market $n \neq n'$ in which she did not observe a deviation. Given that the consumer has point beliefs on and off the path of play, she does not anticipate learning anything even after having observed a deviation. Hence, she believes that her attention allocation can only affect the total surplus she receives if it makes it feasible to purchase from an unregulated deviating firm (by studying its additional price). Whenever the consumer has a unit of attention left upon observing the deviation by a non-initially assigned firm n_i' whose additional price she did not study yet, she studies the deviator's additional price. Hence, her attention strategy is optimal.

In a market in which the consumer observed no deviation, she is indifferent from which firm to purchase two units. When having observed a deviation, she wants to purchase two units from a firm that offers her the largest utility. Her strategy specifies her to do so.

Part II. Towards a contradiction, suppose there exists an equilibrium in which the efficient and competitive outcome obtains in every market. In such an equilibrium, firms in distortable markets charge $a = a^* < \overline{a}$, and all firms charge total prices equal to their marginal cost.

First, we show that in such an equilibrium the consumer must study in regulated distortable markets with probability one. Suppose that there exists a regulated distortable market where the consumer studies with probability strictly less than one. Because total prices are equal to marginal cost, the consumer purchases two units in this market with probability one. Thus, a firm n_i in this market sells two units to a consumer who purchases without studying with strictly positive probability. But then this firm could deviate to an additional price $a_{n_i} > a^*$ and earn strictly positive profits from consumers who purchase without studying n_i with strictly positive probability, a contradiction. We conclude that the consumer must study in regulated distortable markets with probability one.

For the efficient outcome to obtain, the consumer must also study in all unregulated market (for otherwise she cannot purchase in these). Thus, the consumer must use $N - J$ units of attention to study in unregulated markets, and M_r units of attention to study in regulated distortable markets. Since by assumption $J \leq N-K-1+M_r$, $K \leq N-J+M_r-1$ and therefore the consumer does not have enough attention to study in all unregulated and regulated distortable markets. We conclude that if $J \leq N - K - 1 + M_r$, there is no equilibrium in which the efficient and competitive outcome obtains in all markets. □

Proof of Proposition 3. Case I. Since $K + J \leq N_l$, by Lemma 4 in the proof of Theorem A.1, the consumer uses all of her attention to study in low-cost unregulated markets independently of what markets the regulator regulates. Regulating J markets is the only way to open up $K+J$ markets, and thus the unique way to maximize total surplus. Furthermore, by Step (i) in the proof of Theorem A.1, all firms charge a price of v_L and maximizing consumer surplus is equivalent to opening up as many markets as possible. Again, thus, regulating only low-cost markets is uniquely optimal.

Case II. By our third equilibrium-selection assumption, the consumer must begin by studying her initially assigned firm in as many unregulated markets as possible (whereby she reaches her equilibrium utility since firms price symmetrically). Thus, total welfare is always maximized. Once she studied all her initially assigned firms she has more than 2 but less than $1 + s$ units of attention left over. Hence, by Theorem A.1, all regulated markets and unregulated-low-cost-studying markets become competitive. To maximize consumer surplus the regulator, thus, wants to minimize the number of unregulated high-cost-studying markets. The uniquely optimal way to do so is to regulate as many high-cost studying markets as possible.

Case III. By our third equilibrium-selection assumption, the consumer studies unregulated initially assigned firms first, using $N_l + sN_h - J$ units of attention. Then, she has at least $1+s$ units of attention left. Hence, by Theorem A.1 all firms charge a total price c and any pattern of regulation maximizes total and consumer surplus. □

Proof of Proposition 4. Case I. Consider any continuation game after the inefficient firms' entry decisions are observed. The same arguments as in Lemmas 1, 2, and 3 of Theorem A.1 apply unaltered to all markets other than the one with inefficient firms. We conclude that in all these other markets firms set the same total price below v_L. Hence the benefit of browsing in equilibrium is zero in these markets. From now on consider the inefficient market. Let $\underline{t}$

be the lowest price a firm sets in this market. We now show by contradiction that $\underline{t} \geq v_L$. Suppose otherwise, then the firm charging a total price of $\underline{t}$ could deviate and set prices $(\underline{t} - \overline{a} + \epsilon, \overline{a})$, where $\epsilon \in (0, (1/2)\min\{v_H - v_L, v_L - \underline{t}\}$. In any optimal search strategy of the consumer, following this price, the consumer cannot be browsing in the inefficient market as this would save at most 2ϵ and requires her to study in at least one less unregulated market, which in turn reduce her consumer surplus in that market by $v_H - v_L$. We conclude that $\underline{t} = v_L$. Now consider any firm that charges a total price strictly above v_L, and let the firm deviate to $v_L - \overline{a} - \epsilon, \overline{a}$. In that case, all consumers initially assigned to this firm must buy two units from it because it offers the lowest price in the inefficient market, and consumers know so once they observe its headline price. As $\epsilon \to 0$, this approaches the monopoly profit from any consumer observing the firm's headline price and hence is strictly greater than the profits it earns when charging total prices above v_L. We conclude that all firms in the inefficient market must set a total price of v_L. By the exact same same argument, total prices in all other markets must also equal v_L. Given the firms' pricing strategies, minimally adjusting the consumers' strategies and beliefs used in the proof of Theorem A.1 to allow for more firms in the market with inefficient firms proves the existence of an EPBE.

Now given that all firms charge a price of v_L and consumers purchase from their initially assigned firm, it is strictly optimal for inefficient firms to enter.

Case II. We sketch the equilibrium construction, which is essentially the same as in Theorem A.1. In case inefficient firms do not enter on the path of play, we assign the same strategies and beliefs to firms and consumers as in Theorem A.1. If one or more inefficient firms enter, we suppose consumers believe that all firms in regulated markets set an additional price of $\overline{a}$ for any headline price. Furthermore, we suppose the consumer expects unobserved efficient firms to set a headline price of $c - \overline{a}$ and unobserved inefficient firms to set a headline price of $c' - \overline{a}$; similarly, if a single inefficient firm entered, she browses with probability one for any headline price above $c - \overline{a}$. Absent a deviation in all other markets, if the consumer observes an efficient firm setting a headline price above $c - \overline{a}$ or an inefficient firm setting a headline price above $c' - \overline{a}$, she browses with probability one. If there is a deviation in another market, she browses in the deviation market with probability one.

Case III. Consider the continuation equilibrium following the inefficient firms' entry decisions. By Lemmas 1 to 3, firms in all markets other than the one with potentially inefficient firms (henceforth n') charge identical total prices below v_L. Suppose that in market n', firms set different total prices. Recall that on path browsing, in contrast to studying in unregulated markets, does not benefit the consumer in markets $n \neq n'$. Because if the consumer studied in all unregulated markets, she has enough attention left to browse all firms in market n', on path she must browse until she finds a lowest-price firm. Hence, only a lowest-total-price firm can have positive demand in n'. For the sake of a contradiction, suppose this lowest-total price $\underline{t} > c$. Consider an efficient firm that deviates to $(\underline{t} - \overline{a} - \epsilon, \overline{a})$. If in equilibrium total prices differ in n', the consumer browses in it. And if they do not, then by our third equilibrium-selection assumption the consumer browses in it with positive probability. Hence, the deviation attracts the consumer with positive probability, and thus is profitable for sufficiently small $\epsilon > 0$. Because $\underline{t} = c$ in any continuation equilibrium, inefficient firms do not enter. □