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Platform-Enabled Information Disclosure

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Abstract

We analyze consumers' voluntary information disclosure in a platform setting. For given consumer participation, the platform and sellers tend to prefer limited disclosure of consumer valuations, in contrast to consumers. With endogenous consumer participation, seller and platform incentives may be misaligned, and sellers may be better off when consumers can disclose their valuations. A regulator acting in the best interest of consumers and/or sellers may want to intervene and force the platform to employ a disclosure technology that enables consumers to voluntarily disclose information from a richer message space.

Keywords: Two-sided platform, platform governance, information disclosure, information design, privacy regulation, e-commerce

JEL-classification: L12, L15, D21, D42, M37

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1. Introduction

With the growth of e-commerce and advances in data collection and storage, information brokers have collected detailed information about consumer behavior. Some of these information brokers are digital platforms that operate marketplaces for sellers and consumers to trade with each other. Consumers may decide to which extent information on them can be collected or passed on to sellers. A platform that exclusively makes revenues from sellers may be thought of as acting in the interest of sellers and thereby adjusting information design accordingly. However, if consumers foresee that they will receive unattractive terms, some of them will stay away from the marketplace forcing the platform to balance seller and consumer interests. How does a monopoly platform choose price and information design when sellers can use disclosed information to price discriminate between consumers? How does the platform's choice compare with what is best from the seller and/or the consumer perspective?

We embed the model of Ali, Lewis, and Vasserman (2023) with monopoly or competing sellers into a platform setting with heterogeneous consumers as well as a continuum of product categories and derive the platform-preferred information design. We contrast this design with the ones preferred by consumers and sellers. In our setting, the platform monetizes on the seller side; that is, consumers do not pay to visit the marketplace. The platform decides how much freedom to give to consumers to voluntarily disclose relevant information about their valuations to interested sellers. Within the disclosure regime chosen by the platform, consumers have control over their data – this is motivated by the recent activities of regulators aimed at empowering consumers in digital markets. With some information disclosure and seller prices depending on this information, third-degree price discrimination occurs. The platform's information design affects the sellers' pricing strategy and, thus, determines how attractive consumers and sellers find trade on the platform to be. From the viewpoint of the platform, the chosen information design determines the strength of the cross-side network effect exerted from consumers on sellers and vice versa.

Following Hagenbach and Koessler (2017) and Ali, Lewis, and Vasserman (2023), we distinguish between two disclosure regimes: when consumers have the binary choice of fully disclosing or not disclosing information at all, we refer to "simple evidence"; when consumers have more control over how much information to share and can disclose that they belong to a group of consumers with certain characteristics, instead, we refer to "rich evidence". Simple evidence can be exemplified by the practice on online marketplaces of collecting tracking cookies from various websites. Then, consumers can choose to be tracked (full disclosure) or not be tracked at all (no disclosure). Rich evidence can be thought of as the act of selectively deleting cookies from some websites that reveal particular information: for example, eliminating cookies collected by some air travel companies before looking to purchase a ticket can hide a higher valuation for a flight.

The effect of voluntary disclosure on consumer surplus has been analyzed by Ali, Lewis, and Vasserman (2023) in a single product market in which consumer participation is exogenous. Translated into a platform setting, when all consumers join the platform, sellers and the platform (that absorbs part of the sellers' profits) are best off if consumers cannot disclose any information. By contrast, with endogenous consumer participation, a platform that monetizes on the seller side must take two effects into account. From the viewpoint of the platform, the direct effect by which information disclosure is price-reducing is counterproductive. This tends to make "no evidence" the platform's preferred choice. However, in the presence of mutual cross-side network effects (that is, sellers benefit from more consumers participating and consumers benefit from a larger set of available product categories), enabling price-reducing information disclosure tends to attract a larger number of consumers. This indirect effect may be countervailing and dominate the direct effect. Then, the platform will enable voluntary information disclosure.

We explicitly model the consumer-seller interaction when sellers are either monopolists or duopolists. A seller's product belongs to a product category that is drawn from a continuum and each consumer is interested in one of them. We assume that, when joining the platform, consumers do not yet know their product category of interest. Consumers have heterogeneous valuations for the product(s) in their product category of interest, but discover their valuation only upon joining the platform. They make their participation decision based on the number of product categories carried by the platform, as this determines their expected valuation. The information design directly affects the incentives to join for consumers and sellers, through changes in the expected gains of joining, and indirectly, through the effect on the participation decisions of the other side. Our functional form assumptions allow us to obtain explicit solutions.

We spell out the conditions under which the incentives of consumers, sellers, and the platform are misaligned. Consumers tend to benefit from a disclosure regime that gives more possibilities to them to reveal some information on their valuations to sellers. Under monopoly, different disclosure regimes may generate different expected total gains from trade of a transaction, and all economic actors benefit from consumers being allowed to disclose some information. Under seller competition in the classic Hotelling duopoly model with linear transportation costs, all disclosure regimes generate the same total gains from trade and only affect how these gains are shared between the different economic actors.

Consumers' and seller's preferences about the information design are sometimes aligned; buyers and sellers may coincide in benefiting from a richer disclosure regime that is made available to consumers. However, it may not be in the interest of the platform to enable such voluntary information disclosure. In other instances, all three groups have the same preferred disclosure regime. In the monopoly seller case, when the expected gains from trade of a transaction are high, consumer participation is particularly valuable, and sellers and the platform benefit from richer voluntary disclosure through the subsequent increase in trade volume, as do consumers. In the duopoly case, when gains from trade on the platform are relatively low, sellers benefit from voluntary disclosure despite the harsher competition that follows, as the increase in consumer participation more than compensates the reduction of profit margins. A regime in which consumers can not disclose any information is sometimes preferred by consumers, sellers, and the platform: when gains from trade are relatively high, consumers would be better off not being able to disclose their valuation, as this would lead to more seller participation and, thus, an increase in the number of product categories available on the platform.

Information design falls within a broad set of platform design decisions. For instance, Crémer, de Montjoye, and Schweitzer (2019, p. 60) in their report to the European Commission note that "platforms impose rules and institutions that reach beyond the pure matching service [...], e.g., [...] by regulating access to information that is generated on the platform, imposing minimum standards [...] Such rule setting and 'market design' determine the way in which competition takes place." We show that the platform chooses a disclosure regime that may be different from the one preferred by consumers and/or sellers (in a second-best sense according to which the platform always sets the platform fee). We find that a regulator maximizing consumer or seller surplus (or a convex combination thereof) may want to force the platform to enable information disclosure. More broadly, our results speak to whether and which public interventions may increase consumer welfare relative to the platform's self-regulation of information disclosure.

Literature review. This paper relates to two strands of literature: the economics of two-sided platforms and the literature on information design.

In this paper, the platform plays the role of an information designer: as emphasized in Hagiu and Wright (2015), a multi-sided platform is special in its ability to shape interaction and communication between consumers and sellers. The approach we take is related to Teh (2022) in which a platform chooses a governance design that affects a consumer's transaction benefit and a seller's markup. Similarly, in Choi and Jeon (2023) a platform makes investment decisions which affect consumers and sellers differently.[1] Our setting differs in two ways: we look at a particular, discrete platform governance decision that is different from the ones considered by Teh (2022) and Choi and Jeon (2023), and focus on mutual cross-side network effects thereby making consumers and sellers take into account each others' participation decision.[2]

We consider a platform that manages the interaction between sellers and consumers. When sellers offer substitutes (as in our version with duopoly sellers), seller competition affects the expected surplus of consumers and sellers per transaction, and several papers have looked at the platform managing seller competition by limiting seller access to the platform (e.g., Nocke, Peitz, and Stahl, 2007; Hagiu, 2009; Belleflamme and Peitz, 2019; Karle, Peitz, and Reisinger, 2020; Teh, 2022).[3] Intra-platform competition is also incorporated in recent work on hybrid platforms that allows the platform to be vertically integrated with one of the sellers (see e.g. Anderson and Bedre-Defolie, forthcoming).

According to earlier work outside the platform context, consumers may benefit from information disclosure as this may increase the competitive pressure among competing sellers under spatial price discrimination (e.g. Thisse and Vives, 1988) and behavior-based price discrimination (e.g. Fudenberg and Tirole, 2000). Competitive pressure is also affected by voluntary information disclosure in the model by Ali, Lewis, and Vasserman (2023) with competing sellers, which is limited by the disclosure technology. We take a platform perspective

[1]See Belleflamme and Peitz (2021, chap. 6) for a discussion of platform design decisions.

[2]Our focus is on regulating the platform's information design. In a different vein, Jeon, Lefouili, and Madio (2022) consider regulatory intervention regarding platform liability; they do so in a setting in which a copy-cat seller may free-ride on the investment by a brand manufacturer.

[3]Another way in which the platform may shape seller competition is to steer consumers to particular products or reduce the visibility of others. Johnson et al. (forthcoming) consider a platform's demand-steering policy when sellers use Q-learning algorithms for their pricing strategy and show that such policies can undermine seller collusion. Casner (2020) shows that a platform with an exogenous proportional fee on seller revenues benefits from obfuscating search as this leads to higher seller mark-ups.

according to which the platform not only charges sellers but is also an information designer who may limit the extent to which consumers can disclose information. With exogenous consumer participation, the platform would choose the disclosure regime that maximizes seller profits. If consumer participation is endogenous, as in our model, this is no longer necessarily the case and leads to richer results for the platform's information design. Thus, our paper contributes to the growing literature studying the effect of information and privacy on market outcomes.[4]

Voluntary disclosure can be placed between cheap-talk (studied in a monopoly platform setting in Hidir and Vellodi, 2021) and information-based mechanisms (such as the segmentation strategy an intermediary can commit to as in Bergemann, Brooks, and Morris, 2015, or the recommendation system studied in Lefez, 2022). Voluntary disclosure by consumers as in Ali, Lewis, and Vasserman (2023) and, in their footsteps, our paper differs from other works in which the action is purely by the sellers (Armstrong, 2006; Liu and Serfes, 2004; and Thisse and Vives, 1988). Such settings are related but ultimately fundamentally different. Our contribution also differs from Bounie, Dubus, and Waelbroeck (2021) in which a data broker decides which consumer information to provide to sellers. In their setting, the data broker withholds some information on consumers to soften seller competition. Finally, the framework differs substantially from that studied by Armstrong and Zhou (2022a). The authors compare optimal signal structures from the perspective of consumers and sellers when consumers are uncertain about their valuation, but do not allow for voluntary communication between consumers and sellers. In contrast, following Ali, Lewis, and Vasserman (2023), we assume that consumers decide whether and which information to disclose about their valuations.

It matters whether consumers disclose information or sellers acquire information about consumer tastes because the two sides' incentives may be opposed: Ali, Lewis, and Vasserman (2023), Armstrong and Zhou (2022b), Bergemann, Brooks, and Morris (2015), and Elliott et al. (2022) tell us that, when there is horizontal differentiation between sellers, consumers have an interest in disclosing information if located relatively far from both sellers, as this leads to lower prices. Sellers, on the other hand, have an incentive to learn the location of consumers located at the extremes (either very close or very far from their location) to better extract surplus from those consumers.

The rest of the paper proceeds as follows: in Section 2, we present the platform model. In Section 3 we consider the version with monopoly sellers and characterize the equilibrium outcome and compare it with the equilibrium choices made by a regulator who can select the disclosure regime but not interfere with the selection of the entry fee (second best outcome).

[4] See Acquisti, Taylor, and Wagman (2016) and Bergemann and Bonatti (2019) for comprehensive reviews. In particular, Montes, Sand-Zantman, and Valletti (2019) study duopoly competition in a setting in which sellers can use information on consumer tastes to price discriminate, but in which consumers can prevent this use by opting out at a cost; this corresponds to the setting with simple evidence if that cost is zero. They investigate a data broker's incentives to exclusively sell the information it collected from consumers to one of the two sellers. Ichihashi (2020) considers a multi-product monopoly sellers who can price discriminate conditional on the consumer's disclosure decision. The consumer chooses a disclosure rule upfront. In line with Ali, Lewis, and Vasserman (2023), by withholding information about which product is most valuable, the consumer can induce the seller to set lower prices. If the seller has the option to commit to not using the consumer's information for pricing, it prefers to use this option.

In Section 4, we analyze the version in which product categories are served by duopoly sellers. In each of the two sections, we define the admissible parameter space and discuss the relationship between our framework and that of Ali, Lewis, and Vasserman (2023). Section 5 concludes. Appendix A collects calculations on the different disclosure regimes in the version with monopoly sellers and Appendix C in the version with duopoly sellers. Appendix B contains supplementary material on the consumer-seller interaction when sellers are duopolists.

2. Model

We consider a monopoly platform that facilitates trade between consumers and sellers. The platform operator manages the platform by setting a uniform seller fee, which is a proportional tax α_s on a seller's revenue, and choosing an information disclosure regime.[5] The prevailing disclosure regime (together with the platform fee) determines how large the realized surplus is in the consumer-seller interaction and how it is split between consumers, sellers, and the platform.

There is a unit mass of product categories and a unit mass of consumers. Sellers are single-product firms that have zero marginal costs of production. Each product category is associated with an opportunity cost f_s drawn from the uniform distribution $U[0, \overline{f}_s]$. Sellers decide whether or not to enter after observing the opportunity cost in their product category, the uniform fee, and the disclosure regime. In Section 3, we analyze the monopoly version of the model – that is, only one seller per product category can join the platform; in section 4, we analyze the duopoly version of the model – that is, two sellers can enter per product category and, if they do, they compete with horizontally differentiated goods located at the endpoints of the unit interval.

Consumers are heterogeneous in three dimensions: each consumer is interested in exactly one product category (which is drawn with equal likelihood from the continuum of product categories), each consumer has a particular taste regarding the product or products in the product category that is of interest to this consumer, and each consumer has an opportunity cost f_b of joining the platform.

Consumers only learn f_b before they decide whether to join. We consider two groups of consumers. A fraction β of consumers are eager to join and, thus, have zero opportunity cost of joining ($f_b = 0$); thus, they are always present on the platform and β constitutes the minimum network size from the sellers' perspective. The remaining fraction $(1 - \beta)$ of consumers are hesitant to join; they draw their opportunity cost from the uniform distribution $U[0, \overline{f}_b]$ independently across consumers. Opportunity cost f_b is private information of the consumer when deciding whether to join.

Consumers do not know whether the product category that they are interested in is available on the platform. Two interpretations are compatible with this setting: (i) Consumers need to search on the platform to figure out which product category is the one they like or

[5] In reality, we observe very limited fee discrimination by platforms. This may partly be seen as a commitment device by the platform to protect inframarginal seller rents.

(ii) consumers know the product category of interest, but do not know whether it is carried by the platform. In either case, consumers form their expectation on how likely it is that they will find a match based on the number of product categories available on the platform, which is assumed to be observable prior to joining. After joining the platform, these consumers learn whether their product category of interest is available and their willingness to pay or location: if their product category of interest is not represented on the platform, they do not purchase anything. If it is, in the monopoly version, a consumer has valuation v for the available product in the product category that they are interested in and the valuation is drawn from the uniform distribution $U[0, \overline{v}]$; in the duopoly version, we model taste heterogeneity by assuming that each consumer has location x in the preference space and x is drawn from the uniform distribution on $[0, 1]$. Consumers observe the taste realization only after they have joined the platform. Under monopoly, consumers buy in their product category of interest if the price they are asked to pay is weakly lower than their valuation. Under duopoly, we restrict attention to sufficiently attractive products such that, in equilibrium, all consumers buy from their product category of interest – that is, there is full coverage.

Consumers have access to a disclosure technology that is provided by the platform. This disclosure technology allows them to communicate some information on their valuation to the relevant sellers. We follow Ali, Lewis, and Vasserman (2023) and define three disclosure regimes (further details are provided in Appendix B):

- No Evidence (NE): consumers cannot disclose any information regarding their location to sellers;
- Simple Evidence (SE): consumers decide whether or not to disclose their willingness to pay v in the monopoly version or location x to seller i, $i \in \{1, 2\}$ in the duopoly version (disclosure can be seller-specific);
- Rich Evidence (RE): consumers decide whether to disclose (partial) information regarding their willingness to pay v in the monopoly version or location x to seller i, $i \in \{1, 2\}$, in the duopoly version (again, disclosure can be seller-specific); this information can be any convex set of values v or locations x such that the true value is contained in this set.

Intra-platform interactions takes the following form: first, consumers make disclosure decisions, then all sellers simultaneously set retail prices. Prices can be conditioned on the information received from consumers. Both "simple evidence" and "rich evidence" regimes allow consumers to send messages to the seller(s). In most of the exposition, we take a reduced-form approach to quantify the impact of different disclosure regimes on shares of the realized gains from trade. In particular, following Ali, Lewis, and Vasserman (2023), we assume that the disclosure regime $z \in \{NE, SE, RE\}$ is associated with total gains from trade w^z that are split according to shares λ^z and $(1 - \lambda^z)$ between consumers and sellers, gross of the payment sellers make to the platform.

We consider the following timing:

1. The platform chooses a disclosure regime and an ad valorem fee on seller revenues (that is, the percentage of the seller profit that goes to the platform); consumers are

not charged.[6]

2. Sellers learn their opportunity cost of joining and decide whether or not to join.

3. Consumers learn their opportunity cost of joining and choose whether or not to join the platform.

4. Consumers learn their product category of interest and their valuations and make their disclosure decision given the disclosure regime.

5. Given the consumers' information disclosure decision, sellers set prices for each identifiable consumer group.

6. Consumers make purchase decisions and payoffs are realized.

We solve for Perfect Bayesian Equilibria, where, for every subgame starting in stage 4, we select the equilibrium that is most favorable for consumers (as derived in Ali, Lewis, and Vasserman, 2023). This allows for a clear distinction between the "simple evidence" and the "rich evidence" regimes.

To avoid uninteresting corner solutions when $\beta < 1$, we assume that there are always some sellers and some consumers who find it too costly to join the platform no matter the specification in place, which holds if $\overline{f}_b$ and $\overline{f}_s$ are sufficiently large. Furthermore, in the duopoly model, we will assume that when a seller has opportunity costs such that this seller would find it profitable to join the platform, another seller always joins as well so that every product category is served by a duopoly; this assumption is reminiscent of the one in Jeon et al. (2022).

Discussion. We assume that consumers do not observe whether "their" product category is available prior to joining. This generates a cross-side network effect from sellers to consumers since these consumers will be more likely to join the more product categories are available on the platform and, thus, leads to a "true" platform problem. Under this assumption, it is immaterial whether or not consumers observe how many product categories are available on the platform and the predictions would be the same in an alternative model in which sellers and consumers simultaneously make their participation decision.[7]

If we were to assume that all consumers observe which product categories are available on the platform prior to making their participation decision and consumers know in which one they are interested, only consumers with an interest in one of the available categories would consider joining. In such a world, the platform becomes fully segmented, meaning that the number of consumers for a given product category does not depend on the availability of other product categories on the platform and, thus, no network effects would be at play.

[6] Regarding the former, in practice, platforms often ask for a fraction of seller revenues. However, when variable costs are negligible (as is typically the case with digital products) this is indistinguishable from "taxing" profits. Regarding the latter, in many real-world examples of e-commerce platforms, consumers do not pay the platform to be able to join.

[7] With simultaneous participation decisions, consumers would need to observe and "interpret" the seller fee charged by the platform, since they would need to infer the equilibrium fraction of available product categories.

3. Disclosure with monopoly sellers

3.1. The consumer-seller interaction with monopoly sellers

At stage 4, the consumer and seller participation decisions have already been made, and, given the disclosure regime, consumers decide which information if any to disclose and sellers then set prices conditional on the available information about consumer valuations. Here, we reproduce the findings by Ali, Lewis, and Vasserman (2023).

Under no evidence, consumers can not share any information about their valuation v. Then, each seller sets the same price p^M for all consumers. Since $v \sim U[0, \overline{v}]$, it is immediate that the seller sets monopoly price $p^M = \frac{\overline{v}}{2}$ and sells to all consumers with willingness to pay $v \geq p^M$. The expected surplus for consumers and sellers (gross of the ad valorem fee) under this regime are $u^{NE} = \frac{1}{2}\left(\frac{3}{4}\overline{v} - p^M\right) = \frac{1}{8}\overline{v}$ and $\pi^{NE} = \frac{1}{2}p^M = \frac{1}{4}\overline{v}$ and the total gain from trade is $w^{NE} = \frac{3}{8}\overline{v}$.

Under simple evidence, consumers can decide to disclose for free their exact valuation v to the seller in their product category. If they do, they receive a personalized price offer. As shown in Ali, Lewis, and Vasserman (2023), with monopoly sellers consumers are at best not better off than under no disclosure if the platform were to select simple evidence. In particular, if a consumer discloses v, the monopoly seller extracts the full surplus from the interaction. Thus, consumers such that $v < p^M$ are indifferent between not disclosing and disclosing information and receive a personalized price $p^{SE} = v$. In equilibrium, consumers buy at this price. Expected gains from trade for consumers, sellers, and in total under this regime are then $u^{SE} = \frac{1}{8}\overline{v}$, $\pi^{SE} = \frac{1}{2}p^M + \int_0^{\frac{\overline{v}}{2}} v dv = \frac{3}{8}\overline{v}$, and $w^{SE} = \frac{1}{2}\overline{v}$.

Consider now rich evidence. A consumer with willingness to pay v can now send any message $m = [a, b]$ such that $0 \leq a \leq v \leq b \leq \overline{v}$. Since consumers are not restricted to revealing their exact willingness to pay as they would be under simple evidence, there exists an equilibrium disclosure strategy that leads to a strictly higher consumer surplus. The consumer-preferred equilibrium disclosure studied in Ali, Lewis, and Vasserman (2023) that we select here generates a partition that allows consumers to retain additional utility by inducing the monopoly to offer different prices to different segments of the resulting truncated distribution. Formally, Ali, Lewis, and Vasserman (2023) propose an equilibrium in which the interval $[0, \overline{v}]$ is segmented by threshold values $\left(2^{-k}\right)\overline{v}$, $k \in \mathbb{N}_0 \cup \{\infty\}$ so that consumers in each segment pool their messages:

$$m(v) = \begin{cases} m_k = \left(\left(2^{-(k+1)}\right)\overline{v}, \left(2^{-k}\right)\overline{v}\right] & \text{if } v \in \left(\left(2^{-(k+1)}\right)\overline{v}, \left(2^{-k}\right)\overline{v}\right], \\ m_\infty = \{0\} & \text{if } v = 0. \end{cases}$$

Each seller then sets $p_k = \left(2^{-(k+1)}\right)\overline{v}$ to consumers with message m_k. For example, consumers with $v \in (\frac{v}{4}, \frac{v}{2}]$ have an incentive to disclose $m_1 = (\frac{v}{4}, \frac{v}{2}]$ to induce the profit-maximizing price $p_1^{RE} = \frac{v}{4}$.

This equilibrium generates expected gains from trade equal to: $u^{RE} = \frac{v}{2}\sum_{k=1}^{\infty}\left(\frac{1}{4}\right)^k = \frac{1}{6}\overline{v}$, $\pi^{RE} = v\sum_{k=1}^{\infty}\left(\frac{1}{4}\right)^k = \frac{1}{3}\overline{v}$, and $w^{RE} = \frac{1}{2}\overline{v}$.

The result at the interaction stage in the three disclosure regimes is illustrated in Figure 1. In the left panel, under "no evidence", sellers set a uniform price p; in the center, under

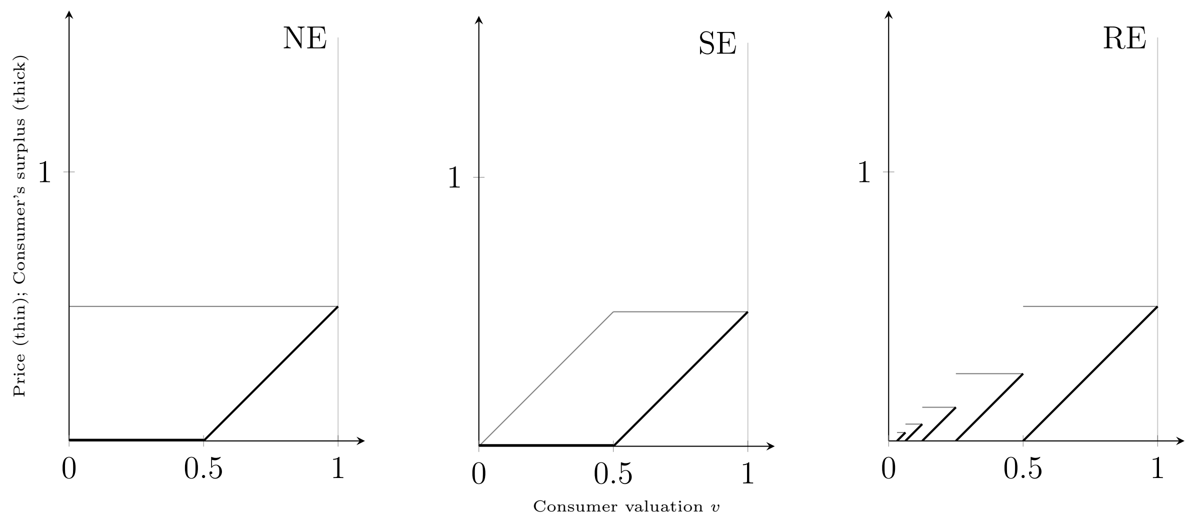

Figure 1: *Equilibrium prices and consumer surplus with monopoly sellers for $z \in \{NE, SE, RE\}$ (with $\overline{v} = 1$).*

NE	SE	RE
$u^{NE} = \frac{1}{8}\overline{v}$	$u^{SE} = \frac{1}{8}\overline{v}$	$u^{RE} = \frac{1}{6}\overline{v}$
$\pi^{NE} = \frac{1}{4}\overline{v}$	$\pi^{SE} = \frac{3}{8}\overline{v}$	$\pi^{RE} = \frac{1}{3}\overline{v}$
$w^{NE} = \frac{3}{8}\overline{v}$	$w^{SE} = \frac{1}{2}\overline{v}$	$w^{RE} = \frac{1}{2}\overline{v}$

Table 1: *Expected gains from trade for consumers and monopoly sellers under NE, SE, RE.*

"simple evidence", they set the same price to consumers who do not disclose ($v \in [1/2, 1]$) and a price equal to v to all other consumers; in the right panel, under "rich evidence", sellers set price p_k for each segment $(\left(2^{-(k+1)}\right)\overline{v}, \left(2^{-k}\right)\overline{v}]$. The figure also reports the associated consumer surplus for each possible realization of v.

Expected gains from trade and shares λ are reported in Lemma 1; correspondingly, Table 1 reports gains from trade $w = u + \pi$ and how much of them go to consumers u and how much to sellers (π).

Lemma 1. *(Propositions 1 and 2 in Ali, Lewis, and Vasserman, 2023) Suppose that consumers have a privately known willingness to pay v extracted from a uniform distribution $U[0, \overline{v}]$. Then, when the sellers are monopolists in their product category, gains from trade w and their share obtained by consumers λ in the consumer-preferred equilibrium are:*

$$w^{NE} = \frac{3}{8}\overline{v}, \quad w^{SE} = \frac{1}{2}\overline{v}, \quad w^{RE} = \frac{1}{2}\overline{v},$$

$$\lambda^{NE} = \frac{1}{3}, \quad \lambda^{SE} = \frac{1}{4}, \quad \lambda^{RE} = \frac{1}{3}.$$

We return to these expressions when evaluating the different disclosure regimes.

3.2. Seller and consumer participation and the profit-maximizing platform fee with monopoly sellers

To shorten notation, we omit the superscript when this does not create ambiguities. Given the disclosure regime and the ad valorem fee, at stages 2 and 3, first sellers and then consumers decide whether to join the platform.

To determine n_b, consider the hesitant consumers' participation decision. Since consumers do not know their product category of interest prior to joining the platform, their participation decision is based on how many product categories are available on the platform. The expected utility of consumers with entry cost f_b at the participation stage is $n_s\lambda w - f_b$. Since f_b is uniformly distributed on $[0, \overline{f}_b]$, we can write the share of hesitant consumers joining the platform as

$$n_b = \frac{n_s \lambda w}{\overline{f}_b}. \tag{1}$$

Notice that that not all of them will make a purchase: since only a fraction of product categories are available, some of the joining consumers end up not purchasing as the product category of interest is not available. The equilibrium volume of trade, then, is $n_s(\beta + (1-\beta)n_b)$.

The share n_s is obtained from the marginal sellers' participation constraint:

$$(1-\alpha_s)(1-\lambda)w(\beta + (1-\beta)n_b(n_s)) \geq f_s.$$

Since f_s is uniformly distributed on $[0, \overline{f}_s]$, the fraction of available product categories n_s solves:

$$n_s = \frac{(1-\alpha_s)(\beta + (1-\beta)n_b(n_s))(1-\lambda)w}{\overline{f}_s}.$$

Substituting for $n_b(n_s)$, we obtain the fraction of active product categories

$$n_s = \frac{(1-\alpha_s)\beta(1-\lambda)w\overline{f}_b}{\overline{f}_s\overline{f}_b - (1-\alpha_s)(1-\beta)(1-\lambda)\lambda w^2}. \tag{2}$$

Hence, using equation (1), the share of hesitant consumers joining the platform is

$$n_b = \frac{(1-\alpha_s)\beta\lambda(1-\lambda)w^2}{\overline{f}_s\overline{f}_b - (1-\alpha_s)(1-\beta)\lambda(1-\lambda)w^2}$$

and the overall share of active consumers is

$$\beta + (1-\beta)n_b = \frac{\beta\overline{f}_s\overline{f}_b}{\overline{f}_s\overline{f}_b - (1-\alpha_s)(1-\beta)(1-\lambda)\lambda w^2}. \tag{3}$$

The expression for active product categories and consumers joining the platform and sellers' profit is positive under the parameter assumption that $\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda)\lambda w^2 > 0$ in all three disclosure regimes (i.e. the denominator of all three expressions is positive for any value of α_s and any admissible z). Equilibrium participation levels decrease in α_s: if the platform increases the seller fee, seller profit decreases and, thus, fewer sellers join the platform. This, in turn, reduces the number of consumers joining the platform and, consequently, demand for every product category, which suppresses seller profits even further.

The monopoly platform does two things: it chooses upfront the disclosure regime and the revenue share sellers have to pay to the platform. In this subsection, we solve for the profit-maximizing platform fee for any given disclosure regime. The platform sets a uniform ad valorem fee to all sellers; sellers know their entry cost and choose whether to join the platform or not after observing the entry fee. Note that the decisions of the platform affect the entry decision of consumers and sellers because of the cross-side network effects.

We solve the platform's problem for a given disclosure regime z. Since there is a monopoly seller in each active product category, the platform sets α_s to maximize

$$\Pi^z(\alpha_s) = \alpha_s \left[(1-\lambda)w(\beta + (1-\beta)n_b)\right] n_s, \tag{4}$$

where n_s represents the share of product categories available on the platform, $\beta + (1-\beta)n_b$ the share of consumers who join. Both n_b and n_s depend on α_s.

Plugging in the share of active sellers and consumers from equations (2) and (3) into the profit function given in equation (4), we obtain

$$\Pi^z(\alpha_s) = [(1-\lambda^z)w^z] \frac{\alpha_s(1-\alpha_s)\beta^2(1-\lambda^z)w^z\overline{f}_s\overline{f}_b^2}{(\overline{f}_s\overline{f}_b - (1-\alpha_s)(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2)^2}.$$

The derivative with respect to α_s can be written as

$$\frac{\partial\Pi(r)}{\partial\alpha_s} = \frac{\beta^2\overline{f}_s\overline{f}_b^2(1-\lambda^z)^2(w^z)^2\left[(1-2\alpha)\overline{f}_s\overline{f}_b - (1-\alpha)(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2\right]}{\left(\overline{f}_s\overline{f}_b - (1-\alpha)(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2\right)^3}.$$

The equation is equal to zero if the term in square brackets is zero. The profit-maximizing fee is

$$\alpha_s^* = \frac{\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda)\lambda w^2}{2\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda)\lambda w^2}. \tag{5}$$

We note that α_s^* depends on the disclosure regime through λ as long as $\beta < 1$: if only eager consumers are present in the market there are no cross-group network effect exerted by consumers on sellers, and the platform sets $\alpha_s^* = \frac{1}{2}$ in all disclosure regimes.

3.3. The optimal disclosure regime with monopoly sellers

Given the profit-maximizing fee α_s^*, we characterize the optimal disclosure regime with monopoly sellers from the perspective of the platform, the consumers, and the sellers. We obtain conditions for each and characterize the prevailing disclosure regime under laissez-faire and under regulation.

Platform-optimal disclosure regime. By plugging in the equilibrium fee from equation (5), the number of sellers joining the platform n_s^* is readily obtained:

$$n_s^* = \frac{\beta(1-\lambda)w\overline{f}_b}{2[\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda)\lambda w^2]}. \tag{6}$$

We rewrite the platform's profit as a function of λ and w through n_s^* and α_s^* by rewriting sellers' profit as a function of n_s^* for a generic disclosure regime and obtain threshold values around which the platform strictly prefers one disclosure regime over the others.

Using equation (4) and noting that $n_s = \frac{(1-\alpha_s)(1-\lambda)w(\beta+(1-\beta)n_b)}{\overline{f}_s}$, we have:

$$\Pi(\alpha_s^*) = \overline{f}_s \frac{\alpha_s^*}{1-\alpha_s^*}(n_s^*)^2 = \frac{\beta^2(1-\lambda)^2 w^2 \overline{f}_b}{4[\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda)\lambda w^2]}.$$

Consider two disclosure regimes z_1 and z_2. As shown in Ali, Lewis, and Vasserman (2023), when the seller representing a product category is a monopolist, different disclosure regimes can lead to different gains from trade being generated. As such, we want to compare the expected platform profit when w^z is different for different $z \in \{NE, SE, RE\}$. Since $\overline{f}_s$, $\overline{f}_b$, and β are the same in all regimes, the platform prefers z_1 over z_2 if:

$$\frac{[(1-\lambda^{z_1})w^{z_1}]^2}{\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2} > \frac{[(1-\lambda^{z_2})w^{z_2}]^2}{\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^{z_2})\lambda^{z_2}(w^{z_2})^2},$$

which can be rewritten as

$$\begin{aligned}&\overline{f}_s\overline{f}_b[[(1-\lambda^{z_1})w^{z_1}]^2 - [(1-\lambda^{z_2})w^{z_2}]^2]\\ &> (1-\beta)(w^{z_1})^2(w^{z_2})^2(1-\lambda^{z_1})(1-\lambda^{z_2})[(1-\lambda^{z_1}) - (1-\lambda^{z_2})].\end{aligned}$$

The inequality above captures the tradeoff of the platform choosing between different disclosure regimes. The left-hand side is larger the greater the gains from trade appropriated by the seller; the right-hand side, instead, reflects the intensity of the network effects, and how valuable it is to attract consumers rather than accommodate sellers. Direct comparison of the two sides requires equilibrium values of w and λ from the trading phase. A few observations, however, can be made directly: first, if two regimes z_1 and z_2 split gains from trade in the same proportion, the one generating the higher gains from trade w would be selected by the platform. Second, if two regimes generate the same gains from trade, the choice of the platforms depends on how costly it is to incentivize the two sides to join. Third, if consumers generate no indirect network effects (i.e. for $\beta = 1$), the regime that generates higher gains on the seller side maximizes platform profits.

We compare the disclosure regime that maximizes platform profits to the one that maximizes some form of social welfare, while the platform continues to set the fee. In particular, we solve the regulator's second-best problem when the regulator selects the disclosure regime to understand society's incentives for non-price regulation.[8] The market participants are the same as in the model under laissez-faire and have the same choice variables as before, except for the platform only setting the fee, while the regulator commits at an earlier stage to a disclosure regime. The regulator's choice of regime then accounts for the profit-maximizing fee derived above. We study the surplus generated for consumers and sellers separately in order to address the possible misalignment of private and social incentives.

[8]Recent efforts in the European Union with its GDPR can be seen in this light: the regulation emphasizes individual consent and affects information disclosure, but it does not directly intervene in the platform's pricing decision.

Consumer-optimal disclosure regime. Suppose first that the regulator is interested in maximizing consumer surplus. Consumer surplus CS under disclosure regime z is equal to:

$$CS^z = (1-\beta)n_b^z\left(n_s^z\left(\lambda^z w^z\left(1-\frac{n_s^z}{2}\right)\right)+(1-n_s^z)\left(-\frac{\lambda^z w^z n_s^z}{2}\right)\right)+\beta(\lambda^z w^z n_s^z)$$
$$= (1-\beta)\frac{(n_s^z n_b^z \lambda^z w^z)}{2}+\beta(\lambda^z w^z n_s^z).$$

Where the first component captures the gains from trade that hesitant consumers would gain net of their opportunity cost of joining, and the second captures the gains from trade of the eager consumers. Since it holds that $n_b^z = \frac{\lambda^z w^z n_s^z}{\overline{f}_b}$, the expression can be rewritten as:

$$CS^z = (1-\beta)\frac{(\lambda^z w^z n_s^z)^2}{2\overline{f}_b}+\beta(\lambda^z w^z n_s^z).$$

From the above, it is clear that a regulator interested in maximizing consumer surplus would aim at maximizing $\lambda^z w^z n_s^z$, which in turns maximizes consumer participation. Given the expression for equilibrium seller participation from equation (6), and since β and $\overline{f}_b$ are common across regimes, then, a regulator interested in consumer surplus would select disclosure regime z_1 over z_2 as long as:

$$\frac{\lambda^{z_1}(1-\lambda^{z_1})(w^{z_1})^2}{\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2} > \frac{\lambda^{z_2}(1-\lambda^{z_2})(w^{z_2})^2}{\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_2})\lambda^{z_2}(w^{z_2})^2},$$

which, after rearranging, can be rewritten as:

$$\overline{f}_s\overline{f}_b\left[\lambda^{z_1}(1-\lambda^{z_1})(w^{z_1})^2-\lambda^{z_2}(1-\lambda^{z_2})(w^{z_2})^2\right] > 0.$$

As was the case for the platform, if two regimes split the gains from trade in the same proportion, the regulator strictly prefers the one that generates most gains from trade overall. Other considerations are less straightforward: the regulator wants to balance consumer and seller participation and compares how dispersed the shares of gains from trade are under different disclosure regimes. Notice, in particular, that if two regimes generate the same gains from trade w, the condition above is equivalent to z_1 being selected over z_2 if:

$$\lambda^{z_1}(1-\lambda^{z_1}) > \lambda^{z_2}(1-\lambda^{z_2}).$$

Seller-optimal disclosure regime. We recall that sellers belong to product categories that differ by their opporunity cost of becoming active in that category. Thanks to the uniform distribution of sellers' cost of entry with the lower bound of zero, sellers make on average a profit equal to half the threshold cost of entry. Producer surplus (PS) under disclosure regime z is:

$$PS^z = n_s^z\left(\frac{1}{2}(1-\alpha_s^*)(1-\lambda^z)w^z(\beta+(1-\beta)n_b)\right) = (n_s^z)^2\frac{\overline{f}_s}{2}.$$

To study the seller-optimal disclosure regime, it is sufficient to compare n_s across the various regimes: n_s increases in the expected profit of sellers given market conditions and, therefore, reflects changes in the share of the gains from trade, consumer participation and equilibrium platform fee brought forth by different disclosure regimes. As before, we derive the condition such that the regulator maximizing PS prefers regime z_1 to z_2:

$$\frac{(1-\lambda^{z_1})w^{z_1}}{\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2} > \frac{(1-\lambda^{z_2})w^{z_2}}{\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_2})\lambda^{z_2}(w^{z_2})^2},$$

which can be rewritten as

$$\begin{aligned}&\overline{f}_s\overline{f}_b[(1-\lambda^{z_1})w^{z_1}-(1-\lambda^{z_2})w^{z_2}]\\&>(1-\beta)w^{z_1}w^{z_2}(1-\lambda^{z_1})(1-\lambda^{z_2})[\lambda^{z_2}w^{z_2}-\lambda^{z_1}w^{z_1}].\end{aligned}$$

As for the platform, the choice of disclosure regime requires comparisons of which user group is more costly to encourage joining the platform, which in turns depends on how dispersed entry costs of consumers and sellers are, and how strong the network effects are. It holds for sellers as well as for the platform that if λ^z is the same for two different regimes, the one generating the most gains from trade is preferred; moreover, if consumers exert no cross-group network effects, the regime generating more gains for the sellers is obviously preferred by sellers.

Equilibrium disclosure regime selection To precisely pin down the platform's and regulator's optimal disclosure regime, we embed the equilibrium results in the consumer-seller interaction as obtained in Section 3.1. As follows from Lemma 1, allowing consumers to share information about their preferences is always strictly better than selecting NE from the perspective of the platform. When disclosure is allowed, sellers are able to generate higher gains from trade by conditioning prices on the messages optimally sent by consumers. Selection between SE and RE, instead, depends on the relative ease with which the platform is able to attract buyers and sellers.

More generally, disclosure is preferable to NE for all participants. Sellers are obviously better off when they can reach consumers that would not purchase anything if they could not disclose their willingness to pay. Consumers do not benefit directly from SE as the additional gains from trade are fully captured by sellers, but they benefit indirectly from the larger number of sellers joining the platform. While the platform's and sellers' optimal disclosure regime depends on the parameters, consumers always strictly prefer RE to be selected:

Proposition 1. *Suppose that each product category on the platform is served by a monopoly seller. Given $F=\overline{f}_b\overline{f}_s$, and given the set of disclosure regimes $\{NE, SE, RE\}$, RE always maximizes consumer surplus, while*

- *for $w<\sqrt{\frac{2}{(1-\beta)}F}$, SE maximizes platform profits and producer surplus,*
- *for $\sqrt{\frac{2}{(1-\beta)}F}<w<\sqrt{\frac{17}{6(1-\beta)}F}$, SE maximizes platform profits and RE maximizes producer surplus,*
- *for $\sqrt{\frac{17}{6(1-\beta)}F}<w$, RE maximizes platform profits and producer surplus.*

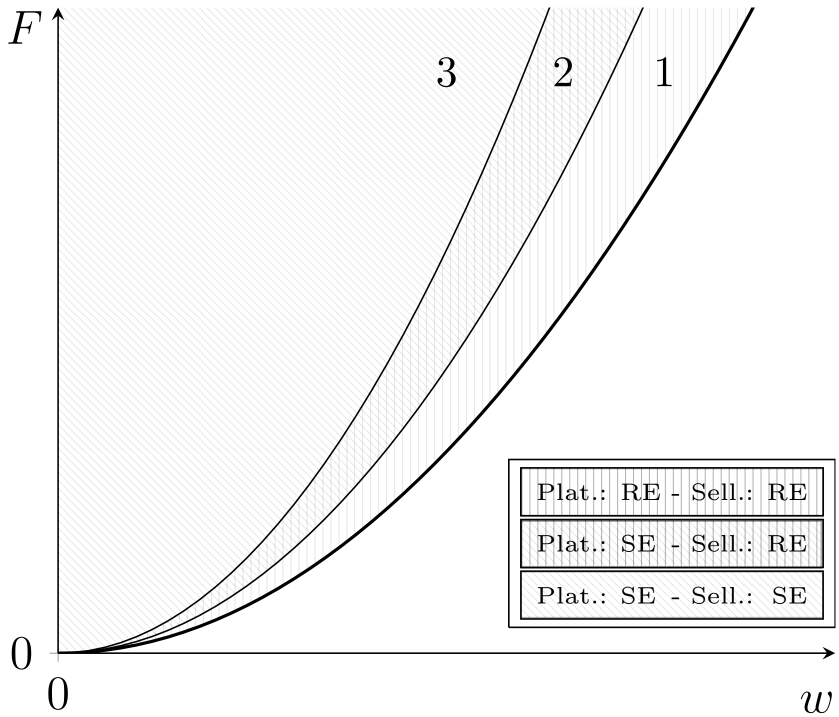

Figure 2: *Preferred disclosure regimes with monopoly sellers.*

Proof. A formal proof is relegated to Appendix A. ■

The result in the monopoly case highlights the distortions that a platform can introduce when selecting its preferred disclosure regime. As illustrated in Figure 2, both the platform and the sellers generally prefer SE over RE: under SE, sellers can capture a higher share of the same gains from trade $w = \frac{1}{2}\overline{v}$; as w grows, however, attracting consumers becomes relatively more valuable and, for high enough gains from trade, both prefer to switch to RE. The weaker the network effects are (that is, the higher β is), the larger w needs to be for the switch to happen. For all values of $\beta < 1$, as w grows, the sellers are interested in switching to the less restrictive regime "earlier" than the platform does.

Consumers, instead, always prefer more disclosure to be available to them: when SE is selected, they obtain, in expectation, as many gains from trade as they would without disclosure in absolute values. They still value having the chance to disclose, since this encourages more sellers to join and, therefore, consumers have a higher expected utility from participation and, therefore, more of them join the platform. The ability to curate the information they can disclose, however, allows consumers to retain a higher share of w, making it their preferred regime. This holds for eager and hesitant consumers alike and for all values of β. Sellers and platforms, instead, strictly prefer SE over RE when $\beta = 1$, as in this case there are no cross-group network effects exerted by consumers on sellers: there is no need to allow consumers to strategically disclose information about themselves to encourage them to join the platform in this case.

The analysis so far suggests that the equilibrium disclosure regime favored by consumers would never be selected by a profit-maximizing platform unless consumers exerted strong

	Scenario 1	Scenario 2	Scenario 3
Platform	RE	SE	SE
Sellers	RE	RE	SE
Consumers	RE	RE	RE

Table 2: *Scenarios with monopoly sellers*

	Scenario 1 ($F = 0.071$)			Scenario 2 ($F = 0.095$)			Scenario 3 ($F = 0.13$)		
	NE	SE	RE	NE	SE	RE	NE	SE	RE
α_s	0.497	0.289	0.228	0.498	0.357	0.321	0.498	0.4	0.381
n_s	0.031	0.12	0.14	0.024	0.067	0.07	0.019	0.0427	0.0417
n_b	≈ 0	0.081	0.132	≈ 0	0.044	0.062	≈ 0	0.0267	0.0347
π	≈ 0	0.0021	**0.0023**	≈ 0	**0.0013**	0.0012	≈ 0	**0.0008**	0.0007
PS	≈ 0	0.0027	**0.004**	≈ 0	0.001	**0.0015**	≈ 0	**0.00059**	0.00056
CS	≈ 0	0.002	**0.0037**	≈ 0	0.0027	**0.004**	≈ 0	0.0006	**0.0008**

Table 3: *Numerical results across disclosure regimes with monopoly sellers ($v = 1$, $\beta = 0.1$)*

enough network effects. Note that $\beta = 1$ corresponds to the model proposed by Ali, Lewis, and Vasserman (2023) embedded in a platform environment that, however, does not feature cross-group network effects exerted by consumers on sellers. Then, regulatory intervention with the mandate that consumers must be allowed to disclose freely would be beneficial to consumers (under our equilibrium selection).

Corollary 1. *Suppose that each product category on the platform is served by a monopoly seller. If $\beta = 1$, then:*

- *SE always maximizes platform profits,*
- *SE always maximizes producer surplus,*
- *RE always maximizes consumer surplus.*

Overall, when product categories are served by monopolists, all economic actors prefer to give consumers some ability to disclose their preferences as it generates more trade. If cross-group network effects from consumers to sellers are sufficiently strong, and enough gains from trade are generated, the platform, sellers, and consumers are aligned in their interest to allow consumers to curate what kind of information they would like to share. If w is relatively low, instead, both platform and sellers prefer to restrict the ability of buyers to disclose information to a simple evidence regime, while consumers would still prefer to retain more freedom. For intermediate values of w, the platform deviates from both consumers' and sellers' preferred regime in the same direction, restricting disclosure to

SE while both consumers and sellers would want RE to be in place. A regulator interested in consumer surplus and, in some cases, producer surplus, then, would optimally intervene to allow consumers to curate the information they share with sellers. Figure 2 and Table 3 illustrate the outcome for a given value of β and for feasible combinations of w and $F = \overline{f}_b\overline{f}_s$, and summarize the possible misalignments of interests.

The misalignment between sellers' and the platform's interests may come as a surprise. To shed some light on it, we report the results of a simple numerical exercise aimed at decomposing this misalignment in Table 3. Given our modeling assumptions, the fee α_s chosen by the platform is lower the richer the disclosure regime. When a more restrictive disclosure regime is in place, fewer consumers join the platform, all else equal. For higher F, allowing consumers to disclose information becomes less effective in inducing them to join the platform at the margin. The tension between the platform's and sellers' interests arise for intermediate values of F (for a given value w), that is, when consumers' become more costly to attract. When this is the case, the platform prefers to restrict disclosure and sacrifices consumer and seller participation.

Discussion of admissible parameter constellations. We provided conditions on w and $\overline{v}$ that determine the optimal disclosure regime. However, not all parameter combinations are feasible. Opportunity costs of joining the platform must be such that the model has an interior solution.

$$\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^z)\lambda(w^z)^2 > 0 \quad \forall z \in \{NE, SE, RE\},$$

Thus, it must hold that $\overline{f}_s$, $\overline{f}_b$ is high enough such that some consumers and sellers always find it too costly to join the platform under all disclosure regimes. As lower bounds, we set

$$\overline{f}_s = (1-\lambda^{SE})w^{SE}, \quad \overline{f}_b = \lambda^{RE}w^{RE};$$

that is, the highest absolute gains from trade either side can obtain if the other side joined in full, under their most-preferred disclosure regime, net of the effect of β. We take the above as lower bound values defining the distributions of opportunity costs for sellers and buyers respectively.

The constraint depends on β, which reflects the role of the network effects: for β low enough, there exist parameter constellations such that the platform, sellers, and consumers are aligned in their interest of selecting RE. As β grows, network effects experienced by sellers become weaker and, for β high enough, the platform stops finding RE to be profit-maximizing. For β even higher, the same is true for the sellers. It follows that the platform's interests align with those of consumers and sellers (and, therefore, the social optimum outcome) only if gains from trade are high enough and β sufficiently small. Otherwise, the platform always chooses a regime different from the one preferred by consumers and, in some cases, also different from the one preferred by sellers. Figure 3 illustrates the possible outcomes for low, intermediate, and high values of β.

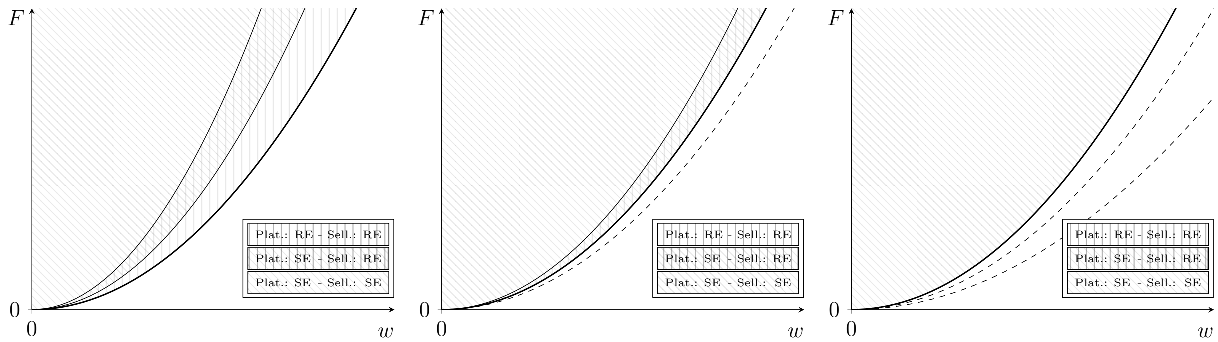

Figure 3: *Equilibrium choices of disclosure regimes for different agents for β small (left), intermediate (center), and large (right) under monopoly sellers.*

4. Disclosure with duopoly sellers

In this section, we allow for seller competition in each product category and consider a particular duopoly model with consumer information disclosure. The set of all possible product categories is the $[0, 1]$ interval. In any available product category, two sellers located exogenously at its end points. Consumers' preferences depend on their location x on the line representing their product category of choice. As for the monopoly case, we assume that a fraction β of consumers are eager and that the remaining fraction $(1 - \beta)$ are hesitant. We continue to assume that eager consumers have an opportunity cost of joining equal at zero, and that hesitant consumers have an opportunity cost that is independently drawn from the uniform distribution $U[0, \overline{f}_b]$. After joining the platform, consumers learn their preferred product category and their location on the Hotelling line, which is independently drawn from $U[0, 1]$: a consumer located at x obtains utility $V - tx - p_1$ if buying from seller 1 at price p_1 and $V - t(1 - x) - p_2$ if buying from seller 2 at price p_2, where t measures the degree of product differentiation and V is a stand-alone utility of the product, which is assumed to be sufficiently large that all consumers buy in every admissible disclosure regime. On the seller side, we assume that when a seller has an opportunity cost such that it would want to join the platform, a second one always joins as well. Thus, every product category is served by a duopoly. Below in this section, we provide conditions on the parameters such that this assumption is satisfied. Sellers' opportunity costs depends on their product category as in the version with monopoly sellers.

4.1. The consumer-seller interaction with duopoly sellers

As follows from Ali, Lewis, and Vasserman (2023)'s results, reproduced in detail in Appendix B, in the version with competing sellers, in contrast to our previous analysis with monopoly sellers, there is no deadweight loss in the consumer-seller interaction under any disclosure regime because the market is fully covered and each consumer buys from the seller that is closest in the product space. Therefore, the disclosure regime has no impact on the overall gains from trade for given participation levels. Moreover, the three regimes can be ordered based on the share λ of gains from trade w obtained by consumers; for all values w

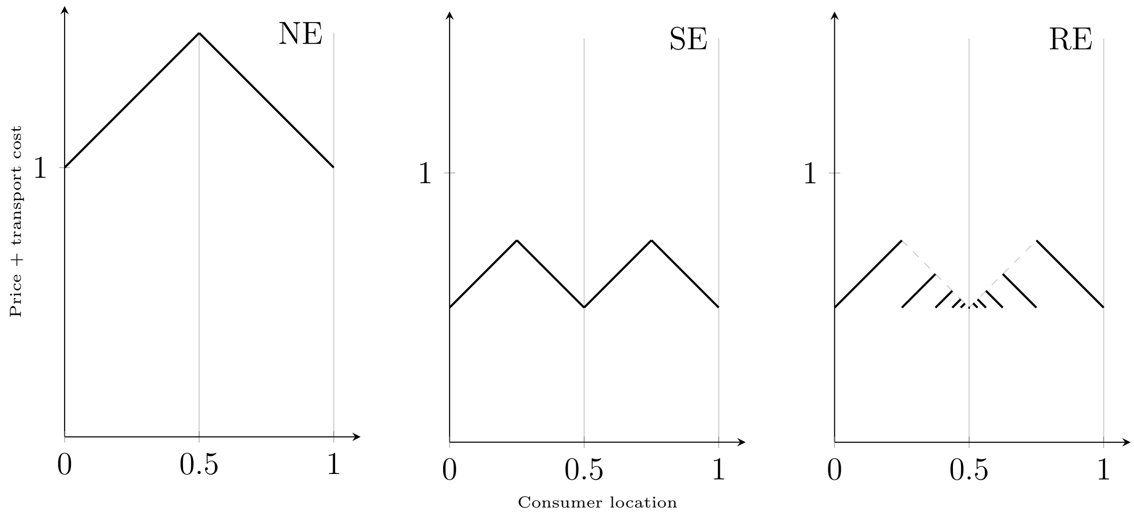

Figure 4: *Price plus transport cost paid by consumer x with duopoly sellers for $z \in \{NE, SE, RE\}$ (with $t = 1$).*

it holds that

$$\lambda^{RE} > \lambda^{SE} > \lambda^{NE}.$$

Equilibrium shares are reported in the following lemma.

Lemma 2. *(Propositions 6, 7, and 8 in Ali, Lewis, and Vasserman, 2023) Suppose consumers have privately known location x extracted from a uniform distribution $U[0,1]$ and linear transportation costs t, and that the market is fully covered by competing sellers located at the extremes of the unit interval. Then, gains from trade (w) are $w^{NE} = w^{SE} = w^{RE} = V - \frac{1}{4}t$ and the share received by consumers (λ) in the consumer-preferred equilibrium are:*

$$\lambda^{NE} = 1 - \frac{t}{w^{NE}} \quad \lambda^{SE} = 1 - \frac{3t}{8(w^{SE})} \quad \lambda^{RE} = 1 - \frac{t}{3(w^{RE})}$$

Proof. See Appendix B. ■

Two differences from the version with monopoly sellers can be noted. First, as mentioned above, there is no obviously dominated disclosure regime: since all regimes generate the same gains from trade w, NE is now a viable choice for both the platform and a regulator maximizing consumer and/or seller surplus. Additionally, it should be noted that under duopoly the share of gains from trade received by the consumers depends on the level w. This follows from the Hotelling framework: sellers are limited in their price setting for all w. For example, under NE, the standard Hotelling model applies and equilibrium prices are equal to t. As w grows, a higher share of the overall surplus is retained by the consumers since the uniform price does not change.

Price plus transport cost paid by a consumer located at $x \in [0,1]$ are plotted in Figure 4 for the three disclosure regimes.

Table 4 reports the net expected surplus for any successful interaction between a consumer and a seller in the three disclosure regimes. The three regimes then can be ordered based

NE	SE	RE
$u^{NE} = V - \frac{5}{4}t$	$u^{SE} = V - \frac{5}{8}t$	$u^{RE} = V - \frac{7}{12}t$
$\pi^{NE} = \frac{1}{2}t$	$\pi^{SE} = \frac{3}{16}t$	$\pi^{RE} = \frac{1}{6}t$
$w^{NE} = V - \frac{1}{4}t$	$w^{SE} = V - \frac{1}{4}t$	$w^{RE} = V - \frac{1}{4}t$

Table 4: *Expected gains from trade for consumers, competing sellers, and in total under NE, SE, RE.*

on the consumers' and sellers' shares of gains from trade: the more flexibly consumers can disclose their location, the higher their share of the gains from trade. This implies that seller profits are largest under no disclosure, lowest under rich evidence, and at an intermediate level under simple evidence. As for the monopoly case, we use the above values to construct gains from trade w and shares λ and $(1-\lambda)$ as given in Lemma 2.

4.2. Consumer and seller participation and platform fee setting

The analysis follows the same steps as the version with monopoly sellers. Participation of consumers and sellers is according to

$$\begin{aligned} n_s &= \frac{(1-\alpha_s)(\beta+(1-\beta)n_b)(1-\lambda^z)w^z}{2\overline{f}_s}, \\ n_b &= \frac{n_s\lambda^z w^z}{\overline{f}_b}. \end{aligned}$$

Thus, equilibrium participation levels are

$$\begin{aligned} n_s &= \frac{(1-\alpha_s)\beta(1-\lambda^z)w^z\overline{f}_b}{2\overline{f}_s\overline{f}_b-(1-\alpha_s)(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2}, \\ n_b &= \frac{(1-\alpha_s)\beta\lambda^z(1-\lambda^z)(w^z)^2}{2\overline{f}_s\overline{f}_b-(1-\alpha_s)(1-\beta)\lambda^z(1-\lambda^z)(w^z)^2}. \end{aligned}$$

The platform's profit function is

$$\Pi^z(\alpha_s) = \left[2\alpha_s(1-\lambda^z)\frac{w}{2}(\beta+(1-\beta)n_b)\right]n_s.$$

The first-order condition of profit maximization can be rewritten as

$$(1-2\alpha)2\overline{f}_s\overline{f}_b-(1-\alpha)(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2 = 0,$$

which leads to the profit-maximizing fee:

$$\alpha_s^* = \frac{2\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z w^2}{4\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z w^2}.$$

Platform profit under regime z is

$$\Pi^z(\alpha_s^z) = 2\overline{f}_s \frac{\alpha_s^*}{1-\alpha_s^*}(n_s^*)^2.$$

Expressions for surpluses CS and PS are

$$CS^z = (1-\beta)\frac{(\lambda^z w^z n_s^z)^2}{2\overline{f}_b} + \beta(\lambda^z w^z n_s^z), \qquad PS^z = (n_s^z)^2 \frac{\overline{f}_s}{2}.$$

To compare the different disclosure regimes, we make use of the equilibrium outcomes in the consumer-seller interaction as characterized in Lemma 2. Plugging in each value of λ^z in the above expressions allows us to compare expected platform profits, CS and PS across the three disclosure regimes. The main result of the section follows:

Proposition 2. *Suppose that each product category on the platform is served by duopoly sellers. Given $F = 2\overline{f}_s\overline{f}_b$, the preferred disclosure regime from the set $\{NE, SE, RE\}$ is as follows:*

- *from the platform's perspective, it is NE for $w < \frac{11F}{(1-\beta)3t} = w_1^P$, SE for $w_1^P < w < \frac{17F}{(1-\beta)3t} = w_2^P$, and RE otherwise;*
- *from the sellers' perspective, it is RE for $F < \frac{1-\beta}{8}t^2 = F_1^S$, SE for $F_1^S < F < \frac{3(1-\beta)}{8}t^2 = F_2^S$, and NE otherwise;*
- *from the consumers' perspective, it is RE for $w < \frac{17}{24}t = w_1^C$, SE for $w_1^C < w < \frac{11}{8}t = w_2^C$, and NE otherwise.*

Proof. See Appendix C. ■

The platform's incentives to set different disclosure regimes mirror those obtained when product categories are served by monopoly sellers. In general, the platform has a strong incentive to select the disclosure regime that generates higher gains from trade on the seller side, since that is the side the platform monetizes. The network effects in place, however, encourage disclosure to take place to attract more consumers and generate more trade. As w grows, since the per trade profit of sellers is fixed to the equilibrium prices, this incentive grows as well. Switching from a less-flexible to a more-flexible disclosure regime implies that, under seller duopoly, a lower fraction of the gains from trade can be extracted by the sellers. However, this leads to higher consumer participation, which may mean more trade and higher expected profits for sellers and the platform. For w high enough, the latter effects dominates. The threshold at which the platform is indifferent between two regimes increases in the dispersion of buyers and sellers, captured by F, which stands for how difficult it is to attract both sides of the trade. The threshold also increases in β: the weaker the network effects (i.e. the larger β is), the lower the incentives to allow for disclosure. It follows that NE is the regime selected by the platform if $\beta = 1$.

A regulator interested in maximizing producer surplus, on the other hand, is primarily interested in the level of dispersion of the two sides of the transaction. The reason lies in the

	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Platform	SE	NE	NE	NE
Sellers	SE	SE	NE	NE
Consumers	SE	SE	SE	NE

Table 5: *Scenarios with duopoly sellers*

interplay between network effects and per-category competition. Since the absolute value of gains from trade obtained by sellers is fixed for all levels of w, sellers' incentives to allow for consumer disclosure come into play when F, the level of dispersion of the two sides, is particularly low. When this happens, network effects are relatively stronger at the margin, and the lower share of gains from trade obtained under a more-flexible disclosure regime is more than compensated by the additional trade it generates. The threshold at which the two effects cancel each other out increases with the strength of the network effects, that is, it decreases in β. As it was the case for the platform, NE is best from the sellers' perspective if $\beta = 1$.

Finally, a regulator interested in maximizing consumer surplus balances seller participation and the share of gains from trade obtained by consumers. Unlike the sellers, consumers benefit from higher levels of w, since seller competition implies that consumers receive higher shares of the gains from trade under all disclosure regimes as w increases. When w is low, consumers benefit relatively more from more-flexible regimes since disclosure allows them to obtain larger shares. As w grows, however, this effects becomes weaker, and it becomes relatively more important to create incentives for sellers to join, which is achieved by restricting disclosure, as this allows sellers to benefit from, on average, higher prices and, thus, obtain a higher share of w. For w high enough, the latter effect dominates and consumers benefit from disabling disclosure.

It is interesting to look at the limit case in which all consumers join the platform.

Corollary 2. *Suppose that each product category on the platform is served by duopoly sellers. If $\beta = 1$, that is, consumers do not exert a cross-group network effect on sellers, the following holds:*

- *NE always maximizes platform profits,*
- *NE always maximizes producer surplus,*
- *consumer surplus is maximized by the disclosure regime reported in Proposition 2.*

The results above must be qualified because of the distributional assumptions that are required for consumer and seller participation to lead to an internal solution and for all categories to be fully covered in the trading phase. Taking these constraints into account, only regimes NE and SE are viable under laissez-faire and regulation, as shown in Figure 5, given the parameter restriction of our model (more on those restrictions at the end of the section).

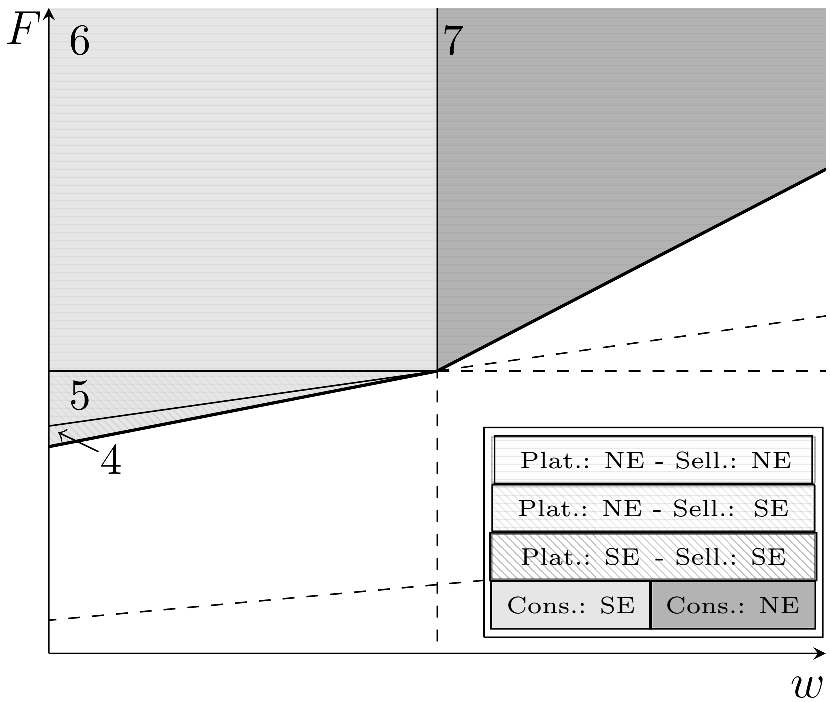

Figure 5: *Equilibrium disclosure regime as selected by a profit maximizing platform, a CS-maximizing regulator, and a PS-maximizing regulator for* $t = 1$ *when sellers compete in duopoly.*

Table 5 reports the possible scenarios regarding the preferred disclosure regime by the platform, consumers, and sellers. When the platform's, the sellers' and the consumers' interests are not fully aligned, the following two outcomes are possible: (i) the platform selects no disclosure, while sellers and consumers would prefer the simple evidence regime; (ii) the platform selects no disclosure, which is also in the interest of sellers, whereas consumers would prefer the simple evidence regime. The latter case is intuitive, since both the platform and sellers benefit from impeding disclosure when network effects are relatively weak. The former sheds light on the subtler interaction between the disclosure regime and the optimal platform fee. When w is particularly low and F is relatively high, the platform has an incentive to select NE and the associated higher equilibrium fee, which leads to higher platform profits but lower seller participation, where sellers would prefer SE. This misalignment emerges for parameter constellations such that CS-maximization would also lead to SE rather than NE: when the platform deviates from the regime maximizing producer surplus, it deviates from the one maximizing CS as well, and in the same direction.

The numerical examples reported in Table 6 shed some light on the factors driving the misalignment in the platform's and sellers' interests regarding the disclosure regime. In particular, the platform's tradeoff (higher fee and less trade versus lower fee and higher trade) depends on the ease with which buyers and sellers can be encouraged to join. Scenarios 4 to 7 have the same overall gains from trade being shared, but buyers' and sellers' participations depend on the feedback effects generated by cross-group network effects. When F is low, the platform optimally chooses a lower α_s to increase participation, as the network effects are

	Scenario 4 ($w=\frac{21}{16}$, $F=0.353$)			Scenario 5 ($w=\frac{21}{16}$, $F=0.36$)			Scenario 6 ($w=\frac{21}{16}$, $F=0.45$)			Scenario 7 ($w=\frac{23}{16}$, $F=0.45$)		
	NE	SE	RE	NE	SE	RE	NE	SE	RE	NE	SE	RE
α_s	0.11	0.014	0.078	0.123	0.032	0.093	0.238	0.185	0.219	0.035	0.11	0.16
n_s	0.052	0.358	0.107	0.094	0.148	0.043	0.039	0.02	0.014	0.328	0.037	0.021
n_b	0.054	0.357	0.36	0.031	0.146	0.044	0.011	0.017	0.013	0.13	0.036	0.02
π	0.00009	**0.0007**	0.0005	**0.00047**	0.00028	0.00007	**0.00019**	0.00003	0.00002	**0.0016**	0.00007	0.00004
PS	0.0002	**0.012**	0.0011	0.0008	**0.0021**	0.0001	**0.00016**	0.00004	0.00002	**0.011**	0.0001	0.00005
CS	0.002	**0.063**	0.001	0.0007	**0.0115**	0.0013	0.00019	**0.00035**	0.00023	**0.011**	0.0011	0.0005

Table 6: *Numerical results across disclosure regimes with duopoly sellers ($t=1$, $\beta=0.01$)*

stronger all else being equal. As their strength dwindles, the platform restricts disclosure opportunities and selects the regime associated with the higher profit-maximizing fee. Sellers would prefer fewer restrictions imposed on the consumers' information disclosure when F is not too high: while they lose in terms of the per transaction share of gains from trade, they gain indirectly because of the lower fee they need to pay to the platform, and because network effects are still relatively strong. When F becomes too high, however, this is not the case anymore: retaining a higher share of gains from trade is better even at a higher fee because network effects do not generate enough additional participation on the consumer side. Finally, in Scenario 7, enabling disclosure is detrimental to the platform, sellers, and consumers.

The analysis has implications for the direction and intensity of interventions that regulators should aim for in the context of consumers' data sharing decision according to which the platform records consumer data and allows sellers to access them. First, in our model, a technology that allows consumers to share their data with sellers should be encouraged when maximizing consumer surplus is the policy objective. In our setting with duopoly sellers, the platform will never select a more permissive disclosure regime than what is in the interest of consumers and sellers; consumers have the strongest interest in being able to disclose.

Second, data sharing rules should require consumers' consent in the spirit of the "privacy by default" in the EU's General Data Protection Regulation (GDPR). This would also apply to regulation aimed at fostering seller surplus over platform profits: as noticed above, for some parameter constellations, the platform selects more rigid regimes than the sellers themselves would. Leaving the control over consumer data sharing to the consumer would limit the platform's freedom to extract rents from sellers through higher fees and ultimately encourage more participation of both groups even though a more flexible regime looks disadvantageous for the sellers, when focusing just on the consumer-seller interaction and ignoring the endogeneity of participation levels.

Overall, the misalignment of interests between platform, consumers, and sellers points at distortions introduced by the platform's regime choice. The platform has a tendency to restrict disclosure relative to the social optimum. The platform may do so at the expense of trade volume, since SE would lead to higher seller participation given the optimal fee selected by the platform. Comparison of the regime selection rules indicates that CS-maximizing regulation would force the platform to enable information disclosure when consumer and platform interests are misaligned. Since in this case there is sometimes also a misalignment of the sellers' and the platform's interests this sometime even holds for a PS-maximizing regulator. Then, mandating SE would also be the choice of a regulator that maximizes the sum of consumer surplus and producer surplus, and, with a smaller parameter range, for a regulator maximizing total surplus (that is, the sum of consumer surplus, producer surplus, and platform profits).

Discussion of admissible parameter constellations. The opportunity costs of joining the platform must be such that the model has an interior solution. The condition must reflect the fact that sellers benefit more from NE than from SE given consumer participation, and that sellers split the consumer base in half. Therefore, the candidate thresholds are

$$\overline{f}_s = (1 - \lambda^{NE})\frac{w}{2}, \quad \overline{f}_b = \lambda^{RE} w.$$

Furthermore, another condition must also hold: consumption benefit w must be high enough that the resulting competition in the Hotelling setting features full coverage in equilibrium. For RE and SE this implies $w > \frac{1}{2}t$; for NE, it implies $w > \frac{5}{4}t$. Thus, we must have $w > \frac{5}{4}t$.

Unlike for the monopoly case, the restriction imposed by $\overline{f}_b$ and $\overline{f}_s$ and reflected in the sufficient condition

$$F = 2\overline{f}_s\overline{f}_b \geq \lambda^{RE}(1 - \lambda^{NE})w^2$$

turns out to be too restrictive. Under this condition, there are only parameter constellations such that both platform and sellers would optimally select NE, for all values of β. Such a condition, however, is stricter than what is needed to guarantee interior solutions for equilibrium consumer and seller participation. When we consider the equilibrium values for n_s^* and n_b^*, it can be shown that, for any disclosure regime $z \in \{NE, SE, RE\}$, more permissive constraints apply: for any regime z, $n_s, n_b \in (0, 1)$ we require that

$$\overline{f}_s^z > (1 - \lambda^z)\frac{w}{2}(2 - \beta), \quad \overline{f}_b^z > \lambda^z w.$$

These restrictions represent three constraints that must be satisfied for the model to have admissible solutions. Taking the most constraining of the three for all values $w > \frac{5}{4}t$ is sufficient.

Figure 6 illustrates the constraints and how they affect the choices of the disclosure regime for different values of β. First, we note that the restriction imposed by RE is never relevant, as those imposed by SE and NE are always tighter for all admissible values of w. Second, for β small, there exist constellations of parameters so that the platform's interests are aligned with any regulator – the regulator may be CS- or PS-maximizing – and SE is selected. As β grows, the network effects become weaker and, for β large enough, the platform selects NE. For some constellations of parameters, this is in conflict with the optimal selection of both a CS- and a PS-maximizing regulator who would select SE instead. For even larger values of β, only values are possible such that a PS-maximizing regulator would also select NE. Still, this can be in conflict with the interests of a CS-maximizing regulator.

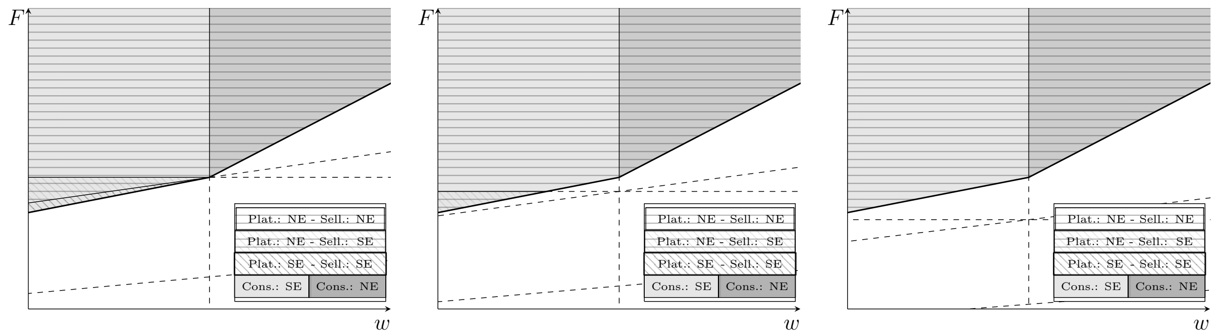

Figure 6: *Preferred disclosure regimes for β small (leftmost), intermediate (center), and large (rightmost) under duopoly sellers.*

5. Conclusion

In this paper, we embed the model of Ali, Lewis, and Vasserman (2023) of voluntary information disclosure by consumers in a platform model. Ali, Lewis, and Vasserman (2023) showed that consumers benefit from a richer set of messages when disclosing their preferences to sellers. In our setting, the platform enables transactions between consumers and sellers and, furthermore, is an information designer who decides on the extent to which consumers can voluntarily disclose information about their preferences to sellers. In return for its services, the platform takes a cut from sellers' profits. We consider two specifications. When the platform hosts at most one seller per product category, consumers always benefit from a disclosure regime that allows them to provide more information. In contrast, the sellers and the platform would generally opt for a more restrictive disclosure regime. Notably, for some parameter constellations, the platform restricts disclosure when sellers would prefer not to.

When there is a duopoly in each product category, the same type of misalignment can arise. The platform tends to restrict the possibility of information disclosure more than what is in the interest of sellers and even more so than what is in the interest on consumers. While the platform never allows for richer disclosure than what is optimal for consumers and/or sellers, a regulator that maximizes consumer surplus, seller surplus, or any convex combination of consumer surplus, seller surplus, and platform profit, may want to intervene and force the platform to implement a more-flexible disclosure regime. However, unlike the monopoly seller case, for some combinations of parameters, all groups can be aligned in their interest that information disclosure is restricted.

Our findings can help to inform the debate about public policy regarding the sharing of personal data by consumers. As we show, regulatory interventions that enable consumers to more freely choose the type of information they prefer to disclose to sellers are in the interest of consumers. In particular, the platform may be overly restrictive and not allow information disclosure at all or only allow for full disclosure by sharing all consumer data. A disclosure technology imposed by the regulator that allows for richer messages (or a selective sharing of consumer data) benefits consumers. Our results are derived under the assumption that information disclosure by consumers is voluntary, which is in line with regulations in the European Union.

Our analysis could be generalized in several directions. First, we took a particular model of product market interaction (Hotelling duopoly and monopoly with linear demand). Second, we imposed uniform distributions of consumers' and sellers' opportunity costs of participation. Third, following Ali, Lewis, and Vasserman (2023), we allowed for three disclosure regimes. Generalizations in all these directions may lead to even richer results.

We provided separate analyses on whether sellers are monopolists or duopolists in their product category. To do so, we made assumptions guaranteeing that the platform will always host either one or two sellers, in any available product category. Under different assumptions, there would be a duopoly only in those product categories in which the opportunity cost to become active is low, and for an intermediate range of product categories sellers would be monopolists. It may be interesting to characterize the outcome under laissez-faire and regulation in this more complex environment.

Appendix

A. Monopoly sellers

This appendix proofs Proposition 1.

Profit-maximizing platform First, we plug in the profit-maximizing fee in the expressions for n_s:

$$\begin{aligned} n_s =& \frac{(1-\alpha_s)\beta(1-\lambda^z)w^z\overline{f}_b}{\overline{f}_s\overline{f}_b-(1-\alpha_s)(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2} \\ =& \frac{\frac{\overline{f}_s\overline{f}_b}{2\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2}\beta(1-\lambda^z)w^z\overline{f}_b}{\overline{f}_s\overline{f}_b-\frac{\overline{f}_s\overline{f}_b}{2\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2}(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2} \\ =& \frac{\beta(1-\lambda^z)w^z\overline{f}_b}{2[\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2]}. \end{aligned}$$

Consumer participation is

$$n_b = \frac{n_s\lambda^z w^z}{\overline{f}_b}.$$

Therefore, platform profits can be written as

$$\Pi^z = \overline{f}_s\frac{\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2}{2\overline{f}_s\overline{f}_b}\left(\frac{\beta(1-\lambda^z)w^z\overline{f}_b}{2[\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2]}\right)^2,$$

which simplifies to

$$\Pi^z = \frac{\beta^2(1-\lambda^z)^2(w^z)^2\overline{f}_b}{4[\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^z)\lambda^z(w^z)^2]}.$$

We have that $\pi^{z1} > \pi^{z1}$ if and only if

$$\begin{aligned} &(1-\lambda^{z_1})^2(w^{z_1})^2(\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_2})\lambda^{z_2}(w^{z2})^2) \\ &> (1-\lambda^{z_2})^2(w^{z_2})^2(\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2), \end{aligned}$$

which, after rearranging, is equivalent to

$$\begin{aligned} &\overline{f}_s\overline{f}_b[[(1-\lambda^{z_1})w^{z_1}]^2-[(1-\lambda^{z_2})w^{z_2}]^2] \\ &> (1-\beta)(w^{z_1})^2(w^{z_2})^2(1-\lambda^{z_1})(1-\lambda^{z_2})[(1-\lambda^{z_1})-(1-\lambda^{z_2})]. \end{aligned}$$

Consider λ^z, w^z for all regimes (see Lemma 1). Since $\lambda^{RE} = \lambda^{NE}$ and $w^{RE} > w^{NE}$, RE is preferred to NE as long as

$$\frac{4}{9}\overline{f}_s\overline{f}_b[(w^{RE})^2-(w^{NE})^2] > 0,$$

which is always satisfied. Since $\lambda^{RE} > \lambda^{SE}$ and $w^{RE} = w^{SE} = w = \frac{1}{2}\overline{v}$, instead, RE is preferred to SE as long as

$$\begin{aligned}&\overline{f}_s\overline{f}_b[[(1-\lambda^{RE})]^2 - [(1-\lambda^{SE})]^2]\\&> (1-\beta)w^2(1-\lambda^{RE})(1-\lambda^{SE})[(1-\lambda^{RE}) - (1-\lambda^{SE})]\end{aligned}$$

Plugging in the values for λ^{RE} and λ^{SE}, this is equivalent to

$$\frac{17}{6}\overline{f}_s\overline{f}_b < w^2(1-\beta),$$

which is the expression reported in Proposition 1.

Consumer surplus Consumer surplus can be obtained by combining expected utility of joining the platform for both the group of eager and the group of hesitant consumers. For the former, the consumer surplus under disclosure regime z is $\beta(\lambda^z w^z n_s^z)$. Hesitant consumers take their opportunity cost of joining into account. Given our distributional assumptions, consumers who join have average opportunity cost equal to $\frac{\lambda^z w^z n_s^z}{2}$. Therefore, the consumer surplus of hesitant consumers is

$$\begin{aligned}&(1-\beta)n_b^z\left[n_s^z(\lambda^z w^z - \frac{\lambda^z w^z n_s^z}{2}) - (1-n_s^z)\frac{\lambda^z w^z n_s^z}{2}\right]\\&= (1-\beta)n_b^z\left[\lambda^z w^z n_s^z - \frac{\lambda^z w^z (n_s^z)^2}{2}) - \frac{\lambda^z w^z n_s^z}{2} + \frac{\lambda^z w^z (n_s^z)^2}{2}\right]\end{aligned}$$

Since $n_b^z = \frac{\lambda^z w^z n_s^z}{f_b}$, combining the two expressions above, we obtain consumer surplus

$$CS^z = (1-\beta)\frac{(\lambda^z w^z n_s^z)^2}{2f_b} + \beta(\lambda^z w^z n_s^z).$$

Therefore, the consumer-preferred disclosure regime can be found by direct comparison of $\lambda^z w^z n_s^z$ across regimes. In particular, it holds that $CS^{z1} > CS^{z1}$ if and only if

$$\begin{aligned}&\lambda^{z_1}(1-\lambda^{z_1})(w^{z_1})^2(\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^{z_2})\lambda^{z_2}(w^{z2})^2)\\&> \lambda^{z_2}(1-\lambda^{z_2})(w^{z_2})^2(\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2),\end{aligned}$$

which can be rewritten as

$$\overline{f}_s\overline{f}_b\left[\lambda^{z_1}(1-\lambda^{z_1})(w^{z_1})^2 - \lambda^{z_2}(1-\lambda^{z_2})(w^{z_2})^2\right] > 0.$$

Consider again the equilibrium values reported in Lemma 1. It is clear that RE is always preferred to NE, as $\lambda^{RE} = \lambda^{NE}$ and $w^{RE} = w^{NE}$. RE is also preferred to SE if and only if

$$\lambda^{RE}(1-\lambda^{RE}) - \lambda^{SE}(1-\lambda^{SE}) > 0,$$

and since $\lambda^{RE} = \frac{1}{3}$ and $\lambda^{SE} = \frac{1}{4}$, it follows that the above is always satisfied. Hence, CS is always maximized by $z = RE$.

Producer surplus Producer surplus is straightforward to obtain. Given our distributional assumption on the opportunity cost of joining the platform, a seller in a product category gets on average half of the gains from trade retained after accounting for the platform fee. Therefore,

$$PS^z = n_s^z \left(\frac{1}{2}(1-\alpha_s^*)(1-\lambda^z)w^z(\beta+(1-\beta)n_b) \right)$$

and since $n_s = \frac{(1-\alpha_s^*)(1-\lambda^z)w^z(\beta+(1-\beta)n_b)}{\overline{f}_s}$,

$$PS^z = (n_s^z)^2 \frac{\overline{f}_s}{2}.$$

Since $\overline{f}_s$ is the same in all disclosure regimes, the one preferred by the sellers can be identified by direct comparison of n_s^z across the three regimes. In particular, regime z_1 is preferred to regime z_2 if and only if

$$\frac{\beta(1-\lambda^{z_1})w^{z_1}\overline{f}_b}{2[\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2]} > \frac{\beta(1-\lambda^{z_2})w^{z_2}\overline{f}_b}{2[\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_2})\lambda^{z_1}(w^{z_2})^2]}.$$

Since β and $\overline{f}_b$ are the same in all regimes, this condition is equivalent to

$$\begin{aligned}&\overline{f}_s\overline{f}_b[(1-\lambda^{z_1})w^{z_1}-(1-\lambda^{z_2})w^{z_2}]\\&>(1-\beta)w^{z_1}w^{z_2}(1-\lambda^{z_1})(1-\lambda^{z_2})[\lambda^{z_2}w^{z_2}-\lambda^{z_1}w^{z_1}].\end{aligned}$$

Taking the values λ^z and w^z from Lemma 1, it is immediate to see that RE is always preferred to NE since $\lambda^{RE}=\lambda^{NE}$ and $w^{RE} > w^{NE}$; RE is also preferred to SE if and only if

$$\overline{f}_s\overline{f}_b[(1-\lambda^{RE})-(1-\lambda^{SE})] > (1-\beta)w^2(1-\lambda^{RE})(1-\lambda^{SE})[\lambda^{SE}-\lambda^{RE}]$$

or, equivalently,

$$2\overline{f}_s\overline{f}_b > (1-\beta)w^2,$$

which is the expression given in Proposition 1.

B. Details on the consumer-seller interaction with duopoly sellers

This appendix reproduces the findings of Ali, Lewis, and Vasserman (2023) with duopoly sellers. Values for π and u as reported in the main text are derived for each of the three disclosure regimes. Values for $w=\pi+u$ and shares obtained by consumers (λ) and sellers ($1-\lambda$) follow immediately (where the sellers' share is gross of any payment to the platform).

Under the duopoly specification, consumers are uniformly distributed on $[0,1]$ and a consumer with characteristic x obtains utility $V-tx-p_1$ and $V-t(1-x)-p_2$ buying from sellers 1 and 2, respectively. Parameter t stands for the degree of product differentiation and V is the stand-alone utility assumed to be high enough to cover the market. Consumers make disclosure decisions and then sellers set prices simultaneously, where prices can be conditioned on the information received from consumers. Active disclosure leads to different equilibrium values under our assumptions on the equilibrium selection. Under each disclosure regime, trade is always efficient and, thus, total gains from trade can be shown to be $w = V - \frac{t}{4}$.

The "no evidence" case is the standard Hotelling setting: when consumers cannot disclose their location, sellers set the same equilibrium price for all consumers and split demand in the middle, every consumer purchases from the closer seller at uniform equilibrium prices $p_1^* = p_2^* = t$. A seller's equilibrium profit is $\pi^{NE} = \frac{1}{2}t$ and consumers can be shown to obtain on average $u = V - (5/4)t$.

Formally, consumers' participation condition is

$$u^{NE} = \int_0^{\hat{x}} (V - tx - p_1)dx + \int_{\hat{x}}^1 (V - t(x-1) - p_2)dx \geq c,$$

where $\hat{x}$ is the consumer indifferent between purchasing from either seller given prices – that is

$$V - t\hat{x} - p_1 = V - t(1-\hat{x}) - p_2 \quad \iff \quad \hat{x} = \frac{1}{2} + \frac{p_2 - p_1}{2t}.$$

Expected utility is then

$$u^{NE} = V - \hat{x}p_1 - (1-\hat{x})p_2 - \frac{t\hat{x}^2}{2} - \frac{t(1-\hat{x})^2}{2}.$$

The maximization problem of seller $i \in \{1, 2\}$ is straightforward; given a fixed demand (which then acts as a scalar and can be omitted):

$$\max_{p_i} \pi_i = p_i \left[\frac{1}{2} + \frac{p_j - p_i}{2t} \right],$$

where the term in square brackets is the standard Hotelling demand.

From the system of first-order conditions of profit maximization, we obtain equilibrium prices $p_1^* = p_2^* = t$, which, after plugging them into the expression for u^{NE} and π^{NE}, gives values

$$u^{NE} = V - \frac{5}{4}t, \qquad \pi^{NE} = \frac{1}{2}t.$$

Under the simple evidence disclosure regime, consumers can choose to disclose only their exact location to either, neither or both sellers by sending private messages $M_1(x), M_2(x)$ to sellers 1 and 2, respectively. Optimal disclosure by consumers in this setting is given in the following result:

Lemma 3. *(Propositions 6 and 7 in Ali, Lewis, and Vasserman, 2023) With simple evidence, the consumers' preferred equilibrium strategy is partial pooling and contains the following messages:*

$$(M_1^*(x), M_2^*(x)) = \begin{cases} ([0,1], \{x\}) & \text{if } x \in [0, \underline{x}], \\ (\{x\}, \{x\}) & \text{if } x \in (\underline{x}, \overline{x}), \\ (\{x\}, [0,1]) & \text{if } x \in [\overline{x}, 1]. \end{cases}$$

All consumers purchase from the closest seller.

In the above, $\underline{x}$ and $\overline{x}$ represent the consumer type who is indifferent between the general offer by seller 1 and a zero price offer by seller 2 and vice versa.

The intuition is the following: consumers have an incentive to disclose their location if and only if by doing so they are offered the product at a lower prices. Consumers located close to either of the sellers cannot realistically threaten to purchase from the distant seller. They choose not to disclose their location to the close seller and purchase at the general price offered by the closer seller. They do, however, have an incentive to disclose their location to the distant seller, since this will trigger a personalized zero price offer, which makes the constraint more binding. The general price offered by the seller is a constrained monopoly price directed at the segment of consumers closest to them, with the constraint stemming from the zero price offer made by the competitor.

Consumers located close to the middle of the distribution have an incentive to share their location to both sellers: by doing so, they communicate to their preferred seller that they are close enough to the competition to purchase from them if their price is low enough. This implies that sellers will compete in an asymmetric Bertrand model for each of these consumer locations: the consumer located at the center will receive a zero price offer from both sellers and those relatively closer to the center will face a price not far above zero (as in Thisse and Vives, 1988).

Compared to the no evidence case, the overall result of this interaction is a drop in prices for all consumers. The resulting profit and expected utility are $\pi^{SE} = \frac{3}{16}t$ and $u = V-(5/8)t$. Thus, consumers have a higher expected utility from trade than under no evidence, while simple evidence has a negative effect on sellers' profits because of more intense competition.

The expected utility of consumers depends on three threshold values for x: the consumer indifferent between seller 1's general offer and a zero price offer by seller 2 (*i.e.* $\underline{x}$), the consumer indifferent between seller 2's general offer and a zero price offer by seller 1 (i.e. $\overline{x}$) and the consumer indifferent between a zero price offer by both sellers (i.e. $\hat{x} = 1/2$). The expected utility under simple evidence is

$$\begin{aligned} u^{SE} = &\int_0^{\underline{x}} (V - tx - p_1)dx + \int_{\underline{x}}^{\hat{x}} (V - tx - p_1(x))dx \\ &+ \int_{\hat{x}}^{\overline{x}} (V - t(x-1) - p_2(x))dx + \int_{\overline{x}}^{1} (V - t(x-1) - p_2)dx, \end{aligned}$$

where $p_1(x)$ and $p_2(x)$ are the personalized prices consumer will get if they disclose to both sellers. These personalized prices are determined by

$$\begin{aligned} V - tx - p_1(x) = V - t(1-x) \quad &\Longleftrightarrow \quad p_1(x) = t(1-2x), \\ V - tx = V - t(1-x) - p_2(x) \quad &\Longleftrightarrow \quad p_2(x) = t(2x-1). \end{aligned}$$

The relevant thresholds can be obtained by setting equal the general offer of the closer seller and a zero price offer from the other (or, in the case of $\hat{x}$, confronting a zero price offer from both sellers), leading to

$$\underline{x} = \frac{1}{2} - \frac{p_1}{2t}, \qquad \hat{x} = \frac{1}{2}, \qquad \overline{x} = \frac{1}{2} + \frac{p_2}{2t}.$$

Plugging in all of the above and solving, we obtain that

$$u^{SE} = V - \frac{t}{4} - \underline{x}p_1 - (1-\overline{x})p_2 - t([x - x^2]_{\underline{x}}^{\hat{x}} + [x^2 - x]_{\hat{x}}^{\overline{x}})$$
$$= V - \frac{t}{4} - \left(\frac{1}{2} - \frac{p_1}{2t}\right)p_1 - \left(\frac{1}{2} - \frac{p_2}{2t}\right)p_2 - t\left(\frac{p_1^2 + p_2^2}{4t^2}\right),$$

which leads to

$$u^{SE} = V - \frac{2(p_1 + p_2) + t}{4} + \frac{p_1^2 + p_2^2}{4t}.$$

The sellers' maximization problem with given demand under "simple evidence" is

$$\max_{p_i} \pi_i = \left[p_i\left(\frac{1}{2} - \frac{p_i}{2t}\right) + \left(\frac{p_i^2}{4t}\right)\right],$$

where $(\frac{p_i^2}{4t})$ are the profits sellers make by selling to consumers at personalized prices. The optimal base price $(p_1 = p_2 = \frac{t}{2})$ can be found from the first-order conditions. It then follows that

$$f_b^{SE} = V - \frac{5}{8}t, \qquad \pi^{SE} = \frac{3}{16}t.$$

Consider now the consumers' "rich evidence" disclosure strategy. When consumers have more control over their information, they can achieve the same equilibrium found in the "simple evidence" case, but there exists an equilibrium in which their expected utility is even higher. As shown in Ali, Lewis, and Vasserman (2023), the optimal disclosure strategy for consumers in this case is to partially pool messages to the closer seller in a way that mirrors the optimal constrained price on the remaining demand given other consumers' messages, a procedure that, without additional constraints to the messages, can be iterated infinitely. This generates an infinite set of prices offered by both sellers targeting different consumer segments. Prices decrease as the targeted segment is further away from the seller's location.

Consumers' expected utility reflects the associated partition. We define prices $p_{i,k}$ and thresholds $\underline{x}_k$ and $\overline{x}_k$, $k = 0, 1, ...$ as follows:

- $\{p_{i,k}\}_{k=0,1,...}$ offered by seller $i = 1, 2$ is such that $p_{i,k} \geq p_{i,k+1} \geq 0 \ \forall k$,
- $\{\underline{x}_k\}_{k=0,1,...}$ are such that $\underline{x}_0 = 0$ and $\underline{x}_k : \frac{1}{2} - \frac{p_{1,k-1}}{2t} \ \forall k > 0$,
- $\{\overline{x}_k\}_{k=0,1,...}$ are such that $\overline{x}_0 = 1$ and $\overline{x}_k : \frac{1}{2} + \frac{p_{2,k-1}}{2t} \ \forall k > 0$.

Each price $p_{i,k}$ determines a segment that ends at threshold location x_{k+1} and starts at location x_k, which is either the same location at which the segment determined by the previous, weakly higher price $p_{i,k-1}$ ends or the relevant border location ($\underline{x}_0 = 0$ or $\overline{x}_0 = 1$). The threshold themselves are such that consumers at the end of a segment are indifferent between the relevant "group" price offered by the closer seller and a zero price offered by the distant one. As k grows, prices go down and segments shrink in size and get closer and closer to the center of the distribution; at the limit, $p_{i,\infty} = 0, i = 1, 2$ and $\underline{x}_\infty = \overline{x}_\infty = \frac{1}{2}$.

The following lemma summarizes the findings of Ali, Lewis, and Vasserman (2023):

Lemma 4. *(Propositions 6 and 8 in Ali, Lewis, and Vasserman, 2023) With rich evidence, there exists an equilibrium in which a consumer's reporting strategy is to send the following message to both sellers:*

$$M^*(x) = \begin{cases} (\underline{x}_k, \underline{x}_{k+1}] & \text{if } \underline{x}_k < x \leq \underline{x}_{k+1}, \\ (\overline{x}_{k+1}, \overline{x}_k] & \text{if } \overline{x}_{k+1} > x \geq \overline{x}_k, \\ \frac{1}{2} & \text{if } x = 1/2. \end{cases}$$

After receiving such messages, the closer seller i charges p_i^k and distant seller j charges 0. *All consumers purchase from the closest seller. This is the consumer-preferred equilibrium.*

Since consumers are not limited to fully revealing their location anymore, they can make better use of the information asymmetry to lower prices even further compared to the "simple evidence" case. To understand why this works, consider again the equilibrium disclosure in the simple evidence case. Consumers located at the extremes purchase at the constrained monopoly price as mentioned above. Consumers located in the center could only share their exact location and, by doing so, trigger low personalized prices by making said constraint more binding. Suppose however that sellers could not exactly identify consumers beyond them being "central", "very close", or "very far". When setting the price for the central group of consumers, they would set another constrained monopoly price to maximize profit in that section. The consumers' optimal strategy is then to distinguish themselves: those that would happily purchase at such a price and those who would do better by disclosing their "even more central" location. This procedure can be iterated infinitely on the "leftover" segment of consumers: in equilibrium, then, the only consumers fully revealing their location to both sellers are the central ones ($x = \frac{1}{2}$), who then receive a zero price offer from both sellers. By mirroring the constrained monopoly prices given the truncated distribution of other consumers, then, consumers can achieve a higher expected utility, again at the expense of sellers. The resulting profit and expected utility can be shown to be $\pi^{RE} = \frac{1}{6}t$ and $u = V - (7/12)t$ respectively.

Formally, expected utility given the buyers' preferred disclosure strategy is

$$u^{RE} = \sum_{k=0}^{\infty} \left\{ \int_{\underline{x}_k}^{\underline{x}_{k+1}} (V - tx - p_{1,k}) dx \right\} + \\ + \sum_{k=0}^{\infty} \left\{ \int_{\overline{x}_{k+1}}^{\overline{x}_k} (V - t(1-x) - p_{1,k}) dx \right\},$$

which can be rewritten as follows:

$$\begin{aligned} u^{RE} &= V - \frac{t}{4} \\ &- \left\{ p_{1,0} \left[\frac{1}{2} - \frac{p_{1,0}}{2t} \right] + p_{1,1} \left[\frac{1}{2} - \frac{p_{1,1}}{2t} - \frac{1}{2} + \frac{p_{1,0}}{2t} \right] + \dots \right\} \\ &- \left\{ p_{2,0} \left[\frac{1}{2} - \frac{p_{2,0}}{2t} \right] + p_{2,1} \left[\frac{1}{2} - \frac{p_{2,0}}{2t} - \frac{1}{2} + \frac{p_{2,1}}{2t} \right] + \dots \right\}. \end{aligned}$$

Thus, we have

$$u^{RE} = V - \frac{2(p_1 + p_2) - t}{4} + \frac{\sum_{k=0}^{\infty}[p_{1,k}(p_{1,k} - p_{1,k+1}) + p_{2,k}(p_{2,k} - p_{2,k+1})]}{2t}.$$

The sellers' maximization problems given a fixed demand are

$$\begin{aligned} \max_{\{p_{1,k}\}_{k=0,1,...}} \pi_1 &= \left[\sum_{k=0}^{\infty} p_{1,k}\left(\underline{x}_{k+1} - \underline{x}_k\right)\right], \\ \max_{\{p_{2,k}\}_{k=0,1,...}} \pi_2 &= \left[\sum_{k=0}^{\infty} p_{2,k}\left(\overline{x}_k - \overline{x}_{k+1}\right)\right]. \end{aligned}$$

The optimal disclosure inducing optimal constrained monopoly pricing on the truncated distribution of consumers makes solving the maximization problem straightforward. Rearranging the system of first-order conditions of profit maximization, gives equilibrium prices

$$p^*_{i,k} = \frac{t}{2^{k+1}} \quad k = 0, 1, 2, ...$$

and the respective segments of consumers are immediately identifiable. For buyers closer to seller 1 (seller 2), the optimal message defines the relevant segment and can be expressed as:

$$M(x) = \{[\underline{x}_k, \underline{x}_{k+1}) : \underline{x}_k \le x \le \underline{x}_{k+1}\}$$

$$(M(x) = \{(\overline{x}_{k+1}, \overline{x}_k] : \overline{x}_{k+1} \le x \le \overline{x}_k\})$$

for $k = 0, 1, 2, ...$

The per-consumer profit can be then expressed as

$$\begin{aligned} \pi_i &= \frac{t}{2} \cdot \frac{1}{4} + \frac{t}{4} \cdot \frac{1}{8} + \frac{t}{8} \cdot \frac{1}{16} + \ldots \\ &= \frac{t}{2} \sum_{k=1}^{\infty} \left(\frac{1}{4}\right)^k = \frac{t}{6}. \end{aligned}$$

Finally, equilibrium prices lead to $u^{RE} = V - \frac{7}{12}t$ and $\pi^{RE} = \frac{1}{6}t$.

C. Duopoly sellers

This appendix shows Proposition 2 and proceeds along the same lines as the version with monopoly sellers in Appendix A.

Profit-maximizing platform Platform profits are given by

$$\Pi^z = \frac{\beta^2(1-\lambda)^2 w^2 \overline{f}_b}{4[2\overline{f}_s \overline{f}_b - (1-\beta)(1-\lambda^z)\lambda^z(w^z)^2]}.$$

Since β, $\overline{f}_b$, and w are common across regimes, it holds that $\pi^{z_1} > \pi^{z_2}$ if and only if

$$(1-\lambda^{z_1})^2(2\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^{z_2})\lambda^{z_2}w^2) \\ > (1-\lambda^{z_2})^2(2\overline{f}_s\overline{f}_b - (1-\beta)(1-\lambda^{z_1})\lambda^{z_1}w^2),$$

which, after rearranging, is equivalent to

$$2\overline{f}_s\overline{f}_b[(1-\lambda^{z_1})^2 - (1-\lambda^{z_2})^2] \\ > (1-\beta)w^2(1-\lambda^{z_1})(1-\lambda^{z_2})[(1-\lambda^{z_1}) - (1-\lambda^{z_2})].$$

Consider λ^z, w^z for all the regimes as in Lemma 2. The inequality above implies that RE is preferred to SE as long as

$$128\overline{f}_s\overline{f}_b - 3(1-\beta)t(8w-3t) > 9(18\overline{f}_s\overline{f}_b - (1-\beta)t(3w-t))$$

or, equivalently,

$$3t(1-\beta)w > 34\overline{f}_s\overline{f}_b.$$

SE is preferred to NE as long as

$$9(2\overline{f}_s\overline{f}_b - (1-\beta)t(w-t)) > 128\overline{f}_s\overline{f}_b - (1-\beta)3t(3w-t))$$

or, equivalently,

$$3t(1-\beta)w > 22\overline{f}_s\overline{f}_b.$$

Finally, RE is preferred to NE as long as:

$$2\overline{f}_s\overline{f}_b - (1-\beta)t(w-t) > 18\overline{f}_s\overline{f}_b - (1-\beta)t(3w-t))$$

or, equivalently,

$$t(1-\beta)w > 8\overline{f}_s\overline{f}_b.$$

The former two conditions are equivalent to the threshold conditions reported in Proposition 2. The last condition can be shown to be never relevant: since it holds that RE is preferred to NE if and only if:

$$w > \frac{8\overline{f}_s\overline{f}_b}{(1-\beta)t} = \tilde{w}$$

and since $w_1^P < \tilde{w} < w_2^P$, the result in Proposition 2 follows immediately.

Consumer surplus All observations made for the monopoly case still apply, and the expression for consumer surplus is unchanged:

$$CS^z = (1-\beta)\frac{(\lambda^z w^z n_s^z)^2}{2\overline{f}_b} + \beta(\lambda^z w^z n_s^z).$$

Therefore, it holds that $CS^{z1} > CS^{z1}$ if and only if

$$\overline{f}_s\overline{f}_b(w)^2\left[\lambda^{z_1}(1-\lambda^{z_1}) - \lambda^{z_2}(1-\lambda^{z_2})\right] > 0.$$

Since it holds that

$$\lambda^{RE}(1-\lambda^{RE}) = \frac{t}{3w}\frac{3w-t}{3w}, \quad \lambda^{SE}(1-\lambda^{SE}) = \frac{3t}{8w}\frac{8w-3t}{8w}, \quad \lambda^{NE}(1-\lambda^{NE}) = \frac{t}{w}\frac{w-t}{w},$$

and since t and w are the same in all regimes, it follows that RE is preferred to SE if and only if

$$\frac{3w-t}{9} > \frac{3(8w-3t)}{64} \iff w < \frac{17}{24}t;$$

SE is preferred to NE if and only if

$$\frac{3(8w-3t)}{64} > w-t \iff w < \frac{11}{8}t;$$

and, finally, RE is preferred to NE if and only if

$$\frac{3w-t}{9} > w-t \iff w < \frac{4}{3}t.$$

Since $\frac{17}{24} < \frac{4}{3} < \frac{11}{8}$, the last condition is never relevant. The result given in Proposition 2 follows immediately.

Producer surplus The observations made in the monopoly seller case still apply, and the expression for producer surplus is unchanged since surplus of both sellers per product category are included:

$$PS^z = (n_s^z)^2\frac{\overline{f}_s}{2}.$$

Since $\overline{f}_s$ is the same in all disclosure regimes, the one preferred by the sellers can be identified by direct comparison of n_s^z across the three regimes. Regime z_1 is preferred to regime z_2 if and only if

$$\frac{\beta(1-\lambda^{z_1})w^{z_1}\overline{f}_b}{2[2\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_1})\lambda^{z_1}(w^{z_1})^2]} > \frac{\beta(1-\lambda^{z_2})w^{z_2}\overline{f}_b}{2[2\overline{f}_s\overline{f}_b-(1-\beta)(1-\lambda^{z_2})\lambda^{z_1}(w^{z_2})^2]}.$$

Since β, $\overline{f}_b$, and w are the same in all regimes, this condition is equivalent to

$$2\overline{f}_s\overline{f}_b > (1-\beta)w^2(1-\lambda^{z_1})(1-\lambda^{z_2}).$$

We have that $(1-\lambda^{RE}) = \frac{t}{3w}$, $(1-\lambda^{SE}) = \frac{3t}{8w}$, and $(1-\lambda^{NE}) = \frac{t}{w}$. Hence, RE is preferred to SE if and only if $2\overline{f}_s\overline{f}_b > (1-\beta)\frac{1}{8}t^2$; SE is preferred to NE if and only if $2\overline{f}_s\overline{f}_b > (1-\beta)\frac{3}{8}t^2$; SE is preferred to NE if and only if $2\overline{f}_s\overline{f}_b > (1-\beta)\frac{1}{3}t^2$. The last condition is never relevant. Therefore, the sellers' preferred disclosure regime is the one stated in Proposition 2.

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