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DECEPTIVE FEATURES ON PLATFORMS*

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Many products sold on online platforms have additional features like fees for services, shipping, luggage, upgrades, and so on. We study when a two-sided platform shrouds additional features towards potentially naive buyers. We explore a novel mechanism according to which platforms shroud to manipulate network externalities between buyers and sellers. Exploring this mechanism, we argue the advent of online marketplaces led to less transparent markets. First, platforms have stronger incentives to shroud seller fees than sellers themselves. Second, platforms shroud their own fees less if they earn more revenue from sellers; so when sellers on the platform compete more fiercely, platforms—somewhat perversely—shroud more. We connect these results to many applications and the current debate on regulating online platforms.

Policymakers have started more actively to regulate online marketplaces that obfuscate fees. The EU pressured Airbnb to include service fees and cleaning charges of hosts in upfront prices.[1] UK authorities forced the ticket marketplace Viagogo 'to make its exorbitant fees and delivery charges clear'.[2] The US Department of Transport ruled that online travel agents must display total ticket prices more prominently than its price components.[3] More generally, the Federal Trade Commission (FTC) is concerned with what it calls 'dark patterns' on platforms, which include obfuscated additional fees and features.[4] Despite the growing concerns of regulators worldwide and reports in the popular press,[5] the economic literature has not yet studied the incentives of two-sided platforms to hide additional fees on their marketplaces.[6] In particular, as in some examples above, why do platforms hide fees they do not even earn themselves? Can regulators rely on platforms to design a transparent marketplace, and if not, how should regulators intervene?

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[1] See https://www.euronews.com/2018/09/20/airbnb-complies-with-eu-consumer-regulation-demands (accessed 6 December 2019).

[2] Source: https://www.theguardian.com/money/2018/aug/01/viagogo-ticket-prices-fees-delivery-costs (accessed 6 December 2019). Also, the Office of Fair Trading (2012) worries about intransparent payment surcharges of online retailers, and the UK Regulators Network (2016) worries about unanticipated additional fees of sellers on price comparison websites.

[3] See https://www.transportation.gov/individuals/aviation-consumer-protection/buying-ticket (accessed 6 December 2019).

[4] See https://www.ftc.gov/news-events/events/2021/04/bringing-dark-patterns-light-ftc-workshop (accessed 7 July 2022).

[5] For example, see the report in 'Last Week Tonight' on obfuscated fees of online ticket platforms. Available at https://www.youtube.com/watch?v=-_Y7uqqEFnY&t=545s (accessed 6 July 2022).

[6] Two recent reports targeted at economic practitioners, De Streel *et al.* (2018) and Scott Morton *et al.* (2019), stress the need to study non-transparent pricing and consumer biases as a source of harm on platform markets.

In Section 1, we introduce our baseline model. We build on the framework by Armstrong (2006) and assume positive cross-group externalities between buyers and sellers on the platform: buyers benefit from more sellers to buy products from and vice versa. The profit-maximising platform can charge membership fees to buyers and sellers who join the marketplace. But in line with our applications, we focus on settings where the platform gives free access to buyers.

We enrich the standard setting and explicitly model the buyer–seller interaction on the platform based on Gabaix and Laibson (2006) and Heidhues *et al.* (2016b). In each product category on the platform, sellers charge a base price f and a potentially shrouded mandatory surcharge $a \leq \overline{a}$. There are naive and sophisticated buyers. When naive buyers choose a product, they wrongly ignore shrouded surcharges and end up paying more than they anticipated. Sophisticated buyers take shrouded fees into account, but shrouding induces a hassle cost $e > 0$ for them. The hassle cost captures in a reduced form that intransparent platforms require more scrutiny for consumers who make more careful choices. For example, Blake *et al.* (2021) find that drip pricing induces some consumers to click back and forth more, and Morrison and Taubinsky (2023) show that consumers who correctly understand surcharges use significant mental effort to do so.

Our key novel feature is that the platform can shroud or unshroud surcharges that sellers charge. Unshrouding reveals surcharges to buyers when they choose a product. This transparency reduces hassle costs, and turns naive buyers into sophisticated ones, which makes buyers more price-sensitive to surcharges. Thus, platforms face a choice between helping sellers shroud their surcharges or unshrouding them to design a transparent marketplace.

Our baseline model captures critical features of many important platforms. To illustrate, consider primary event-ticket platforms like Ticketmaster. Ticketmaster intermediates interactions between events and consumers. Events charge base prices for tickets and surcharges (venue fees, service fees, etc.). Ticketmaster could disclose these surcharges and add them upfront to the ticket prices. Instead, it can shroud surcharges and display them late in the purchase process, a practice known as 'drip pricing'. Compelling evidence shows that drip pricing boosts sales. For example, studying a leading US secondary event-ticket platform, Blake *et al.* (2021) find that—fixing prices and fees—drip pricing a 15% buyer fee boosts revenues by 21%. In line with our hassle cost, drip pricing induces consumers to click more back and forth and spend more time on the website.

In Section 2, we analyse our baseline model. The novel mechanism underlying our results is that the platform (un)shrouds surcharges of sellers to manipulate cross-group externalities in order to generate activity. Shrouding impacts the average perceived buyer surplus per interaction on the platform (henceforth 'buyer surplus'): a larger buyer surplus attracts more buyers to the platform, and, due to cross-group externalities, more buyers make the platform more attractive for sellers.

Shrouding seller fees has two opposing effects on buyer surplus. When the platform shrouds, sellers know that buyers become less price-sensitive for surcharges and charge large surcharges $\overline{a}$. First, naive buyers ignore shrouded surcharges and wrongly believe products are cheap, increasing perceived buyer surplus. Second, sophisticated buyers anticipate shrouded fees, but face a hassle cost e, reducing buyer surplus. The platform trades off these effects to increase buyer surplus and attract more buyers because more buyers—via cross-group externalities—increase the willingness of sellers to join the platform. Thus, the platform shrouds seller fees to make products look cheap if and only if there are a sufficient number of naive buyers.

According to this mechanism, platforms use drip pricing to generate activity. This can explain why platforms like Ticketmaster use drip pricing on venue fees of events; or why online travel agencies (OTAs) hide hotels' resort fees, even when they do not receive a cut of these fees.

To better evaluate the platform's incentive to shroud seller fees, we compare it to a laissez-faire benchmark where sellers can shroud their own surcharges. This leads to our first main insight: even though the platform neither earns the shrouded fees nor commissions for shrouding, it has stronger incentives to shroud seller fees than sellers themselves. To gain intuition, suppose all sellers shroud and charge large surcharges $\overline{a}$ to buyers. Then a seller can unshroud surcharges to reduce hassle costs and attract sophisticated buyers. By competing through unshrouding, however, sellers also reveal to naive buyers that products are more expensive than they have anticipated, which induces some buyers to leave the marketplace.

Our laissez-faire benchmark shows that cross-group externalities drive the platform to shroud more. Sellers—neglecting cross-group externalities—ignore that their unshrouding induces buyers to leave the platform, which reduces demand for other sellers. Because the platform internalises cross-group externalities and wants to generate activity on the platform, it shrouds seller fees more often to keep more buyers on the platform. As a result, the platform shrouds fees of third-party sellers more often than sellers themselves, even though shrouding harms sophisticated buyers.

Section 3 extends our basic model and we explore when the platform charges and shrouds its own surcharges. For example, Ticketmaster gets a cut from the service fees that buyers pay. What drives the platform to shroud its own surcharges? On the one hand, buyers attract many sellers, so when the platform unshrouds, it sets all its buyer fees to zero. So shrouded platform fees cannot make the platform look any cheaper. But shrouding induces a hassle cost, so *shrouded platform fees reduce the total number of buyers*; and fewer buyers—due to cross-group externalities—lower revenues from sellers. On the other hand, buyers are less price-sensitive to shrouded platform fees, so the platform can shroud its fees to *raise revenues from buyers*.

This trade-off leads to our second main result: a platform that extracts more revenue from sellers has stronger incentives to unshroud its own fees to attract more buyers. In turn, when a platform extracts less revenue from sellers, e.g., because sellers compete more fiercely, the platform wants to cash in on buyers and shrouds its own fees. We argue that this insight helps explain why primary event-ticket platforms like Ticketmaster shroud their own fees, while marketplaces, such as Amazon and Etsy, and hotel-booking sites do not charge buyers who interact with third-party sellers any shrouded fees themselves.

In Section 4, we discuss policies. Existing work on intermediaries suggests they may bias their advice or hide fees to earn commissions for certain products (Inderst and Ottaviani, 2012; Murooka, 2015), or to promote their own brands (De Corniere and Taylor, 2019; Anderson and Bedre-Defolie, forthcoming). Our results imply that banning these practices may not induce transparency: even without commissions or self-preferencing, cross-group externalities drive platforms to appear cheap and shroud fees.

Our results also shed new light on the common intervention that we mentions above—requesting all-inclusive upfront pricing. First, policies that limit shrouded seller fees can make products appear more expensive and cause buyers to leave the marketplace. Policymakers who are concerned about insufficient participation on platforms might therefore hesitate to target seller fees on platforms. Indeed, the Competition and Markets Authority (2017) voices concerns that many consumers do not yet use digital comparison tools. Second, when forced to unshroud, network effects induce the platform to lower its own surcharges without

raising other fees. Thus, policies that target shrouded platform fees do not have the same adverse effect on buyer participation and more unambiguously increase actual total consumer surplus.[7]

We contribute to the ongoing policy debate on the role of online platforms. The EU commissioner, Margrethe Vestager, describes platforms as private rule-makers who design a marketplace and set rules that sellers must follow.[8] Our framework suggests platforms as private rule-makers can have strong incentives to shroud features, and regulators should not rely on platforms to initiate reliable consumer-protection rules on their marketplaces. Indeed, the examples we provide in the initial paragraph suggest that policymakers are increasingly active against obfuscation on platforms. Also the EU's recent Digital Services Act (DSA) mandates online platforms to enable sellers to comply with existing price transparency rules.[9]

Section 5 discusses several extensions and how they help connect our results to a wide range of important applications like marketplaces, price comparison websites (PCWs) and OTAs (hotels and flights). Our framework explains several facts across these applications: the prevalence of drip pricing; which platforms shroud their own fees; that OTAs shroud resort fees of which they did not earn a cut; how platforms can sort consumers to make shrouding more stable; and others. Our results also suggest which policy interventions against Airbnb, Ticketmaster and others benefit consumers more robustly.

We discuss the related literature in Section 6. Section 7 concludes.

1. Baseline Model

We now introduce our baseline model of a two-sided market with three types of players: sellers, buyers and a platform. Buyers and sellers interact exclusively on the platform.

The monopoly platform has zero marginal costs for serving a buyer or seller, and sets membership fees M_S for sellers and $M_B \geq 0$ for buyers. Additionally, the platform can influence the transparency of fees on the marketplace and can shroud or unshroud additional fees of sellers.

There are infinitely many buyers and sellers who choose to join the platform or not. The value of buyers and sellers from joining the platform are

$$v_B = n_S u - M_B \quad \text{and} \quad v_S = n_B \pi - M_S,$$

where n_B and n_S denote the mass of buyers and sellers who join the platform, respectively. These valuations capture some common assumptions. First, each seller (buyer) interacts with all n_B buyers (n_S sellers) on the platform and enjoys the expected perceived surplus π (u) per buyer (seller) on the platform. Thus, buyers benefit from more sellers and vice versa—the platform features positive cross-group externalities (aka indirect network effects). Second, each additional interaction has the same marginal value.

[7] Throughout, 'actual total consumer surplus' denotes the true consumer surplus for all transactions that includes shrouded and unshrouded fees.

[8] See https://ec.europa.eu/commission/commissioners/2019-2024/vestager/announcements/speech-forum-europe-conference-digital-services-act_en (accessed 10 December 2020).

[9] See p. 20, point (74), of https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R2065 (accessed 25 October 2023).

There is a mass one of potential buyers whose outside option, to simplify exposition, is uniformly distributed on [0, 1]. There is a mass one of sellers whose outside option, also to simplify exposition, is homogeneous and normalised to zero.[10]

Importantly—and in contrast to the existing literature—the platform can shroud seller fees to manipulate the cross-group externalities π and u. To capture this, we endogenise π and u by modelling interactions between buyers and sellers explicitly, based on Gabaix and Laibson (2006) and Heidhues *et al.* (2016b).

Each seller potentially offers a single product in one product category on the platform. We assume all product categories are identical and independent. Each product category on the platform has two potential sellers.[11] In each product category the two potential sellers have marginal cost c and are located at opposite ends of a Hotelling line of length one. Each seller $s \in \{1, 2\}$ charges a base price f_s and a mandatory surcharge $a_s \in [0, \overline{a}]$.[12] We refer to the rival of 's' as '$-s$'.

In each product category the position of each buyer is uniformly distributed on the Hotelling line. Buyers have linear transportation costs t, and a value v for the products. We assume v is large enough such that when both sellers in a product category join the platform, the market is covered. All buyers are aware of the base price f_s, but they differ by whether they take shrouded surcharges into account. At each location on the Hotelling line, buyers are naive with probability α. When the platform shrouds surcharges, naifs ignore them and wrongly believe they are zero. With probability $1 - \alpha$ buyers are sophisticated. Sophisticated buyers observe shrouded surcharges when choosing a product, but shrouding induces a hassle cost e for every interaction.

The platform shrouds or unshrouds surcharges, and it does so for all transactions on the platform. Unshrouding allows all buyers to observe all surcharges correctly when they choose a seller, and reduces the hassle cost to zero.

The timing is as follows:

Stage 1: The platform shrouds or unshrouds surcharges, and sets membership fees.
Stage 2: Buyers and sellers decide whether to join the platform.
Stage 3: Sellers choose f_s and a_s.
Stage 4: In each product category, buyers who joined the platform draw their position on the Hotelling line and whether they are naive or sophisticated. Buyers make their purchase decision in each product category. If the platform shrouds surcharges, naive buyers consider only f_s, and sophisticated buyers observe f_s and a_s and face hassle cost e. If the platform unshrouds, all buyers are sophisticated and observe f_s and a_s hassle-free.

Stages 1 and 2 capture the monopolist's *platform design*, and stages 3 and 4 *competition on the platform*.

In general, naive and sophisticated buyers have different incentives to join the platform, so the share of naive consumers on the platform (α in the above model), is different from the share of naive consumers in the population (which we call β). For expositional convenience, our baseline model assumes that buyers are *ex ante homogeneous*, i.e., nature draws whether a buyer is naive or

[10] Homogeneous outside options of sellers imply that more buyers increase benefits of sellers without attracting more sellers in equilibrium. This limits—without eliminating—cross-group externalities and simplifies the demand system. See Online Appendix A.2.1 for a model variant with heterogeneous outside options of sellers.

[11] The mass 1 of sellers and each seller having one potential rival implies there is a mass 1/2 of product categories.

[12] See Gabaix and Laibson (2006) and Heidhues and Kőszegi (2018) for different interpretations of $\overline{a}$: a regulatory price cap, a price above which consumers register a complaint, or, in the spirit of Morrison and Taubinsky (2023), a price above which consumers no longer use rules of thumb, but start paying closer attention to additional fees.

sophisticated after they join the platform. This rules out any selection effects and implies $\alpha = \beta$. In Online Appendix A.3, we show that relaxing this assumption leads to selection effects so that a shrouding platform attracts naive consumers disproportionately, i.e., $\alpha > \beta$. But importantly, all our main results are robust in this setting, showing that modelling *ex ante* homogeneous or heterogeneous buyers does not drive our results.

We look for perfect Bayesian equilibria.[13] As common with multi-sided platforms, there can be equilibria with zero probability of interactions on the platform. To rule out these economically uninteresting cases, we focus on equilibria with a strictly positive mass of buyers and sellers.

To streamline exposition, we make the following two assumptions throughout the main text:

ASSUMPTION 1. $\pi \geq u$.[14]

$\pi \geq u$ means that buyers exert a large cross-group externality on sellers. This implies that the platform has strong incentives to attract buyers and optimally sets the lowest possible membership fee for buyers, $M_B = 0$. In the vast majority of our applications buyers can access platforms for free, and, thus, we think of this as an arguably weak condition.

ASSUMPTION 2. *In each product category, total profit and perceived buyer surplus are larger with duopoly sellers than a monopoly seller.*[15]

Assumption 2 focuses the main analysis on cases with some competition on the platform, i.e., where the platform prefers to have duopoly sellers in the product categories.

1.1. *Application: Primary Event-Ticket Platforms*

We now discuss how the model captures key aspects of primary event-ticket platforms.

Primary event-ticket platforms intermediate transactions between events (e.g., sports, music, culture, etc.) and their potential audience. The major player in the United States is Ticketmaster, which has significant market power: it controls roughly 70% of the market for event tickets.[16]

Network effects play an important role as consumers benefit from a wider range of event offers, and events benefit from the large customer base of Ticketmaster. Our model also captures competition on the platform between different events, e.g., similar events in the same area.

Our model reflects various prices and fees on Ticketmaster (see Figure 1 for an overview): consumers pay a price f for an event ticket; a captures that events charge various mandatory surcharges (service fees, venue fees, facility fees, etc.). According to Ticketmaster, events set ticket prices and venue fees; events also have a say in setting service fees, of which they get a cut.[17]

Event organisers sign agreements with Ticketmaster to use the platform. The details of these agreements including the types of payments are typically not public. Our model captures that

[13] As in Eliaz and Spiegler (2006; 2008), naive buyers and firms agree to disagree on the model. Alternatively, we could follow Heidhues and Kőszegi (2017) and study subgame-perfect Nash equilibria in the model between firms.

[14] In terms of the primitives of the model, this translates to $v - c + \max\{\alpha\overline{a} - (1-\alpha)e, 0\} \leq \frac{9}{4}t$.

[15] Assumption 2 is based on Karle *et al.* (2020). Intuitively, with duopoly more consumers buy and get products closer to their taste, so that duopolists earn more profits and the platform prefers to have duopoly sellers. Formally, we need that the Hotelling line with monopoly seller is not covered, i.e., $v - c + \max\{(2+\alpha)\overline{a} + (1-\alpha)e, 0\} \leq 2t$, and that buyer surplus increases with duopoly, which follows from $\frac{7}{4}t \leq v - c + \min\{\alpha\overline{a} - (1-\alpha)e, 0\}$. We show in the proof of Lemma 2 that these conditions can be jointly satisfied with all other assumptions on the parameters.

[16] See https://insights.som.yale.edu/insights/did-ticketmasters-market-dominance-fuel-the-chaos-for-swifties (accessed 13 July 2023).

[17] See https://help.ticketmaster.com/hc/en-us/articles/9663528775313-How-are-ticket-prices-and-fees-determined-?language=en_US (accessed 13 July 2023).

Variable	Application to Event-Tickets
f	Ticket price
a	Mandatory surcharges of event (service fee, venue fee, facility charges, etc)
Shrouding	Drip pricing
Unshrouding	Upfront pricing
e	Hassle cost of drip pricing for sophisticated buyers
M_S (M_B)	Fixed fee for event to sell via platform (buyers to use platform)

Fig. 1. *Event-Ticket Platforms.*

Ticketmaster charges a fixed fee M_S to events, but our results are robust with other types of fees such as ad valorem fees. Our model allows the platform to charge a fixed access fee M_B to buyers. In equilibrium, the platform finds it optimal to set $M_B = 0$, which is also what Ticketmaster does.

The timing of our model captures how users experience Ticketmaster. Ticketmaster designs a marketplace and terms and conditions. Given these market conditions, users either use Ticketmaster or not. Events set various ticket prices and fees. Users can choose between different events. Ticketmaster uses drip pricing, so all mandatory surcharges are only revealed to consumers at checkout. Drip pricing requires sophisticated consumers, who make sure they take correct surcharges into account, to click back and forth or use extra time and attention. We capture this as a transaction cost e that these users face when they engage with sellers and shrouded fees in stage 4. Instead of drip pricing, Ticketmaster could add fees to ticket prices upfront. Just like unshrouding in our model, this would lower hassle costs and reduce the scope for mistakes.

2. Shrouding Seller Fees

We now analyse our baseline model. First, we explore competition on the platform (stages 3 and 4) and then look at the platform's design choices (stages 1 and 2).

2.1. *Seller Competition on Platforms*

In stage 3, the platform's membership fees are sunk and only the platform's choice to shroud or unshroud influences demand of sellers. We therefore distinguish these two cases. We suppose for now that there are two sellers in each product category and show below that this holds in equilibrium.

2.1.1. *Seller competition with unshrouding*

We start with subgames after the platform unshrouds surcharges. Unshrouding turns all buyers into sophisticated ones who observe surcharges when they choose a product. Seller s with a rival $-s$ faces demand

$$d_s(f_s, f_{-s}; \textit{unshrouding}) = \frac{1}{2} + \frac{f_{-s} - f_s}{2t} + \frac{a_{-s} - a_s}{2t}.$$

The first two terms are classic Hotelling demands. The third term captures that buyers face surcharges a_s. Because the platform unshrouds fees, all buyers observe surcharges.

We can write the profits of seller s as $(f_s + a_s - c)\left(\frac{1}{2} + \frac{(f_{-s}+a_{-s})-(f_s+a_s)}{2t}\right)$. Surcharges are mandatory for buyers and transparent. Thus, only total prices $f_s + a_s$ determine profits of sellers, resulting in classic Hotelling prices, profits, and buyer surplus. Applying the superscript 'un' for 'unshrouding', the equilibria of the subgame satisfy $f^{un} + a^{un} = c + t$. The *ex ante* in period 2 expected profit per buyer on the platform is $\pi^{un} = t/2$, and the *ex ante* expected buyer surplus per seller on the platform is

$$u^{un} = \frac{1}{2}\left[v - \frac{5}{4}t - c\right]. \tag{1}$$

2.1.2. *Seller competition with shrouding*

In stage 3—after the platform shrouds—a seller s with a rival $-s$ faces demand

$$d_s(f_s, f_{-s}; shrouding) = \frac{1}{2} + \frac{f_{-s} - f_s}{2t} + (1-\alpha)\frac{a_{-s} + e - a_s - e}{2t}.$$

All consumers take base prices into account. Naive buyers ignore shrouded additional fees. Sophisticated buyers take them into account, but face a hassle cost e for every interaction.

We can now express the profit of seller s as $(f_s + a_s - c)\left(\frac{1}{2} + \frac{f_{-s}-f_s}{2t} + (1-\alpha)\frac{a_{-s}-a_s}{2t}\right)$. The key observation is that shrouding makes demand less sensitive to surcharges. Thus, for any fixed total price $f_s + a_s$, firm s maximises demand by charging a large surcharge $a_s = \overline{a}$ and adjusting the base price f_s accordingly.

Using this insight, the profit of seller s simplifies to $(f_s + \overline{a} - c)\left(\frac{1}{2} + \frac{f_{-s}-f_s}{2t}\right)$. Applying the superscript '*shr*' for 'shrouding', this leads to equilibrium base prices $f^{shr} = c + t - \overline{a}$, *ex ante* expected profits per buyer $\pi^{shr} = t/2$, and *ex ante perceived* expected buyer surplus per seller on the platform

$$u^{shr} = \underbrace{\frac{1}{2}\alpha\left[v - \frac{5}{4}t - c + \overline{a}\right]}_{\text{perceived utility of naifs}} + \underbrace{\frac{1}{2}(1-\alpha)\left[v - \frac{5}{4}t - c - e\right]}_{\text{perceived utility of sophisticates}} = u^{un} + \frac{1}{2}\left[\alpha\overline{a} - (1-\alpha)e\right]. \tag{2}$$

The outcome resembles earlier results on shrouded attributes (Gabaix and Laibson, 2006; Armstrong and Vickers, 2012; Heidhues and Kőszegi, 2018). Sellers earn the same profits per interaction with shrouding and unshrouding ($\pi^{shr} = \pi^{un}$): shrouding makes demand less sensitive to surcharges, which leads sellers to charge large surcharges. But—as in a waterbed effect—sellers compete away this revenue and reduce base prices by $\overline{a}$.[18]

To develop intuition, it will be important to understand how shrouding affects perceived buyer surplus. To do so, we first show how it affects the buyers' perceived cost of purchase (gross of transport cost). Note first that the total price of sellers is the same with shrouding and unshrouding. But because of shrouding, naive buyers only take base prices into account and perceive the costs $f^{shr} = c + t - \overline{a}$. Sophisticated buyers face a hassle cost e and take surcharges into account; they have costs $f^{shr} + \overline{a} + e = c + t + e$. With unshrouding, the cost of purchase is $f^{un} + a^{un} = c + t$ for all buyers. Thus, shrouding has a conflicting impact on these two consumer groups: shrouding (*i*) makes products look cheaper to naifs, but (*ii*) induces hassle costs for sophisticated buyers.

[18] In contrast to Gabaix and Laibson (2006) and Armstrong and Vickers (2012), surcharges are mandatory, which is why naifs do not cross-subsidise sophisticated buyers in our baseline model.

The effect of shrouding on perceived buyer surplus u^{shr} captures these two opposing effects. Shrouding makes naive buyers believe that products are cheaper, which increases perceived buyer surplus by $\alpha\overline{a}$. But sophisticated consumers face a hassle cost e, reducing perceived buyer surplus by $(1-\alpha)e$. The former effect dominates if and only if $\alpha \geq \underline{\alpha} \equiv \frac{e}{\overline{a}+e}$, i.e., the share of naifs on the platform is sufficiently large. Lemma 1 summarises these results.

LEMMA 1.

(*1*) $\pi^{un} = \pi^{shr} = t/2 \equiv \pi$.
(*2*) $u^{shr} \geq u^{un}$ *if and only if* $\alpha \geq \underline{\alpha}$.

2.2. *Platform Design*

We now explore when the platform shrouds fees of sellers on the marketplace. We solve the platform's problem for generic benefits per interaction of π and u and later apply the (equilibrium) benefits per interaction from Lemma 1. Recall that buyers are *ex ante* homogeneous in stage 2 and expect the same perceived surplus u per seller on the platform.

To start, we derive demand of buyers and sellers for joining the platform in stage 2. Because buyers' outside option is uniformly distributed on the interval [0, 1], free entry leads to $n_B^* = v_B = n_S^* u - M_B$, i.e., the number of buyers increases linearly in their valuation for the platform. Because sellers' outside option is homogeneous and normalised to zero, the monopoly platform chooses $M_S = n_B \pi$ to extract the total profit ($n_B \pi$) from sellers, and all sellers join the platform ($n_S^* = 1$).

Next, we explore how shrouding impacts demand. By Lemma 1, $\pi = t/2$ for shrouded and unshrouded surcharges, but shrouding does impact the number of buyers via u. Thus, because the platform earns no direct revenues from shrouded seller fees, the platform shrouds or unshrouds fees of sellers only to manipulate cross-group externalities. We can therefore write the platform's problem as if it chooses u directly:

$$\max_{M_S, M_B, u} n_S^* M_S + n_B^* M_B = \max_{M_B, u} (u - M_B)(\pi + M_B),$$

where we plug in n_S^*, n_B^* and $M_S = n_B^* \pi$ from above. The next lemma characterises the solution.

LEMMA 2. *The unique equilibrium outcome is that the monopoly platform sets membership fees* $M_B = 0$ *and* $M_S = u\pi$*, and earns profits* $\Pi = \pi u$*. The platform shrouds or unshrouds to maximise* u*.*

The key observation is that the platform shrouds or unshrouds seller fees a_s to increase buyer surplus u and attract more buyers. A larger perceived buyer surplus u attracts more buyers to the platform, and more buyers—via cross-group externalities—increase the willingness to pay of sellers. Thus, the platform prefers to attract more buyers to extract more revenue from sellers.

We combine the results from Lemmas 1 and 2 to describe when the platform shrouds seller fees.

PROPOSITION 1. *The platform shrouds sellers' surcharges if and only if* $\alpha \geq \underline{\alpha} = \frac{e}{e+\overline{a}}$*, inducing sellers to charge large surcharges* $\overline{a}$*. Otherwise the platform unshrouds sellers' surcharges.*

We saw in Lemma 1 that shrouding (*i*) makes products look cheaper to naifs, but (*ii*) induces hassle costs for sophisticated buyers. By Lemma 2, the platform balances both effects to maximise the number of buyers on the marketplace.

The cut-off $\underline{\alpha}$ captures unshrouding incentives. It increases in the distortion e and decreases in shrouded fees $\overline{a}$. When $\overline{a}$ increases, shrouding hides more fees and makes products look even cheaper, attracting more buyers. When e increases, shrouding creates more distortion for sophisticated buyers and attracts fewer buyers.

The cut-off satisfies $\underline{\alpha} > 0$, so naiveté is key to explain why platforms shroud fees. With only sophisticated buyers, the platform generates activity by creating a hassle-free experience. Thus, classic results on the pricing of add-ons and upgrades (Ellison, 2005; Gabaix and Laibson, 2006), where sellers always disclose add-on prices when doing so is cheap and all consumers are sophisticated, extend to whether a two-sided platform reveals fees of third-party sellers.

Cross-group externalities have implications for the impact of shrouding on actual total consumer surplus. For $\alpha > \underline{\alpha}$, platforms shroud seller fees even though, in each product category, shrouding makes sophisticated buyers worse off. This contrasts with previous work on deceptive products (Gabaix and Laibson, 2006; Heidhues *et al.*, 2016a,b), where shrouding tends to harm naive consumers and benefits sophisticated ones through a cross-subsidy.[19] This suggests that intervening on platforms may be less controversial for consumers.

2.3. *Benchmark with a Laissez-Faire Platform*

To evaluate shrouding incentives more carefully, we now ask if the platform has stronger incentives to shroud seller fees than sellers themselves. To do so, we explore a laissez-faire platform where each seller decides if they want to shroud or unshroud their additional fee. For example, an event-ticket platform could give events the option to commit to adding their surcharges directly to the ticket price upfront.

Consider a product category with two sellers. Each seller can decide to shroud or unshroud their surcharges at the same time as they set prices.[20] To compare shrouding incentive of sellers and platforms in the cleanest way, we suppose in the main text that if a seller unshrouds, all naive consumers turn sophisticated in that product category.[21] Additionally, because the unshrouding seller reveals their fees upfront, consumers can interact with them for zero hassle cost.

LEMMA 3. *On a laissez-faire platform, each seller unshrouds their surcharge with probability one for any* α.

To illustrate, suppose in a product category both sellers shroud, and consider the incentive of a seller s to deviate and unshroud. Seller s unshrouding has two effects. First, sophisticated buyers

[19] This result that shrouding harms sophisticated buyers also holds when we have a cross-subsidy in our setting. For details, see the web appendix on Johannes Johnen's webpage https://sites.google.com/site/johannesjohneneconomist/research.

[20] More precisely, the setting modifies our baseline model as follows. The platform no longer chooses to shroud or not. In stage 3, sellers set f_s and a_s and decide whether to shroud additional fees to consumers in the market or not. The setting resembles Gabaix and Laibson (2006) and Heidhues *et al.* (2016b), but is adapted to our applications. In contrast to Gabaix and Laibson (2006), we consider mandatory surcharges. In contrast to Heidhues *et al.* (2016b), shrouded surcharges induce hassle cost for sophisticated consumers.

[21] There are other ways to model the situation where one firm unshrouds while its rival shrouds and they may soften our conclusions. Below, we discuss one such alternative that we find reasonable and with which results are robust: we capture the idea that unshrouding makes fees of the unshrouding firm more transparent than the fees of the shrouding firm.

can purchase hassle-free from them, which is why seller s may unshroud to attract sophisticated consumers. Second, seller s also shows to previously naive consumers that products are more expensive than they thought. But unshrouding also makes these consumers aware of the surcharges of the rival $-s$, which is why unshrouding does not make seller s appear more expensive in relative terms.[22] So unshrouding allows seller s to attract sophisticated consumers without losing previously naive consumers, which is why seller s strictly benefits from unshrouding. And if s unshrouds, $-s$ also wants to unshroud to reduce its hassle cost to zero.

The next proposition compares the laissez-faire platform with Proposition 1 where the platform shrouds sellers' fees. The result follows directly from comparing the respective shrouding cut-offs. It is our first main result.

PROPOSITION 2. *The platform has stronger incentives to shroud seller fees than sellers, i.e.,* $\underline{\alpha} \in (0, 1)$*, but each seller unshrouds for any* α.

This result holds even though sellers themselves cash in the fees. For a small share of naive consumers $\alpha < \underline{\alpha}$ the platform and sellers agree on unshrouding. But for $\alpha \geq \underline{\alpha}$, Lemma 3 shows that sellers unshroud to attract buyers from their shrouding rivals. In the resulting unshrouding equilibrium, sophisticates no longer incur the hassle cost e, but products also appear more expensive to formerly naive buyers. For sufficiently many naive buyers, i.e., $\alpha > \underline{\alpha}$, the latter effect dominates and unshrouding reduces the number of buyers on the platform. To prevent buyers from leaving, the platform prefers to coordinate shrouding for all sellers, eliminating the possibility for individual sellers to unshroud to attract buyers.

The benchmark implies that platforms have a strong incentive to shroud fees that they do not even earn themselves. Sellers may unshroud to attract buyers, but they neglect that this may reduce the demand of their rival and—in equilibrium—leads buyers to leave the marketplace. The platform, however, internalises cross-group externalities and shrouds more to keep more buyers on the platform.

This result holds for more general unshrouding technologies. In practice, seller unshrouding may leave some consumers naive and unaware of the fees of rivals that continue to shroud. In this scenario, the remaining naive consumers will perceive the unshrouding seller as more expensive than its shrouding rival, so the unshrouding seller may lose demand. As a result, sellers will shroud sometimes in equilibrium. But since sellers still do not internalise that their unshrouding may lower overall participation on the platform, sellers shroud less than platforms.[23]

REMARK: In our baseline model, the platform can extract all seller profits via a lump-sum fee so that industry profits and seller profits are perfectly aligned. We show in two extensions that this is not essential for our results in Propositions 1 and 2. First, in Online Appendix A.2.1 we study a monopoly platform where sellers have a smoothly decreasing demand function for joining the platform so that sellers earn strictly positive profits in equilibrium. Second, in Online Appendix A.2.2 we study a setting where competition between platforms induces strictly positive profits for sellers. In both cases, the platform's objective is not fully aligned with industry

[22] Because the Hotelling line is covered, unshrouding does not induce formerly naive buyers who decided to join the platform to stop buying in that product category. But results get only stronger if unshrouding directly reduces demand from naive buyers. In such a scenario, unshrouding directly reduces demand in a product category, which sellers only partially internalise, but a platform would fully internalise.

[23] More precisely, the proof of Lemma 3 establishes results when unshrouding by seller s (*i*) reveals its own total prices to all consumers hassle-free, and (*ii*) turns a share $(1 - \lambda) \in [0, 1]$ of naive consumers into sophisticated consumers, who are now also aware of rival $-s$'s surcharges. The main text presents results for $\lambda = 0$. Our result that platforms shroud more than sellers holds for all $\lambda \in [0, 1]$.

profits and sellers (and buyers) earn a strictly positive rent in equilibrium. Also in these settings, platforms (un)shroud seller fees to attract buyers and generate activity, so our results are robust when platform- and industry profits are not perfectly aligned.

3. Shrouding Platform Fees

Platforms also shroud their own surcharges, e.g., Ticketmaster gets a cut from service fees and they use drip pricing to shroud them. We now explore when the platform shrouds its own surcharges.

We extend the setting from Section 1 to allow platforms to charge mandatory surcharges. In stage 1, the platform now also chooses its own surcharge $A \in [0, \bar{A}]$ paid by buyers per transaction with a seller, and whether to shroud or unshroud this fee. Naive buyers wrongly believe that shrouded platform fees A are zero. Sophisticated buyers can observe A, but face a hassle cost E if the platform shrouds its surcharges. Unshrouding allows all buyers to observe A hassle-free in stage 2.[24] We do not adjust the definition of π and u, so A and E remain excluded.

We start with competition in product categories in stages 3 and 4. As before, we assume v is sufficiently large such that the market in each product category is covered. Because A applies equally to all sellers, it does not affect competition between sellers. Thus, the perceived surpluses per interaction gross of E and A—π and u—are unaffected.

Next, we characterise demand for the platform in stage 2, starting with the demand of sellers. As in Section 1, sellers have an outside option normalised to zero, implying the platform optimally charges sellers a membership fee $M_S = n_B\pi$ and all sellers join the platform. Next, we look at the demand of buyers. Because the outside option of buyers is uniformly distributed on [0, 1], participation of buyers is determined by $n_B = v_B$. This leads to the following demand of buyers for joining the platform under shrouding and unshrouding, respectively:

$$\begin{aligned} n_B^{shr} &= n_S\left[u - \frac{1}{2}(1-\alpha)(A+E)\right] - M_B, \\ n_B^{un} &= n_S\left[u - \frac{1}{2}A\right] - M_B. \end{aligned} \tag{3}$$

The expressions in squared brackets are the perceived buyer surpluses per seller net of platform-related interaction costs A and E. Note that A and E are weighted by $1/2$ because in each product category buyers interact with only one of the two sellers. With shrouded platform fees naifs ignore platform surcharges A; the second term captures that sophisticated buyers take shrouded platform fees into account and face hassle costs E. Unshrouding allows all buyers to observe A hassle-free.

We can now analyse the platform's design choices in stage 1. By Assumption 1, buyers exert a strong externality on sellers, which is why the platform wants to attract buyers, offers them free access $M_B = 0$, and wants to appear cheap about its own surcharges. To appear cheap, the platform has two options. First, it can unshroud and set low surcharges $A = 0$. Second, it can charge large surcharges $A > 0$, but shroud them. Because naive buyers are less sensitive to shrouded fees than to membership fees, shrouding its surcharges allows the platform to earn strictly positive surcharges $A > 0$ from buyers despite their large cross-group externality on sellers. Thus, the platform charges positive surcharges if and only if it shrouds. This matches the

[24] For tractability we assume unshrouding A does not affect naiveté about seller surcharges a and vice versa. A positive direct spillover of unshrouding could even reinforce our results.

casual observation that platforms rarely charge buyers for access, but use drip-priced and rather shrouded admin- and service fees.

These observations simplify the platform's profits to $n_S M_S + n_B M_B + \frac{1}{2} n_B n_S A = n_B(\pi + M_B + \frac{1}{2}A)$, where $n_B = n_B^{shr}$ or $n_B = n_B^{un}$ if the platform shrouds or unshrouds, respectively. The next proposition summarises the equilibrium and characterises when the platform shrouds its own fees.

PROPOSITION 3. *The platform charges $M_B = 0$. When the platform shrouds, it charges $A^{shr} > 0$, and when it unshrouds $A^{un} = 0$. The platform shrouds A if and only if $\alpha \geq \alpha'$, for a unique $\alpha' \in (0, 1)$. α' is strictly decreasing in u and strictly increasing in π.*

To set its own surcharges A, the platform trades off two sources of revenue: shroud to extract revenues from buyers directly, or unshroud to attract more buyers and benefit from their externality on sellers. We already saw that the shrouding platform sets surcharges $A^{shr} > 0$ to earn direct revenue from buyers. To see that shrouding A reduces the number of buyers on the marketplace, note first that shrouding A does not affect the perceived value of naive buyers: shrouding does not change membership fees because access is free ($M_B = 0$) under shrouding and unshrouding, and unshrouded surcharges A^{un} are zero just like the wrongly perceived shrouded surcharges. But sophisticated buyers anticipate and avoid large shrouded surcharges at cost E. Thus, shrouding A reduces the average buyers' perceived value from joining the marketplace and reduces the number of buyers. To see formally that shrouding reduces the number of buyers, we substitute equilibrium outcomes $M_B = 0$, $A^{un} = 0$, $A^{shr} > 0$ and $n_S = 1$ into (3):

$$n_B^{shr} = u - \frac{1}{2}(1 - \alpha)(A^{shr} + E) < u = n_B^{un}.$$

We argued above that u is unaffected by the shrouding or unshrouding of platform fees, which is why this inequality holds and shrouding reduces the number of buyers.

Fewer buyers, however, lower the willingness to pay of sellers, which is why the shrouding platform reduces the membership fee M_S for sellers. To sum up, the platform trades off to shroud A and earn direct revenues from buyers with unshrouding A to increase revenue from sellers.

The platform's incentive to unshroud its own fees, i.e., α', depends on the size of the cross-group externalities π and u in an intuitive way. Suppose π increases and sellers benefit more from interacting with buyers. This encourages the platform to unshroud A, because unshrouding A, as discussed above, attracts more buyers, which increases the willingness to pay of sellers ($n_B \pi$). A larger perceived buyer surplus per interaction u, however, attracts more buyers and incites the platform to shroud and cash in $A^{shr} > 0$ from naive buyers. Thus, the incentives to unshroud platform fees decrease in u and increase in π.

The key insight that emerges from this discussion is that a platform that extracts more revenues from sellers is more inclined to be transparent about its own fees towards buyers. In turn, a platform that extracts revenue from buyers directly will do so via shrouded fees. This insight has several implications.

First, we can explain why some platforms charge shrouded fees to buyers while others charge none. We discuss this in detail in Section 5.

Second, the result links shrouding incentives to other platform-design features that affect cross-group externalities like competition on platforms. In our model, a decrease in t captures fiercer competition between sellers. Fiercer competition reduces profits per buyer (lower π), and attracts buyers (larger u). Using these insights, Proposition 3 implies that competition has a perverse

effect on platform design: fiercer competition between sellers shifts surplus towards buyers and thereby incites the platform to cash in on buyers by charging shrouded surcharges.

COROLLARY 1 (PERVERSE EFFECT OF SELLER COMPETITION). *A lower transportation cost t increases the platform's incentives to shroud its own surcharges.*

Recent empirical work emphasises that platform design influences competition on platforms (Ghose *et al.*, 2014; Fradkin, 2015; Chen and Yao, 2017; Dinerstein *et al.*, 2018). Our result suggests that more competition on platforms—exactly because it attracts buyers—encourages platforms to shroud their fees. Fiercer competition between sellers can even reduce actual total consumer surplus.[25]

The result nuances the common argument by policymakers and academics that marketplaces facilitate product comparison and encourage competition.[26] Instead, our results suggest that platforms can have strong incentives to shroud fees exactly because they encourage competition.

4. Policy Implications

Our framework suggests that regulators should not rely on platforms to initiate reliable consumer protection on their marketplaces. Indeed, policymakers have become increasingly active against obfuscation on platforms. We now discuss implications of our results for some specific policies.

4.1. *Bans on Commissions and Hybrid Platforms*

Existing research emphasises that intermediaries might give biased advice to earn commissions (Inderst and Ottaviani, 2012; Murooka, 2015), for example, from merchants who pay a PCW to push a certain product, or to favour their own brands (De Corniere and Taylor, 2019; Anderson and Bedre-Defolie, forthcoming). From these perspectives, restricting such commissions, or hybrid platforms and self-preferencing might make intermediaries less biased. Indeed, in the policy discussion around Amazon, common proposals involve banning Amazon brands and limiting self-preferencing.[27] Our results suggest that such bans, while potentially beneficial for the reasons outlined in previous work, may not fully debias platforms; in our setting, platforms earn the same amount from all sellers, and do not sell their own brands. Still, they shroud seller fees more than sellers themselves.

4.2. *Transparency-Inducing Policies*

Policymakers can prevent drip pricing and insist prices are revealed upfront. They have done so for fees that are rather earned by sellers, like the EU pushing Airbnb and OTAs to reveal mandatory surcharges upfront, or by platforms, such as the UK's Competition and Markets

[25] To see how a more competitive platform design can reduce actual total consumer surplus, take two search algorithms 1 and 2 where 1 is more competitive and by Proposition 3 we have $\alpha_1' < \alpha_2' \equiv \alpha_1' + \epsilon$, where $\epsilon > 0$. But then for $\alpha \in (\alpha_1', \alpha_2')$, the platform only shrouds under the more competitive search algorithm. For $\epsilon > 0$ sufficiently small, the less competitive algorithm increases the number of buyers, prevents inefficient effort E, and increases actual total consumer surplus.

[26] For example, the Competition and Markets Authority (2017, p. 6) writes that digital comparison tools 'save time and effort for people by making searching around and comparing easier and more appealing', and 'they make suppliers compete harder'. See also Brynjolfsson and Smith (2000), Dinerstein *et al.* (2018) and Ellison and Ellison (2018).

[27] See https://www.theguardian.com/commentisfree/2020/nov/14/when-it-comes-to-amazon-breaking-up-is-hard-to-do (accessed 12 March 2021).

Authority (CMA) requesting Viagogo to be upfront about service fees. Our results imply that effects are quite different if policies target platform or seller fees.

We capture these transparency policies as forcing platforms to unshroud fees. Doing so has two direct effects. First, it eliminates hassle costs (e and/or E), benefiting consumers. Second, unshrouding reveals to naive consumers that products are more expensive than they thought, which can induce buyers to leave the marketplace; fewer buyers can also induce sellers to leave, further reducing activity on the platform.

Crucially, the magnitude of this second effect depends on how unshrouding affects prices. This is where our results point to important differences between seller fees and platform fees. By Lemma 1, sellers may lower unshrouded seller fees, but then sellers raise base prices, akin to a waterbed effect, so that their total prices are unaffected. Thus, unshrouding seller fees may not affect total prices much, but makes buyers fully aware of these prices, so they might leave the platform.

Unshrouding platform fees, however, raises pressure to reduce platform fees. With Proposition 3, cross-group externalities induce low fees and prevent any waterbed effect, so platforms will lower A without raising M_B. As a result, forced unshrouding of platform fees induces lower fees and hassle costs and attracts more buyers to the platform, increasing actual total consumer surplus.

4.3. *Regulating Fees*

Policymakers could impose caps on fees. We model these caps as reductions in $\overline{a}$ and $\overline{A}$. We see from the cut-offs $\underline{\alpha}$ and α' in Propositions 1 and 3 that sufficiently low caps encourage the platform to unshroud, leading to the same qualitative effects as forced unshrouding.

But, for the same reasons that unshrouding seller fees can backfire, a cap that reduces seller fees $\overline{a}$ only a little could backfire as well, thus the platform continues to shroud. But sellers—as in a waterbed effect—increase base prices f^{shr}; this makes naive buyers more aware of the total price they pay and can reduce activity on the platform. In turn, caps on $\bar{A}$ do not affect buyers' membership fees; they do not cause buyers to leave the platform. Thus, caps on platform fees more unambiguously increase actual total consumer surplus.

To summarise, policies that target shrouded seller fees can reduce hassle cost and increase transparency. But they can also make products appear more expensive and induce buyers to leave the platform. Policymakers who are concerned about insufficient participation on platforms might therefore hesitate to target seller fees. Network effects, however, limit waterbed effects for platform fees. This is why policies that target shrouded platform fees (A) do not have the same adverse effect on buyer participation and more unambiguously increase actual total consumer surplus.

5. Applications

Before we discuss how our model and its extensions shed light on additional applications, we emphasise two assumptions we made only to simplify exposition. First, we assume buyers and sellers are *ex ante* identical, but, as we discuss in Section 1, our results are robust if we relax this assumption. Second, we assume platforms set membership fees. In many applications, platforms charge a royalty instead, i.e., a share of seller revenue. Our results are robust if platforms set such royalties instead of membership fees.

5.1. *Event-Ticket Platforms*

We discuss in Section 1.1 how our baseline model captures key features of primary event-ticket platforms like Ticketmaster. In extensions, we capture additional features of event-ticket platforms.

First, secondary event-ticket platforms, such as StubHub, Ticketmaster and Viagogo, allow resellers to sell tickets. Platforms compete more intensely on this market, yet they still drip-price fees. Indeed, our results are robust to competition between platforms (see Online Appendix A.1). Intuitively, similar to monopoly platforms that (un)shroud to attract consumers who would otherwise not buy, a competing platform (un)shrouds to poach buyers from its rivals. Thus, even though buyers and sellers may earn larger rents, competing platforms (un)shroud to manage network effects in a similar way as monopoly platforms. Competition does not suffice to induce transparent markets.

Second, events typically offer seats of different quality. We show in Section C.1 of the Online Appendix that our main results extend to shrouding of optional add-ons and product upgrades.[28] Platforms have strong incentives to also use drip pricing for extra charges on upgraded tickets. Indeed, service fees are typically larger (in absolute terms) for more expensive tickets, so drip pricing makes product upgrades look cheaper and induces consumers to purchase more expensive tickets (Blake *et al.*, 2021).

Our results are also in line with evidence on event-ticket platforms. That platforms shroud fees to increase demand is in line with the aforementioned evidence by Blake *et al.* (2021) on StubHub. Closely matching the mechanism in our main model, more than half of the revenue increase is from additional ticket sales, and in line with our extension on optional add-ons and upgrades with roughly 30% of the effect from consumers who buy more expensive tickets.

5.2. *Online Marketplaces and Price Comparison Websites*

Our framework applies to PCWs and online marketplaces, such as eBay, Amazon and Etsy. As in the baseline model, buyers typically face a basic price for a product and a surcharge for shipping. Indeed, extensive evidence shows drip pricing induces consumers to underestimate the total price of products.[29] Our extension with optional add-ons (in Section C.1 of the Online Appendix) extends our results to optional fees for fast shipping, or product upgrades like complementary insurance. Our results help explain why drip pricing fees of third-party sellers became standard practice.

Marketplaces like Amazon also sort consumers into more or less transparent environments. Amazon Prime users pay a fixed monthly fee to get free shipping, so they do not need to worry about drip-priced shipping fees. The remaining users face drip-priced shipping fees.[30] Our framework also sheds light on this practice and how marketplaces can use price discrimination to sort consumers: suppose (i) consumers in our basic model are *ex ante* heterogeneous so that

[28] The web appendix is on Johannes Johnen's webpage https://sites.google.com/site/johannesjohneneconomist/research.

[29] Overwhelming field evidence finds drip pricing increases demand (Morwitz *et al.*, 1998; Smith and Brynjolfsson, 2001; Hossain and Morgan, 2006; Chetty *et al.*, 2009; Brown *et al.*, 2010; Einav *et al.*, 2015; Tran, 2020; Blake *et al.*, 2021). No study finds a negative effect of drip pricing on demand, and one study (Dertwinkel-Kalt *et al.*, 2020) finds a null effect, as one might expect with rational buyers. See also Huck and Wallace (2015) and Santana *et al.* (2020) for experimental studies. The work by Dertwinkel-Kalt *et al.* (2022) suggests that concentration bias can explain these patterns: subjects under-appreciate costs when they are spread out over multiple smaller cost components.

[30] See https://www.amazon.com/amazonprime (accessed 10 September 2020).

nature draws their degree of naiveté before they join the platform, and (*ii*) the platform offers a menu of memberships. Then the platform can offer a basic membership $M_B = 0$, and a prime membership fee $M'_B > 0$ in exchange for zero surcharges and no more hassle ($e = 0$), e.g., free shipping. Sophisticated buyers see the value of reduced hassle costs and self-select into prime, but naive ones underestimate this benefit and select a basic membership.[31] An immediate implication is that the platform no longer faces a trade-off between shrouding and unshrouding and always shrouds shipping fees for basic users. Indeed, Amazon does use drip pricing for shipping fees in Amazon Basic. Our framework suggests that the ability to sort consumers this way makes shrouding even more stable.[32]

The previous argument on sorting shows how even platforms with many sophisticated consumers can profitably shroud. Indeed, many consumers use Amazon regularly, so one might expect a fair amount of learning about drip-priced fees. But by sorting consumers, a platform can profitably shroud even when learning is important and few consumers are naive.

Marketplaces may also shroud by steering consumers towards expensive upgrades (Ellison and Ellison, 2009; Heidhues *et al.*, 2023). Ellison and Ellison (2009) discuss the case of a PCW. They find extremely price-sensitive demand for basic products. But—in line with our perspective—they argue many buyers who inspect basic products are then steered towards expensive and obfuscated upgrades. In their setting, the merchants seem to do the steering, but platforms could still unshroud by using their search algorithm to favour sellers who steer less, or encourage consumers to choose a product version before they compare prices.

5.3. *Online Travel Agents*

5.3.1. *Flights*

Several comparison sites intermediate transactions between travellers and airlines, such as Expedia, Google Flights, Kayak and Skyscanner, so that these platforms face a rather competitive environment. Major airlines typically offer their flights on multiple platforms—that is, they multihome. But our results hold when platforms compete and sellers multihome (see Online Appendix A.1).

Regulators in the EU and USA force airlines and platforms to add all mandatory surcharges (e.g., fuel charges, etc.) to the ticket price upfront.[33] But despite these regulations, some platforms and airlines continue to drip-price surcharges. Our Proposition 2 suggests that platforms have stronger incentives to violate this regulation than airlines. Indeed, four years after the EU forced all-inclusive upfront pricing for air tickets, 13% of airlines did not fully comply with the rule compared to 24% of online platforms (Steer Davies Gleave, 2012).

But even if all-inclusive upfront pricing is fully enforced, our extension on optional add-ons and upgrades suggests platforms have strong incentives to shroud optional fees, such as fees for checked luggage, seat selection, priority boarding and complementary travel insurance.

[31] Underlining that Amazon Prime was targeted at sophisticated consumers, Amazon started Prime to offer value to its best customers; who arguably use Amazon more regularly and are more likely to be sophisticated. See https://www.vox.com/recode/2019/5/3/18511544/amazon-prime-oral-history-jeff-bezos-one-day-shipping (accessed 27 July 2023).

[32] Another implication is that basic users subsidise prime users. As is clear in our extension on optional add-ons, sellers will raise base prices and ensure that profits per interaction are the same with such a policy. But because prime users pay no shipping fees and sellers will raise base prices, basic users essentially cross-subsidise prime users.

[33] See Steer Davies Gleave (2012) and https://www.transportation.gov/individuals/aviation-consumer-protection/buying-ticket (accessed 20 July 2023).

5.3.2. *Hotel booking*

Major platforms for hotel booking are booking.com, Expedia and Google Hotel and Airbnb for other travel accommodation. Also here, competition between platforms might play a role, but as we argued before, our results are robust with competition (Online Appendix A.1).

Our results connect to the debate on hotel resort fees (aka amenity/destination/facility fee) that guests pay on top of basic room rates. These fees are usually mandatory, so our baseline model with mandatory surcharges captures this setting well. Also hassle costs e are likely significant in this case, because consumers might have to contact hotels directly to learn resort fees.

In 2018, hotels earned around $2.9 billion in resort fees. In those days, hotels usually did not pay ad valorem fees to OTAs on their resort fees, so one might expect that OTAs favoured hotels without resort fees. But they did not: in 2019, ten major OTAs, including Expedia and booking.com, showed initial room rates without including mandatory resort fees. After increased reporting in 2019, some OTAs like booking.com and Expedia announced to take action against resort fees.[34] But booking.com took action by also applying ad valorem fees on resort fees, which arguably does not induce transparency, but gives booking.com a cut of the pie. Expedia announced it would lower priority in their search algorithm for hotels with resort fees; but hotels can pay to accelerate their listing, so this measure also appears rather like an attempt to extract revenue.[35] Indeed, still in 2022, CNN and Forbes reported that Expedia—while announcing search results included taxes and fees—did not include resort fees.[36] One might argue that OTAs cannot do more because they simply do not know the resort fees. But booking.com started to charge ad valorem fees on resort fees, so they must have some idea about what these fees are.[37] Our mechanism, however, can explain the OTAs' intransparency about resort fees: they shroud resort fees and even accept to forgo a cut on these fees to generate activity on their platforms.

5.3.3. *Airbnb*

Cleaning fees on Airbnb are mandatory surcharges that guests have to pay to their hosts, i.e., they are a type of seller surcharge. Airbnb only revealed cleaning fees at checkout, which is why regulators were concerned that Airbnb uses drip pricing to hide these fees. Our model suggests Airbnb hides the cleaning fees of third-party sellers to attract more guests to the platform and generate activity.

Only recently, Airbnb in the United States offered the option to order search outcomes with cleaning fees included. But the default option still ranks accommodation without cleaning fees. In the spirit of our sorting argument above, this makes the marketplace more transparent for some users, but reinforces incentives to drip price for others. Sophisticated users can now re-order search outcomes and avoid any hassle when using Airbnb; but naive consumers might underestimate the value of doing so and stick with the default option.

[34] See https://www.consumerreports.org/fees-billing/the-sneaky-ways-hotels-are-hiding-their-resort-fees/ and https://nypost.com/2019/05/24/booking-com-is-cracking-down-on-hotel-resort-fees/ (accessed 6 July 2022).

[35] See https://skift.com/2019/11/14/expedia-tells-hotels-adding-resort-fees-will-lower-your-listings-on-its-pages/ (accessed 6 July 2022).

[36] See https://edition.cnn.com/cnn-underscored/travel/how-to-avoid-resort-fees and https://www.forbes.com/advisor/travel-rewards/how-to-avoid-hotel-and-resort-fees/ (accessed 6 July 2022).

[37] Additionally, the FTC ruled that undisclosed fees are illegal, which is why hotels usually disclose resort fees somewhere. See https://www.cbsnews.com/news/new-travel-rip-off-hidden-hotel-fees/ (accessed 6 July 2022). Thus, even if this disclosure is often not transparent for consumers, it allows OTAs to get the price information and transmit it to consumers.

5.4. *Discussion*

5.4.1. *Do platforms shroud a lot?*

There is suggestive evidence for our result of Proposition 2 that platforms have indeed strong incentives to shroud. First, as we mentioned above, Steer Davies Gleave (2012) shows platforms were more likely to violate all-inclusive upfront pricing for flight tickets than airlines. Second, Blake *et al.* (2018, tbl. 9) show that a wide range of two-sided online platforms, such as Airbnb, eBay, Hotels.com and TaskRabbit, use some form of drip pricing. Third, a large empirical literature (Smith and Brynjolfsson, 2001; Hossain and Morgan, 2006; Ellison and Ellison, 2009; Brown *et al.*, 2010; Ahmetoglu *et al.*, 2014; Einav *et al.*, 2015; Greenleaf *et al.*, 2016; Tran, 2020; Blake *et al.*, 2021) studies drip pricing on online platforms and shows it raises demand, suggesting that this arguably deceptive practice is quite common.

5.4.2. *Which platforms shroud their own fees?*

According to Proposition 3, platforms that extract more revenues from sellers are more inclined not to charge shrouded fees themselves towards buyers who interact with third-party sellers. For example, many marketplaces, such as eBay, Amazon and Etsy, have a vast number of rather small sellers; and especially Amazon sellers can depend on using Amazon's warehouse and delivery infrastructure. Similarly, OTAs enforced most-favoured-nation clauses towards hotels, suggesting they have a strong bargaining position vis-à-vis hotels. Indeed, as our results predict, these platforms do not charge their own shrouded fees to consumers who interact with third-party sellers.

However, primary event-ticket platforms face events with loyal supporters and bargaining power; so our model predicts, as is the case in practice, that these platforms charge their own shrouded fees to buyers. On secondary event-ticket platforms, many resellers sell tickets for the same event. Thus, competition is arguably more fierce than on primary ticket platforms and our Proposition 3 suggests also these platforms shroud their own fees. Flight-booking platforms may have a relatively weak bargaining position towards large airlines, so our results suggest they would charge shrouded fees. But as we mentioned above, regulators in the EU and the USA require all-inclusive upfront pricing from these platforms, making shrouded mandatory surcharges illegal.

5.4.3. *Which fees should regulators unshroud?*

Our policy implications shed light on recent regulatory proposals to enforce all-inclusive upfront pricing. The Biden administration pressures Ticketmaster and other event-ticket platforms to add 'hidden junk fees' to ticket prices upfront. Authorities in Canada already took similar steps.[38] Similarly, in 2018, the EU pressured Airbnb to include service fees and cleaning charges of hosts in upfront prices.[39] Our policy results in Section 4 suggest that all-inclusive upfront pricing may harm or benefit buyers depending on whether sellers or platforms earn these fees.

[38] For the US, see https://edition.cnn.com/2023/06/15/business/live-nation-ticketmaster-fees-biden/index.html; for Canada, see https://www.digitalmusicnews.com/2018/01/26/canada-competition-bureau-ticketmaster/ (all accessed 20 July 2023).

[39] See https://www.euronews.com/2018/09/20/airbnb-complies-with-eu-consumer-regulation-demands, and https://www.theverge.com/2022/11/7/23444561/airbnb-total-price-update-cleaning-fee-filter (accessed 20 July 2023).

Ticketmaster claims it shares its service fees with its clients.[40] But some commentators argue that Ticketmaster gets by far the largest cut of service fees.[41] If true, our results suggest that transparency will have only moderate effects on total ticket prices, but may induce Ticketmaster to lower its fees and benefit consumers.

On secondary event-ticket platforms, however, platforms themselves charge and earn service fees, so our results suggest UK authorities that enforced all-inclusive upfront pricing on Viagogo benefited consumers by lowering hassle costs and prices.[42]

On Airbnb, cleaning fees are mostly earned by hosts, so our results suggest the push by EU regulators to add cleaning fees upfront could have had ambiguous effects for consumers.

5.4.4. *Learning*

Consumers may learn about shrouded fees over time, raising the share of sophisticated consumers. Learning might be more relevant for platforms that consumers use more frequently. For example, Ticketmaster may face less experienced consumers than Amazon because an average consumer probably purchases more products on Amazon than visits concerts. But, even when consumers learn, our sorting argument above shows how platforms may profitably shroud towards a small fraction of naive consumers.

Evidence suggests, however, that consumer learning about drip-priced fees is limited: Blake *et al.* (2021) zoom in on more experienced users. Drip pricing has a slightly smaller, but still sizeable and significant effect on their demand.[43] Additionally, drip pricing is widely used, and the evidence we cite throughout spans more than twenty years, so there have been ample learning opportunities. Yet, even recent articles find that drip pricing has a substantial impact on demand.

5.4.5. *Reputation*

Naive consumers who figure out that they were exploited might blame the platform. Such reputation effects, however, can be minor in practice. First, exploitation might be worth the loss in reputation. Murooka (2015) shows that intermediaries simply require more generous payments from sellers to compensate for lost reputation; Chiles (2020) finds that shrouding resort fees reduces a hotel's ratings on OTAs, but also illustrates that the losses in revenues from lower ratings are much smaller than the additional revenues from shrouding. Second, buyers might not blame the platform, but sellers or themselves for their own mistakes. Third, as we argued in the previous paragraph, buyers might not learn about their mistakes.

6. Related Literature

We identify a novel mechanism that explains why two-sided intermediaries might design intransparent platforms: they shroud fees to manipulate cross-group externalities between their users.

We combine two disjoint literatures, namely those on shrouded fees and two-sided platforms. First, existing work on shrouded features does not explain why two-sided platforms would help

[40] See https://help.ticketmaster.com/hc/en-us/articles/9663528775313-How-are-ticket-prices-and-fees-determined-?language=en_US (accessed 20 July 2023).

[41] See Last Week Tonight, Season 9, Episode 4 on Ticket Resale, aired on HBO on 13 March 2022.

[42] See https://www.theguardian.com/money/2018/aug/01/viagogo-ticket-prices-fees-delivery-costs (accessed 20 July 2023).

[43] More precisely, more-experienced users are users with at least ten visits in the 30 days prior to the experiment. Among these users, drip pricing raises revenues by 15% (as opposed to 21% in the full sample).

third-party sellers hide their fees (Gabaix and Laibson, 2006; Dahremöller, 2013; Murooka, 2015; Heidhues *et al.*, 2016a,b; Kosfeld and Schüwer, 2017; Gomes and Tirole, 2018; Johnen, 2020). Second, our approach offers a fundamentally novel perspective on the role of two-sided platforms for consumer protection. In practice, many online platforms are eager to attract consumers and offer them free access. In models with rational consumers (e.g., Caillaud and Jullien, 2003; Rochet and Tirole, 2003; Armstrong, 2006), such platforms need to offer buyers more value, giving platforms strong incentives to protect rational consumers. Thus, from the perspective of these papers, it is a puzzle why platforms give free access to buyers and at the same time hide significant fees. We show that platforms can also attract consumers by reinforcing biases to appear more valuable. In this way, adding consumer biases to the picture fundamentally changes the perspective on whether interventions are needed to protect consumers, and what the consequences of interventions are.

Literature on the Regulation of Online Platforms. There are growing concerns about—and an increasing regulatory scrutiny into—harmful commercial practices of large online platforms. Such practices include Amazon and Google favouring their own products versus third-party sellers (Hagiu *et al.*, 2022); killer acquisitions (Hemphill, 2020; Cunningham *et al.*, 2021); predatory pricing (Khan, 2016); and booking.com putting pressure on consumers by misleading sales tactics (Teubner and Graul, 2020). The large number of cases we discuss throughout show that hidden fees on platforms are also a major policy concern. We contribute to this ongoing debate by providing the first framework to explore the incentives of two-sided platforms to hide fees.

Literature on Advice from Intermediaries. A key insight of this literature is that intermediaries that offer subsidised (i.e., free) services to consumers and earn commissions from firms give biased advice (Inderst and Ottaviani, 2012) and/or hide fees (Murooka, 2015). We show that results differ substantially for two-sided platforms: platforms may even shroud fees of third-party sellers of which they get no cut (Proposition 1), and platforms that extract revenue from sellers are more inclined to be transparent about their own fees towards consumers (Proposition 3).

Heidhues *et al.* (2023) study welfare implications of steering: steering consumers to products they misunderstand, in contrast to steering to products they prefer, typically harms consumers. We ask instead what drives a platform to reinforce consumer mistakes (by steering or other tools). We highlight the crucial role of network effects in this decision, which are absent in their setting.

Literature on Platform Governance. Some recent articles explore how platforms design a marketplace using non-price tools. Teh (2022) identifies which fee instruments induce a platform to relax or reinforce competition. We complement this work and study different governance tools that may not affect markups (in equilibrium), but rather impact consumer perception.

Another strand of the literature studies platforms and consumer search (Armstrong and Zhou, 2011; Eliaz and Spiegler, 2011; Hagiu and Jullien, 2011; Ellison and Wolitzky, 2012; Heresi, 2018; Mamadehussene, 2020; Wang and Wright, 2020; Ronayne, 2021). In these settings, larger search costs tend to reduce consumer participation on platforms. They therefore cannot explain the evidence which we cite in Section 5 that drip pricing increases demand.

Only a few articles explicitly model products with additional fees on two-sided platforms. Gomes and Tirole (2018) study a two-sided credit-card network that charges fees to merchants, and merchants can charge buyers extra for card payments. Concerned about missed sales, merchants will not pass the network's fees on to buyers, effectively subsidising card payments. We have a different focus and study additional fees as deceptive features that platforms might shroud.

7. Conclusion

We identify a novel mechanism that explains why two-sided intermediaries might design intransparent platforms: they shroud fees to manipulate cross-group externalities and generate activity between their users. Because of cross-group externalities, two-sided platforms may have stronger incentives to shroud the fees of third-party sellers than the sellers themselves. Additionally, platforms are more inclined to shroud their own fees if they depend less on revenues from sellers.

We highlight several additional factors that encourage platforms to shroud additional features: (*i*) if shrouding induces a smaller hassle for sophisticated consumers (lower e or E), (*ii*) if revenues from shrouded fees ($\overline{a}$ or A) are large, (*iii*) if platforms can sort naive and sophisticated consumers as in the Amazon Prime example which we discuss above. Competition between platforms, however, may not suffice to encourage transparency.

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Additional Supporting Information may be found in the online version of this article:

Online Appendix

References

Ahmetoglu, G., Furnham, A. and Fagan, P. (2014). 'Pricing practices: A critical review of their effects on consumer perceptions and behaviour', *Journal of Retailing and Consumer Services*, vol. 21(5), pp. 696–707.
Anderson, S.P. and Bedre-Defolie, Ö. (forthcoming). 'Hybrid platform model: Monopolistic competition and a dominant firm', *The RAND Journal of Economics*, forthcoming.
Armstrong, M. (2006). 'Competition in two-sided markets', *The RAND Journal of Economics*, vol. 37(3), pp. 668–91.
Armstrong, M. and Vickers, J. (2012). 'Consumer protection and contingent charges', *Journal of Economic Literature*, vol. 50(2), pp. 477–93.
Armstrong, M. and Zhou, J. (2011). 'Paying for prominence', Economic Journal, vol. 121(556), pp. F368–95.
Belleflamme, P. and Peitz, M. (2019a). 'Managing competition on a two-sided platform', *Journal of Economics & Management Strategy*, vol. 28(1), pp. 5–22.
Belleflamme, P. and Peitz, M. (2019b). 'Price disclosure by two-sided platforms', *International Journal of Industrial Organization*, vol. 67, article ID 102529.
Blake, T., Moshary, S., Sweeney, K. and Tadelis, S. (2018). 'Price salience and product choice', Working paper, National Bureau of Economic Research.
Blake, T., Moshary, S., Sweeney, K. and Tadelis, S. (2021). 'Price salience and product choice', *Marketing Science*, vol. 40(4), pp. 619–36.
Brown, J., Hossain, T. and Morgan, J. (2010). 'Shrouded attributes and information suppression: Evidence from the field', *The Quarterly Journal of Economics*, vol. 125(2), pp. 859–76.
Brynjolfsson, E. and Smith, M.D. (2000). 'Frictionless commerce? A comparison of internet and conventional retailers', *Management Science*, vol. 46(4), pp. 563–85.
Caillaud, B. and Jullien, B. (2003). 'Chicken & egg: Competition among intermediation service providers', *RAND Journal of Economics*, vol. 34(2), pp. 309–28.
Chen, Y. and Yao, S. (2017). 'Sequential search with refinement: Model and application with click-stream data', *Management Science*, vol. 63(12), pp. 4345–65.
Chetty, R., Looney, A. and Kroft, K. (2009). 'Salience and taxation: Theory and evidence', *American Economic Review*, vol. 99(4), pp. 1145–77.
Chiles, B. (2020). 'Shrouded prices and firm reputation: Evidence from the US hotel industry', *Management Science*, vol. 67, pp. 661–1328.
Competition and Markets Authority. (2017). *Digital Comparison Tools Market Study: Final Report*, London: UK Government.

Cunningham, C., Ederer, F. and Ma, S. (2021). 'Killer acquisitions', *Journal of Political Economy*, vol. 129(3), pp. 649–702.
Dahremöller, C. (2013). 'Unshrouding for competitive advantage', *Journal of Economics & Management Strategy*, vol. 22(3), pp. 551–68.
De Corniere, A. and Taylor, G. (2019). 'A model of biased intermediation', *The RAND Journal of Economics*, vol. 50(4), pp. 854–82.
Dertwinkel-Kalt, M., Gerhardt, H., Riener, G., Schwerter, F. and Strang, L. (2022). 'Concentration bias in intertemporal choice', *The Review of Economic Studies*, vol. 89(3), pp. 1314–34.
Dertwinkel-Kalt, M., Köster, M. and Sutter, M. (2020). 'To buy or not to buy? Price salience in an online shopping field experiment', *European Economic Review*, vol. 130, article ID 103593.
De Streel, A., Buiten, M. and Peitz, M. (2018). *Liability of Online Hosting Platforms: Should Exceptionalism End?* Report, Brussels: Centre on Regulation in Europe.
Dinerstein, M., Einav, L., Levin, J. and Sundaresan, N. (2018). 'Consumer price search and platform design in internet commerce', *American Economic Review*, vol. 108(7), pp. 1820–59.
Einav, L., Kuchler, T., Levin, J. and Sundaresan, N. (2015). 'Assessing sale strategies in online markets using matched listings', *American Economic Journal: Microeconomics*, vol. 7(2), pp. 215–47.
Eliaz, K. and Spiegler, R. (2006). 'Contracting with diversely naive agents', *The Review of Economic Studies*, vol. 73(3), pp. 689–714.
Eliaz, K. and Spiegler, R. (2008). 'Consumer optimism and price discrimination', *Theoretical Economics*, vol. 3(4), pp. 459–97.
Eliaz, K. and Spiegler, R. (2011). 'A simple model of search engine pricing', Economic Journal, vol. 121(556), pp. F329–39.
Ellison, G. (2005). 'A model of add-on pricing', *The Quarterly Journal of Economics*, vol. 120(2), pp. 585–637.
Ellison, G. and Ellison, S.F. (2009). 'Search, obfuscation, and price elasticities on the internet', *Econometrica*, vol. 77(2), pp. 427–52.
Ellison, G. and Ellison, S.F. (2018). 'Search and obfuscation in a technologically changing retail environment: Some thoughts on implications and policy', *Innovation Policy and the Economy*, vol. 18(1), pp. 1–25.
Ellison, G. and Wolitzky, A. (2012). 'A search cost model of obfuscation', *The RAND Journal of Economics*, vol. 43(3), pp. 417–41.
Fradkin, A. (2015). 'Search frictions and the design of online marketplaces', Working paper, Massachusetts Institute of Technology.
Gabaix, X. and Laibson, D. (2006). 'Shrouded attributes, consumer myopia, and information suppression in competitive markets', *The Quarterly Journal of Economics*, vol. 121(2), pp. 505–40.
Ghose, A., Ipeirotis, P.G. and Li, B. (2014). 'Examining the impact of ranking on consumer behavior and search engine revenue', *Management Science*, vol. 60(7), pp. 1632–54.
Gomes, R. and Tirole, J. (2018). 'Missed sales and the pricing of ancillary goods', *The Quarterly Journal of Economics*, vol. 133(4), pp. 2097–169.
Greenleaf, E.A., Johnson, E.J., Morwitz, V.G. and Shalev, E. (2016). 'The price does not include additional taxes, fees, and surcharges: A review of research on partitioned pricing', *Journal of Consumer Psychology*, vol. 26(1), pp. 105–24.
Hagiu, A. and Hałaburda, H. (2014). 'Information and two-sided platform profits', *International Journal of Industrial Organization*, vol. 34, pp. 25–35.
Hagiu, A. and Jullien, B. (2011). 'Why do intermediaries divert search?', *The RAND Journal of Economics*, vol. 42(2), pp. 337–62.
Hagiu, A., Teh, T.H. and Wright, J. (2022). 'Should platforms be allowed to sell on their own marketplaces?', *The RAND Journal of Economics*, vol. 53(2), pp. 297–327.
Heidhues, P., Köster, M. and Kőszegi, B. (2023). 'Steering fallible consumers', Economic Journal, vol. 133(652), pp. 1430–65.
Heidhues, P. and Kőszegi, B. (2017). 'Naivete-based discrimination', *The Quarterly Journal of Economics*, vol. 132(2), pp. 1019–54.
Heidhues, P. and Kőszegi, B. (2018). 'Behavioral industrial oganization', in (B.D. Bernheim, S. DellaVigna and D. Laibson, eds.), *Handbook of Behavioral Economics*, pp. 517–612, Amsterdam: Elsevier.
Heidhues, P., Kőszegi, B. and Murooka, T. (2016a). 'Exploitative innovation', *American Economic Journal: Microeconomics*, vol. 8(1), pp. 1–23.
Heidhues, P., Kőszegi, B. and Murooka, T. (2016b). 'Inferior products and profitable deception', *The Review of Economic Studies*, vol. 84(1), pp. 323–56.
Hemphill, C.S. (2020). 'What role for antitrust in regulating platforms?', *Communications of the ACM*, vol. 63(5), pp. 36–8.
Heresi, J.I. (2018). 'Multi-sided platforms and consumer obfuscation', Ms., Toulouse School of Economics.
Hossain, T. and Morgan, J. (2006). '... Plus shipping and handling: Revenue (non) equivalence in field experiments on eBay', *Advances in Economic Analysis & Policy*, vol. 5(2), pp. 1–30.
Huck, S. and Wallace, B. (2015). 'The impact of price frames on consumer decision making: Experimental evidence', Working paper, University College London.

Inderst, R. and Ottaviani, M. (2012). 'Competition through commissions and kickbacks', *American Economic Review*, vol. 102(2), pp. 780–809.
Johnen, J. (2020). 'Dynamic competition in deceptive markets', *The RAND Journal of Economics*, vol. 51, pp. 375–401.
Karle, H., Peitz, M. and Reisinger, M. (2020). 'Segmentation versus agglomeration: Competition between platforms with competitive sellers', *Journal of Political Economy*, vol. 128(6), pp. 2329–74.
Khan, L.M. (2016). 'Amazon's antitrust paradox', *Yale Law Journal*, vol. 126, pp. 710–805.
Kosfeld, M. and Schüwer, U. (2017). 'Add-on pricing in retail financial markets and the fallacies of consumer education', *Review of Finance*, vol. 21(3), pp. 1189–216.
Liu, Q. and Serfes, K. (2013). 'Price discrimination in two-sided markets', *Journal of Economics & Management Strategy*, vol. 22(4), pp. 768–86.
Mamadehussene, S. (2020). 'The interplay between obfuscation and prominence in price comparison platforms', *Management Science*, vol. 66(10), pp. 4843–62.
Morrison, W. and Taubinsky, D. (2023). 'Rules of thumb and attention elasticities: Evidence from under- and overreaction to taxes', *Review of Economics and Statistics*, vol. 105, pp. 1110–27.
Morwitz, V.G., Greenleaf, E.A. and Johnson, E.J. (1998). 'Divide and prosper: Consumers' reactions to partitioned prices', *Journal of Marketing Research*, vol. 35(4), pp. 453–63.
Murooka, T. (2015). 'Deception under competitive intermediation', Ms., University of Munich.
Office of Fair Trading. (2012). 'Payment surcharges: Response to the *Which?* super-complaint', UK Government.
Rochet, J.C. and Tirole, J. (2003). 'Platform competition in two-sided markets', *Journal of the European Economic Association*, vol. 1(4), pp. 990–1029.
Ronayne, D. (2021). 'Price comparison websites', *International Economic Review*, vol. 62(3), pp. 1081–110.
Santana, S., Dallas, S.K. and Morwitz, V.G. (2020). 'Consumer reactions to drip pricing', *Marketing Science*, vol. 39(1), pp. 188–210.
Scott Morton, F., Bouvier, P., Ezrachi, A., Jullien, B., Katz, R., Kimmelman, G., Melamed, A.D. and Morgenstern, J. (2019). 'Committee for the study of digital platforms market structure and antitrust subcommittee report', George J. Stigler Center The University of Chicago Booth School of Business.
Smith, M.D. and Brynjolfsson, E. (2001). 'Consumer decision-making at an internet shopbot: Brand still matters', *The Journal of Industrial Economics*, vol. 49(4), pp. 541–58.
Steer Davies Gleave. (2012). 'Price transparency provisions in regulation 1008/2008 and other relevant EU legal texts', Working paper, European Commission.
Teh, T.H. (2022). 'Platform governance', *American Economic Journal: Microeconomics*, vol. 14(3), pp. 213–54.
Teubner, T. and Graul, A. (2020). 'Only one room left! How scarcity cues affect booking intentions on hospitality platforms', *Electronic Commerce Research and Applications*, vol. 39, article ID 100910.
Tran, K.D. (2020). 'Partitioned pricing and consumer welfare', Discussion Paper 1888, DIW Berlin.
UK Regulators Network. (2016). 'Payment surcharges: Response to the Which*?* super-complaint', Working paper, UKRN.
Wang, C. and Wright, J. (2020). 'Search platforms: Showrooming and price parity clauses', *The RAND Journal of Economics*, vol. 51(1), pp. 32–58.

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