Search Costs, Hassle Costs, and Drip Pricing: Equilibria with Rational Consumers and Firms

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Abstract

This paper examines drip pricing related to compulsory charges—a situation where firms intentionally make it costly for consumers to discover mandatory fees or surcharges that "drip" into the full (total) price, which is only revealed after incurring the hassle cost of completing a purchase. We show that drip pricing can arise as an equilibrium phenomenon with fully rational consumers and profit-maximizing firms. We also show that, when consumers and firms are rational, (a) situations where drip pricing raises prices and harms consumers are unlikely to arise from unilateral business decisions, and that (b) the most likely avenue by which drip pricing harms consumers is through the coordinated adoption of drip pricing.

1 Introduction

This paper provides an equilibrium analysis of drip pricing—a business strategy in which a firm intentionally fails to disclose the total (full, or all-in) price of a product or bundle until the end of the buying process. For example, a consumer might visit a hotel's website, expend time and effort navigating through various pages, enter her address and credit card information and so on before ultimately reaching the checkout page—only then discovering a higher total price owing to a mandatory resort fee. Recently, such strategies have come under scrutiny by the Federal Trade Commission (FTC), who sent the following warning to one or more hotels:

> "We reviewed your website...and found that in at least some instances mandatory resort fees are not included in the reservation rate quoted to consumers. We strongly encourage you to review your company's website to ensure you are not misrepresenting the total price consumers can expect to pay when making a reservation to stay in your hotel. Please be advised that the FTC may take action to enforce and seek redress for any violations of the FTC Act as the public interest may require."[1]

Similar concerns have been raised by the Department of Transportation (DOT), the former Office of Fair Trading (OFT) in the UK, and other agencies charged with protecting consumers from unfair business practices.[2] Much of this concern derives from the observation that drip pricing may permit firms to exploit consumer irrationality to increase prices and, consequently, harm consumers.

[1] https://www.ftc.gov/sites/default/files/attachments/press-releases/ftc-warns-hotel-operators-price-quotes-exclude-resort-fees-other-mandatory-surcharges-may-be/121128hoteloperatorsletter.pdf

[2] See, for instance, Sullivan (2017), DOT (2011, 2012), and OFT (2010a,b).

It is widely believed that behavioral biases are *necessary* to justify mandatory disclosure policies that prevent drip pricing.[3] Jovanovic (1982) identifies conditions in which "...the free market offers ample incentives for disclosure..." and, in his model, there is "...no support for a policy that makes business disclosure mandatory."[4] Brown, *et al.* (2010) and Sullivan (2017) correctly note that these and related models (e.g., Milgrom, 1981) are based on the assumption that consumers are fully rational. Largely for this reason, much of the economics literature justifying policies to prevent drip pricing is based on models with irrational consumers. The interested reader is encouraged to read Ahmetoglu, *et al.* (2010) and Sullivan (2017) for a discussion of the theoretical and empirical literature on behavioral economics and its relevance to drip pricing.

The present paper focuses on drip pricing related to compulsory surcharges (rather than optional add-on charges) in an environment where consumers and firms are fully rational. In this setting, consumers have full information about everything but price, and hence do not gain any new information about product quality or add-on options during the buying process. Instead, consumers discover information about mandatory fees and surcharges that "drip" into the total price—the actual price paid— which is only revealed at the end of the process.[5] We show that the conventional wisdom—that drip pricing regarding compulsory charges cannot harm rational consumers—is incomplete. Harm from drip pricing depends on the "hassle costs" (e.g., the time and

[3] See, for instance, the surveys by Ahmetoglu (2010), Sullivan (2017) and the OFT (2010a,b).

[4] Jovanovic (1982, p. 42).

[5] An important difference between discovering the price of optional features versus compulsory fees is that the former entails changes in the nature/quality of the product or "bundle" purchased during the buying process (resulting in additional revenues to the firm only if a consumer opts for add-ons), while the latter does not.

effort required to discover the total price) imposed on consumers. Indeed, we show that with fully rational consumers and firms, a continuum of drip pricing equilibria can arise in which consumers pay higher average prices as a result of firms' injection of frictions into the price discovery process. The magnitude of the hassle costs orders prices and consumers welfare in these equilibria.

It is important to stress that drip pricing comes in many flavors, some of which might benefit consumers. For instance, a firm may engage in drip pricing because disclosing the total price up front is costly and/or would confuse consumers. Product complexity may make it difficult for a firm to initially disclose the total price when the total price depends on optional or add-on features selected by particular consumers. For these sorts of reasons, many custom-home builders do not disclose the total price up front, as this price depends on a plethora of customer-specific options including the structure (brick or vinyl) and other features that vary in price, grade and/or quality (e.g., paint/wall paper, appliances, molding, energy efficiency, and so on). Our analysis does not incorporate these considerations although, in some settings, they may be important.

We model the disclosure and discovery of price information as endogenous decisions of rational firms and consumers. Consumers engage in optimal non-directed sequential search to visit sellers' websites and possibly purchase a product of known quality. The cost of navigating to a particular firm's website—the traditional search cost—is positive and exogenous, but potentially negligible. Unlike traditional search models, landing on a firm's website need not reveal full price information to consumers. Instead, a consumer only discovers the total price by incurring the hassle of navigating the firm's website to reach the checkout page—that is, by bearing the hassle cost imposed by the firm. Thus, a consumer makes two choices when visiting a firm: whether to incur the hassle cost and whether to buy. Each profit-maximizing firm unilaterally decides on the amount of hassle to impose on potential customers. Intuitively, hassle costs are zero if a firm does not engage in drip pricing, and positive if price information drips out as the consumer navigates to the firm's checkout page. In addition to choosing its level of hassle costs, each firm sets a price for its product. A firm's profit-maximizing price generally depends on marginal cost, which varies across firms, and consumer demand.

We show that, when an individual firm engages in drip pricing, it does not change a rational consumer's reservation price and hence does not impact equilibrium search or pricing behavior. In contrast, if all firms in an industry engage in drip pricing, rational consumers raise their reservation prices, which softens price competition and reduces overall consumer welfare. Whether the option to engage in drip pricing matters depends on firms' cost of creating hassle (along with consumers' cost of incurring it). Our Propositions 1 through 3 show that whether consumers are harmed depends on who bears costs of price disclosure and discovery. To the best of our knowledge, we are the first to examine equilibrium when drip pricing is costly for consumers, firms, or both.

We begin by presenting the model and our results, and then conclude with a discussion of some potential policy implications and important caveats of Propositions 1 through 3 when taken as a whole.

2 Model and Results

2.1 Model

Consider an environment where firms engage in price competition. A given firm privately learns its marginal cost, m, which we view as an *iid* realization from a continuous distribution with cdf $G(m)$ on $[\underline{m}, \overline{m}]$, where $\underline{m} \geq 0$ and $\overline{m} < \infty$. When there is no ambiguity, we also refer to m as a firm's type; thus, p denotes a generic price and p_m denotes the price charged by a firm of type m (e.g., a firm with marginal cost, m). Two steps are required to purchase a product. First, a consumer must incur (an exogenous) search cost, $c > 0$, to visit a firm's website. Next, a consumer must incur the (potentially endogenous) hassle cost, $\kappa_m \geq 0$, of navigating through firm m's website to its checkout page to discover its total price, and determine whether and how much to buy. Hassle costs may vary across firms; different values of κ represent different possible consumer experiences from arrival to checkout. Low values represent circumstances where price discovery is relatively straightforward; high values of κ represent situations where price discovery is time-consuming and arduous. In practice, firms may achieve the latter by requiring consumers to navigate to additional pages to learn the price. For simplicity, we assume that a consumer observes the hassle cost κ_m of navigating the website of firm m on reaching the checkout page, at which point these costs have already been incurred.[6]

[6]Our results are robust to when a consumer learns about hassle costs. In particular, all of our propositions hold for the opposite polar case where the consumer learns the amount of hassle costs before incurring them. One may also readily extend our results to an environment where there is a potentially large number of unknown stages (or pages to navigate) to reach firm m's checkout page. For example, if the number of stages is Poisson distributed, forward-looking expectations regarding

A consumer who visits n firms, obtains a price quote from each, and purchases $q(p)$ units from a firm charging a price, p, obtains (indirect) utility

$$V = v(p) + Y - \left(cn + \sum_{m \in N} \kappa_m \right)$$

where N denotes the set of firms visited and Y is income. By Roy's identity, a representative consumer's demand is $q(p) \equiv -v'(p)$. Following Reinganum (1979), we assume (a) consumers have identical isoelastic demands given by $-v'(p) = q(p) = p^{\varepsilon}$, where $\varepsilon < -1$; thus, firm m's monopoly price is:

$$\rho_m \equiv \left(\frac{\varepsilon}{1+\varepsilon} \right) m$$

(b) consumers engage in optimal non-directed sequential search with free recall, and (c) consumers find it optimal to search at least once.[7] In our model, a sufficient condition for (c) is that hassle costs have a finite upper bound, $\overline{\kappa}$, such that $\kappa_m \leq \overline{\kappa} \equiv v(\rho_{\overline{m}}) - c$ for all m. That is, a consumer would be willing to incur search cost c for the privilege of purchasing at the monopoly price of the firm with the highest marginal cost, even if doing so entailed the highest possible hassle cost. Note that the Reinganum model is nested as the special case where hassle costs are zero. As in Reinganum, we assume that consumers are endowed with rational beliefs regarding firm decisions, and these beliefs are unaffected by particular search realizations.

hassle costs are memoryless and thus one may view κ_m as the expected incremental hassle cost a consumer must incur to discover firm m's total price.

[7] For details, see Reinganum (1979) or Baye, *et al.* (2006).

2.2 Equilibrium with Exogenous Hassle Costs

As a benchmark, consider an environment where hassle costs κ are exogenous and common across firms.[8] This might represent a situation where, for reasons outside the model, all the firms' websites have the same "look and feel" and the consumer must navigate the same number of pages to discover the total price. Later, we shall relax the assumption that the checkout price is the firm's only strategic variable.

Lemma 1 *Suppose hassle costs are identical across firms. Then optimal search requires a consumer to obtain a price quote from every firm visited.*

Proof. By way of contradiction, suppose a consumer visits n firms but only observes $l < n$ prices. The best price observed is $z \equiv \min(p_1, p_2, ..., p_l)$.

(a) If the consumer stops searching and buys, her utility is

$$\begin{aligned} & v(z) + M - nc - l\kappa \\ < \quad & v(z) + M - lc - l\kappa \end{aligned}$$

which is a contradiction since the consumer strictly gains by obtaining the same price information (z) by visiting to only l firms.

(b) If the consumer stops searching and does not buy, her utility is

$$\begin{aligned} & M - nc - l\kappa \\ < \quad & M - lc - l\kappa \end{aligned}$$

which is also a contradiction.

[8] The assumption that all firms are endowed with the same level of hassle costs is of no consequence. One may instead interpret κ as the expected hassle costs at a randomly sampled firm without affecting any results.

(c) If the consumer continues searching, the cost of obtaining another price quote is $c+\kappa$. But this method of searching is not optimal; since $l < n$ and $\kappa < c+\kappa$; thus, the most efficient way for a consumer to obtain an additional price quote is to incur κ to observe the price charged by a firm already visited.

We conclude that optimal search requires the consumer to obtain a price quote at every firm visited. ■

The main idea behind the lemma is simple. On arriving at a firm's website, the consumer can incur the hassle cost κ to obtain a price quote from the current firm, or expend $c+\kappa$ to obtain a price quote from a different firm. Since the consumer does not engage in directed search, the expected price quote is independent of the firm visited; she strictly gains by discovering the price at the current firm rather than sampling another firm.

An optimizing consumer compares the expected benefits of searching again to the prospective costs (including hassle costs), $c+\kappa$. Thus, analogous to Reinganum, equilibrium consists of a reservation price and a distribution of prices associated with a search cost $c+\kappa$, denoted $r_{c+\kappa}$, and $F_{c+\kappa}(p)$, such that neither consumers nor firms can gain by deviating. In such an equilibrium, each firm charges the minimum of its monopoly price, $\rho_m = \left(\frac{\varepsilon}{1+\varepsilon}\right) m$, and the reservation price, $r_{c+\kappa}$. Since marginal costs vary across firms according to $G(m)$, this induces a distribution of prices with support $\left[\rho_{\underline{m}}, r_{c+\kappa}\right]$ and cdf

$$F_{c+\kappa}(p) = \begin{cases} G\left(\frac{1+\varepsilon}{\varepsilon} p\right) & \text{if} \quad p < r_{c+\kappa} \\ 1 & \text{if} \quad p = r_{c+\kappa} \end{cases}$$

where the reservation price satisfies[9]

$$\int_{\underline{p}}^{r_{c+\kappa}} \left(v\left(p\right) - v\left(r_{c+\kappa}\right)\right) dF_{c+\kappa}\left(p\right) = c + \kappa \tag{1}$$

The *reservation price*, $r_{c+\kappa}$, represents the highest acceptable price to a consumer. At higher prices, a consumer strictly gains from obtaining another price quote; at lower prices, she strictly gains from buying. Hence, consumer behavior is optimal given the price distribution $F_{c+\kappa}$. Likewise, no firm can gain by altering its price. Clearly, a firm whose monopoly price lies below $r_{c+\kappa}$ can do no better by deviating. A firm whose monopoly price lies above the reservation price optimally charges $r_{c+\kappa}$ since it earns less by charging a lower price and, since all prices $p > r_{c+\kappa}$ are rejected, earns nothing by charging a higher price. Hence, firms of all types are behaving optimally. In such an equilibrium, a firm of type m earns profits of [10]

$$\pi_m = \begin{cases} \left(\rho_m - m\right) q\left(\rho_m\right) & \text{if } \rho_m \leq r_{c+\kappa} \\ \left(r_{c+\kappa} - m\right) q\left(r_{c+\kappa}\right) & \text{if } \rho_m > r_{c+\kappa} \end{cases}$$

Note that $\pi_m > 0$ for all m. For future reference, we refer to these pricing, search, and buying strategies as a "Reinganum $c + \kappa$ equilibrium." We formalize these observations as:

Proposition 1 *Suppose that hassle costs, $\kappa \leq \overline{\kappa}$, are exogenous and identical across firms. Then there exists a Reinganum $c + \kappa$ equilibrium.*

In the equilibrium identified in Proposition 1, all firms have identical hassle costs exogenously given by $\kappa > 0$. Rational consumers optimally respond by setting a higher reservation price ($r_{c+\kappa}$) than they would in a situation where hassle costs are

[9]Like Reinganum, we assume an interior solution for the reservation price. Baye, *et al.* (2006) also characterize corner cases.

[10]Without loss of generality, we assume that the number of consumers per firm is unity.

absent (r_c). While the presence of common, industry-wide hassle costs do not impact the prices charged by firms with low marginal costs ($\rho_m \leq r_c$), firms with higher marginal costs increase their prices. In particular, firms whose monopoly price lies in the interval $[r_c, r_{c+\kappa}]$ increase prices to their monopoly level, ρ_m, while firms whose monopoly prices are above $r_{c+\kappa}$ raise their prices to the match the new reservation price. In short, adding exogenous hassle costs $\kappa > 0$ raise industry profits and average prices, but lowers consumer welfare compared to the absence of hassle costs.

This implication of Proposition 1—that hassle costs associated with price discovery lead to higher prices and lower consumer welfare—might lead one to conclude that individual firms have incentives to engage in drip pricing. In the next section, we examine this more formally.

2.3 Equilibrium with Endogenous Hassle Costs

Having examined the extreme case where firms have no control over their hassle costs, we now examine the opposite extreme where firms completely control their hassle costs. Suppose that, prior to consumer search, firms simultaneously (but independently) choose their prices and hassle costs. Then we obtain the following:

Proposition 2 *When it is costless for firms to impose endogenous hassle costs, there exists a continuum of Reinganum* $c+\kappa$ *equilibria where all firms impose identical hassle costs* $\kappa \in [0, \overline{\kappa}]$.

Proof. It follows immediately from Proposition 1 that a consumer cannot gain by deviating from a reservation price $r_{c+\kappa}$, given firm strategies in the putative equilibrium. Likewise it follows from Proposition 1 that no firm can unilaterally gain by changing its price under in the putative equilibrium. It remains to show that no firm can gain by altering κ, with or without a price deviation.

Suppose a firm unilaterally deviates, such that a consumer observes (p, κ') at checkout. If the consumer stops searching, her utility is

$$v(p) + M - c - \kappa'$$

If the consumer rejects the offer and searches again, her expected utility is

$$\begin{aligned} & F_{c+\kappa}(p)\left(\int_{\underline{p}}^{p} v(z)\frac{dF_{c+\kappa}(z)}{F_{c+\kappa}(p)}\right) + [1 - F_{c+\kappa}(p)]\, v(p) + (M - 2c - \kappa' - \kappa) \\ = & \int_{\underline{p}}^{p} v(z)\, dF_{c+\kappa}(z) + [1 - F_{c+\kappa}(p)]\, v(p) + (M - 2c - \kappa' - \kappa) \end{aligned}$$

Differencing, the expected gain from rejecting the firm's offer and searching again is

$$\int_{\underline{p}}^{p} [v(z) - v(p)]\, dF_{c+\kappa}(z) - c - \kappa$$

Since this expression equals zero at $p = r_{c+\kappa}$, such a deviation has no impact on the consumer's reservation price; $r_{c+\kappa}$ remains the same regardless of a deviation in κ. And hence, a firm cannot gain by altering its price. Therefore the consumer's strategy remains optimal and so the firm gains nothing by altering its price. ■

Proposition 2 shows that each of the equilibria identified in Proposition 1 with $\kappa \in [0, \overline{\kappa}]$ can arise when hassle costs are endogenous. This highlights that the level of drip pricing prevailing in any given market is the result of a coordination problem. Proposition 2 understates the degree of the coordination problem. For example, for any non-degenerate distribution of hassle costs with mean κ and support $S \subseteq [0, \overline{\kappa}]$, Proposition 2 still holds. Regardless of the realized hassle cost of discovering a particular firm's price, a consumer's purchase decision depends on her prospective evaluation of the (expected) cost of obtaining an additional price quote, which is $c + \kappa$. Note that the continuum of equilibria are Pareto ordered; equilibria in which the industry coordinates on higher levels of hassle costs result in greater industry profits (and lower consumer welfare). We summarize this observation as:

Corollary 1 *When firms act in concert to raise the costs of price discovery, industry profits rise and consumer welfare falls.*

Depending on the nature of industry coordination, Corollary 1 has potential ramifications for whether Section I of the Sherman Act or Section 5 of the FTC Act is the most appropriate avenue to pursue enforcement actions regarding drip pricing.[11]

Finally, note that the reduction in consumer welfare associated with equilibria with positive hassle costs does *not* stem from an individual firm "surprising" consumers with an unexpectedly high hassle cost or price. Faced with such a situation, the consumer evaluates the firm's offer against the value of an additional search, which is unchanged by encountering unexpectedly high hassle costs. Hence, even though a firm can surprise rational consumers with a high hassle cost, it gains nothing by doing so. To summarize:

Corollary 2 *Acting alone, a firm cannot gain by surprising consumers or raising the cost of discovering its price.*

We conclude this section by noting that our finding that drip pricing can harm fully rational consumers is fragile. It turns out that, if firms must incur any expense whatsoever to raise their hassle costs above some status quo level, denoted $\hat{\kappa} \in [0, \overline{\kappa})$, they will never do so. This conclusion holds regardless of whether one views $\hat{\kappa}$ as the lowest feasible level of hassle costs, the socially efficient level of hassle costs, or merely an arbitrary level.

[11] Section I of the Sherman Act prohibits agreements by firms to coordinate on higher prices, while Section 5 of the FTC Act prevents "unfair" business practices.

Proposition 3 *Suppose hassle costs are endogenous and that it is costly for firms to increase them above some status quo,* $\hat{\kappa}$*. Then there does not exist an equilibrium in which firms impose hassle costs above the status quo.*

Proof. Let $C(\kappa) \geq 0$ denote the cost of increasing hassle costs to $\kappa \geq \hat{\kappa}$, with $C(\kappa) = 0$ if and only if $\kappa = \hat{\kappa}$. Since firms choose strategies simultaneously, independently, and are *ex ante* identical, it follows that a representative consumer's optimal stopping rule consists of a reservation price, r'. Given this stopping rule, a firm of type m optimally charges $p_m = \min\{\rho_m, r'\}$.

Suppose to the contrary that there exists an equilibrium where some firm chooses p_m and sets $\kappa_m > \hat{\kappa}$. Since, by choosing $\kappa_m > \hat{\kappa}$, a firm of type m incurs added costs of $C(\kappa_m) > 0$, it follows that such a firm can gain $C(\kappa_m)$ by charging p_m but deviating to $\kappa_m = \hat{\kappa}$. Thus, no firm will choose $\kappa_m > \hat{\kappa}$ in equilibrium. ■

Proposition 3 illustrates that, while the industry as a whole may benefit (at the expense of consumers) from hassle costs that soften price competition by raising consumers' costs discovering prices, there is a free-rider problem when it is costly to create price discovery barriers. While all firms would like their brethren to construct such barriers, they are not keen on doing it themselves.

Corollary 3 *If it is costly for firms to impose hassle costs, they never do so unilaterally.*

In the next section we conclude by discussing the implications of these results for drip pricing policies. We also highlight several caveats and additional questions that these results raise.

3 Discussion

This section connects our findings to practice and policy. We primarily focus on drip pricing related to compulsory charges, i.e., where the consumer desires a specific item and must undergo some inconvenience (hassle) to learn the full price a given seller charges. As we have already mentioned, our formal results do not pertain to add-on pricing or more exotic pricing practices that may (or may not) have efficiency rationales.

Central to all of our results is this: Even when consumers and firms are fully rational, industry-wide drip pricing can raise average prices, increase industry profits, and harm consumers. The larger is the hassle to consumers of discovering firms' all-in prices, the greater is the magnitude of the potential effect.

One might be tempted to view the role of drip pricing and, more broadly, the practice of unnecessarily inconveniencing consumers for strategic advantage, merely as a disguised version of the Diamond Paradox, where search frictions provide the seller with maximal leverage in negotiating with a "captive" consumer, allowing it to charge its monopoly price. This is not the potential source of harm from drip pricing that we identify. Instead, firms derive leverage as a consequence of the consumer's cost to searching *elsewhere*—no seller gains by employing drip pricing to inconvenience its own customers.

Even acting in concert, firms with the lowest marginal costs gain *nothing* from drip pricing, as they already have maximal leverage and thus charge monopoly prices. Competition from these firms (with the lowest monopoly prices) constrains the prices of firms with moderate and high marginal costs. The imposition of industry-wide hassle costs relaxes this constraint. Firms with moderate marginal costs begin charging monopoly prices. Those with the highest costs raise their price to the (now higher) reservation level.

Industry Coordination

Since a seller gains nothing by inconveniencing its own customers, moving away from transparent pricing would require some degree of industry coordination. In markets with numerous sellers, such coordination would seem difficult. Regardless, our results may cast drip pricing policies in a new light: Rather than focusing on the practice of drip pricing *per se*, the more relevant consideration might be to focus on industry coordination.

Importantly, however, evidence that all firms in an industry impose similar levels of "hassle costs" need not imply that drip pricing stems from coordinated behavior. Firms in an industry often adapt and react to common features of the market in similar ways, for efficiency and other reasons. This, in turn, leads to common industry practices even absent coordination motives. Indeed, such practices may be efficient depending on the nature of the product or the evolution of the industry. Asymmetric benefits to participating firms further impede coordination; only the less efficient (higher marginal cost) firms benefit from industry-wide drip pricing in our model.

Industry Lock-In

It would of course be a mistake to conclude that an industry will automatically evolve to minimize hassle costs. Since low cost firms in our model gain nothing by adopting drip pricing, they also gain nothing by abandoning it. The reason is that, with non-directed search, a seller cannot *ex ante* signal its degree of price transparency, and hence cannot attract more customers through transparent pricing. Moreover, because hassle costs are sunk at the time of purchase, a seller cannot charge a price premium for offering a more streamlined shopping experience. Thus, firms with low marginal costs gain nothing from abandoning drip pricing. Those with high costs have even less incentive to abandon this practice.

In principle, centralized policy interventions, such as the DOT's requirement that "...all mandatory taxes and fees must be included together in the advertised fare" of airline tickets, might remedy such *industry* lock-in.[12] The key challenge is determining what practices to require and the degree of specificity. On the other hand, such regulation may be unnecessary. Southwest Airlines, for instance, successfully advertised a transparent pricing strategy to induce customers to engage in *directed search* to its website. More broadly, if firms can influence consumer choice through marketing or reputation, this may mitigate the need for regulation. We return to these issues when we discuss *mandatory disclosures*.

The Free-rider "Problem"

Most of regulatory attention has, rightly, focused on the costs to *consumers* of drip pricing and similar practices. But decisions about how to best organize a store's website or floor space, and the cost to *firms* of implementing these decisions, also bear consideration. While our results indicate that competition may not lead to more transparent pricing, a countervailing force—free-riding—might. When firms must incur costs to intentionally add frictions into the buying experience, such as redesigning websites or reconfiguring floor space, they are no longer indifferent between price transparency and opacity. Firms exercise market power because *others* engage in drip pricing—their own disclosure practices do not figure.

Thus, firms have an incentive to free-ride: They will not invest in drip pricing when doing so is costly. Moreover, firms' costs of adding frictions to price discovery need not be direct. Indirect costs, such as legal risk, bad publicity, or reputational damage,

[12] https://www.transportation.gov/affairs/2012/dot0812.html.

might also matter, and such considerations may even dwarf direct costs. Accounting for indirect costs amplifies firms' incentives to free-ride, thereby mitigating the risk of deleterious drip pricing.

On the other hand, if informational frictions arise from acts of omission rather than acts of commission, free-rider incentives work against price transparency. Consider an industry where firms have settled on a given level of frictions, perhaps even the socially optimal level, given the available technology. A new innovation appears that reduces frictions, but requires firm investments. The migration of internet stores from Web 1.0 to Web 2.0 offers a good, real world, example. In this case, free-riding incentives hurt rather than help—no firm has a unilateral incentive to embrace Web 2.0, regardless of how cheap or how good it is. Even acting collectively, firms have no incentives to invest.

Mandatory Standards

In principle, a regulatory body or enforcement agency might attempt to solve the problems alluded to above by mandating standards or imposing transparency rules. But what level of transparency is appropriate? For instance, it may be technologically feasible to create a buying process that is virtually frictionless, but at a prohibitively high cost to firms. Determining the "right" level of transparency is no easy task. Merely observing the existence of hassle costs—that price disclosure is not perfect—implies nothing about whether more or less disclosure is socially desirable. Likewise, survey evidence indicating that an alternative presentation of information would result in enhanced price discovery does not resolve the question either. Depending on the particulars of the environment, observing positive hassle costs can be consistent with too much or too little disclosure frictions relative to the social optimum.

This observation readily generalizes. In many regulatory environments, a "full information" benchmark is inappropriate for evaluating various disclosure policies. Even if one discounts the cost to firms of achieving a given standard, the full disclosure benchmark can still be misleading as it ignores consumers' costs of processing more detailed disclosures. When presented with "full disclosure," effort is required for a consumer to plow through a mass of data, and these costs must be taken into account. For instance, even in a simple case where there are L binary choices that determine the final product and price, full disclosure would require a consumer to evaluate and compare 2^L different prices—and that for only a single firm. When L is large, is hard to imagine any consumer benefiting from this form of "transparency." The broader point is that regulators must employ considerable care in evaluating market transparency or imposing disclosure rules.

References

[1] Ahmetoglu, Gorkan, Simon Fried, John Dawes, and Adrian Furnham (2010), "Pricing Practices: Their Effects on Consumer Behaviour and Welfare," Report Prepared for the Office of Fair Trading.

[2] Baye, Michael R., and John Morgan (2001), "Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Product Markets," *American Economic Review* 91(3): 454-474.

[3] Baye, Michael R., John Morgan, and Patrick Scholten (2006), "Information, Search, and Price dispersion," in Elsevier: *Handbook on Economics and Information Systems* 1: 323-375.

[4] Brown, Jennifer, Tanjim Hossain, and John Morgan (2010), "Shrouded Attributes and Information Suppression: Evidence from the Field," *The Quarterly Journal of Economics* 125(2): 859-876.

[5] Department of Transportation (2011), "Enhancing Airline Passenger Protections," *Federal Register* 76: 23110-23111.

[6] Department of Transportation (2012), "New Airline Passenger Protections Take Effect This Week," available at https://www.transportation.gov/affairs/2012/dot0812.html.

[7] Jovanovic, Boyan (1982), "Truthful Disclosure of Information," *The Bell Journal of Economics* 13(1): 36-44.

[8] Milgrom, Paul R. (1981), "Good News and Bad News: Representation Theorems and Applications," The Bell Journal of Economics, 12(2), Autumn, 380-391.

[9] Office of Fair Trading (2010a), "Advertising of Prices," *OFT Report* 1291.

[10] Office of Fair Trading (2010b), "The Impact of Price Frames on Consumer Decision Making," *OFT Report* 1226.

[11] Reinganum, Jennifer F. (1979), "A Simple Model of Equilibrium Price Dispersion." *Journal of Political Economy,* 87 (4): 851-858.

[12] Shelanski, Howard A., Joseph Farrell, Daniel Hannerm, Christopher J. Metcalf, Mary W. Sullivan, and Brett W. Wendling (2012), "Economics at the FTC: Drug and PBM Mergers and Drip Pricing," *Review of Industrial Organization* 41: 303-319.

[13] Sullivan, Mary W. (2017), "Economic Analysis of Hotel Resort Fees," Economic Issues Paper, Bureau of Economics, Federal Trade Commission.