# Bait and Ditch: Consumer Naïveté and Salesforce Incentives*

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**Abstract**

We analyze a model of price competition between a transparent retailer and a deceptive one in a market where a fraction of consumers is naïve. The transparent retailer is an independent shop managed by its owner. The deceptive retailer belongs to a chain and is operated by a manager. The two retailers sell an identical base product, but the deceptive one also offers an add-on. Rational consumers never consider buying the add-on, yet naïve ones can be "talked" into buying it. By offering its store manager a contract that pushes him to never sell the base good without the add-on, the chain can induce an equilibrium in which both retailers obtain more-than-competitive profits. The equilibrium features price dispersion and market segmentation, with the deceptive retailer targeting only naïve consumers whereas the transparent retailer serves only rational ones. Consumer welfare is not monotone in the fraction of naïve consumers. Hence, policy interventions desgned to de-bias naïve consumers might actually backfire.

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# 1 Introduction

Many consumers are familiar with so-called bait-and-switch strategies whereby customers are first "baited" by merchants' advertising products or services at a low price, but upon visiting the store, are then pressured by sales people to consider similar, but more expensive, items ("switching"). In a series of articles appeared in the "The Haggler" — a column in the Sunday edition of The New York Times (NYT) — journalist David Segal describes a somewhat different strategy employed by large retailers like Staples, BestBuy and others, which he dubs *bait-and-ditch*: escorting shoppers out of the store, empty-handed, when it's clear they have no intention of buying an expensive warranty or some other add-on for some steeply discounted electronic appliance — a practice that employees at Staples themselves call "walking the customer." He further reports that clerks and sale representatives, at Staples and elsewhere, are under enormous pressure to sell warranties and accessories, particularly on computers. For motivation, close tabs are kept on the amount of extras and service plans sold for each and every computer; the goal is to sell an average of $200 worth of add-ons per machine, and a sales clerk who cannot achieve the goal is at risk of termination. Therefore, sale representatives prefer to forgo the sale altogether, rather than selling the base good without the add-on.

The use of sales quota to motivate sales representatives is not novel nor is the fact that meeting one's quota is usually an attractive goal as it leads to additional benefits such as promotion or job security (see Oyer, 2000). Yet, the article in question highlights how retail chains design compensation schemes that push their sales people to target and exploit naïve or less savvy consumers, concluding that such compensation schemes might backfire in the end.[1] Indeed, it is well known that often sales people successfully "game" incentive systems by taking actions that increase their pay but hurt the objectives of their employer, such as manipulating prices, influencing the timing of customer purchases, and varying effort over their firms' fiscal years.[2]

In this paper, we start from the same premise as the NYT article — that firms' attempts to exploit consumer naïveté might lead them to design somewhat perverse incentive contracts — and show that a firm, by using these seemingly perverse incentive contracts, is able to increase its profits. In particular, our analysis shows that it may be optimal for a retailer to design a compensation scheme that incentivizes its salesforce to exclusively target naïve consumers. The reason is that the contract between the retailer and its salesforce acts as a credible commitment

[1] In the context of financial advice, Anagol, Cole, and Sarkar (2017) report evidence that suggests that sales agents tend to cater to, rather than correct, customers' biases. That financial advisers often reinforce customers' biases that are in their interest is also documented by Mullainathan, Noeth and Schoar (2012).

[2] Oyer (1998) argues that as firms often use the fiscal year as the unit of time over which many sales quota and compensation schemes are measured, a salesperson who is under pressure to meet a quota near the end of the year may offer a customer a bigger price discount if the client orders immediately. In fact, he shows that firms tend to sell more (and at lower margins) near the end of fiscal years than they do in the middle of the year. Similarly, Larkin (2014) analyzes the pricing distortions that arise from the use of non-linear incentive schemes at an enterprise software vendor and finds that salespeople are adept at gaming the timing of deal closure to take advantage of the vendor's commission scheme.

device ensuring that the retailer will not attempt to capture the whole market. This, in turn, induces other retailers in the market to price less aggressively, thereby softening price competition.

Section 2 introduces our baseline model. We analyze a model of price competition between a transparent retailer and a deceptive one. The transparent retailer is an independent local shop managed by its owner. The deceptive retailer is a franchise retailer which belongs to a chain and is operated by an agent (or manager) on behalf of the chain company. The two retailers sell an identical base product, but the deceptive retailer also offers an add-on. There is a unit mass of consumers with heterogeneous willingness to pay for the base good. Consumers can be either sophisticated or naïve. A sophisticated consumer understands that the add-on offered by the deceptive retailer is worthless. A naïve consumer, on the other hand, can be convinced by the agent that the add-on increases the value of the base good; i.e., s/he can be "talked" by the agent into buying the add-on next to the base product.

Our main contribution is to show that by designing an appropriate compensation scheme for its manager, the chain can induce a pricing equilibrium in which both retailers obtain "abnormal" profits (i.e., above competitive levels). The chain can achieve this outcome by offering its store manager a contract that pushes him to never sell the base good without the add-on. In this case, we say that the chain is engaging in "bait-and-ditch" by inducing its manager not to serve those consumers who do not wish to buy the add-on. Hence, complete market segmentation arises in equilibrium with the deceptive retailer targeting only naïve consumers while the transparent retailer serves only rational ones. Market segmentation softens price competition and eliminates the incentives for the retailers to undercut each other's price for the base good. Moreover, we also show that the transparent retailer might obtain a higher profit than the deceptive one

The idea that contractual delegation to a manager can be profitable for firms' owners is not new. Indeed, several authors have shown how, by using an appropriate incentive contract that is not based solely on profits, a firm can commit to behave more (or less) aggressively than it would without delegation (e.g., Fershtman, 1985; Vickers, 1985; Fershtman and Judd, 1987, Sklivas, 1987). In particular, a firm may utilize seemingly perverse incentive schemes. For instance, Fershtman and Judd (1987) showed that owners can benefit by inducing their managers to keep sales low.[3] Our paper differs from these previous contributions in the assumed market structure and, more importantly, in how we model consumer behavior. The different underlying assumptions generate novel results and implications. For example, our model predicts price dispersion in the based good's price despite the fact that retailers supply identical products and have the same costs. Classical models of price dispersion (e.g., Salop and Stiglitz, 1977; Varian, 1980) rely on the presence of significant search costs for consumers and on price randomization on the part of firms. In our model, instead, consumers are all perfectly informed about the price(s) of the base good and the pricing game's equilibrium is in pure strategies. Nonetheless, price dispersion arises as a by-product of the endogenous market segmentation.

[3]Delegation can also be used to collude more effectively; see Fershtman, Judd and Kalai (1991) and Lee (2010).

The finding that the chain can increase its profits by committing to sell only the bundle is – at first glance – reminiscent to the leverage theory of tied sales (Whinston, 1990). According to the leverage theory bundling is beneficial for the firm that offers both products but harmful to the competitor who offers only one product. In contrast in our model, both firms benefit if the chain commits to sell the base good only together with the add on. Therefore, our finding that the deceptive retailer can increase its profits by committing to serve only naïve consumers who buy the add-on together with the base good, is closer related to the role of technological bundling as a tool to relax price competition. Chen (1997) considers a duopoly model where firms can commit to sell only the bundle via "technological bundling". In equilibrium, one firm offers pure bundling and the other firm specializes by offering only one of the two products. Our model, however, differs on two crucial aspects. First, naïve consumers are attracted by the bundle only if it is cheaper than the base good offered at the competing retailer. Second, the ability to commit to offer only the pure bundle is intrinsically connected to the fact that the deceptive retailer uses a compensation scheme that induces its agent to target only naïve consumers.

Another interesting implication of our model is that welfare is not monotone in the fraction of naïve consumers in the market.[4] This implies that a policy intervention that is designed to de-bias naïve consumers can actually backfire. The reason is that a reduced fraction of naïve consumers may provide the deceptive retailer exactly with the commitment power necessary to engage in bait-and-ditch and achieve perfect market segmentation.

Section 3 analyzes two extensions of our basic framework. In Section 3.1 we enrich the baseline model to allow the manager of the deceptive retailer to exert private effort that enhances the probability that a customer buys the add-on. Moreover, the manager also incurs a cost when walking out consumers who are not willing to purchase the add-on. Intuitively, the addition of this two-task agency problem makes it more costly for the deceptive retailer to engage in bait-and-ditch. Nevertheless, we show that it is often profitable for the deceptive retailer to do so even if it has to pay an information rent to its agent. Interestingly, we also identify a "complementarity of inefficiencies" whereby the chain company is more likely to induce the manager to exert (socially costly) effort when it engages in bait-and-ditch.[5] Section 3.2 extends our baseline model beyond the case of duopoly by introducing a competitive fringe that supplies an imperfect substitute for the base good supplied by the deceptive and transparent retailers, and shows that bait-and-ditch still arises in equilibrium if these retailers retain sufficient market power.

Section 4 concludes the paper by recapping the results of the model and pointing out some of its limitations as well as possible avenues for future research. The remainder of this section

[4]This finding is shared by Johnen (2017).

[5]Inderst and Ottaviani (2009) analyze a two-task agency model of sales where an agent needs to prospect for customers as well as advise them on the product's suitability. However, in their model the two tasks are in direct conflict with each other so that when structuring its salesforce compensation, a firm must trade off the expected losses from "misselling" unsuitable products with the agency costs of providing marketing incentives to its agent. In our model, instead, in equilibrium the agent's tasks end up being complementary with one another.

discusses the literature most closely related to our paper.

Our paper joins the recent literature on consumer naïveté. Starting with the seminal contribution of Gabaix and Laibson (2006), most papers in this literature focus on the incentives (or lack thereof) for deceptive firms to educate naïve consumers by unshrouding their hidden fees or attributes, and derive conditions for a deceptive equilibrium — one in which naïve consumers are exploited — to exist.[6] The main implications of this literature are twofold: (i) deceptive firms do not want to educate/de-bias naïve consumers as this would turn them from profitable into unprofitable; and (ii) the presence of naïve consumers benefits rational ones who take advantage of low-priced base goods (often loss leaders) but do not buy the expensive add-ons. While related, our paper differs from previous contributions in this literature on several key dimensions. First, we do not focus on the question of whether firms want to educate consumers as we consider an asymmetric set-up with one deceptive firm and one transparent firm (or more). Nevertheless, we find that even in such an asymmetric environment, a deceptive equilibrium can be sustained. Moreover, in most of the models in this literature, deceptive and transparent equilibria result in the same profits for the firms as profits gained from naïve consumers via the add-on are passed on to sophisticated consumers via a lower price on the base good; in our model, instead, both the deceptive firm and the transparent one attain strictly higher profits in a deceptive equilibrium, with the transparent firm potentially obtaining the lion's share of the total profits. Furthermore, in our model the presence of naïve consumers actually hurts sophisticated ones.[7] The reason is that in equilibrium naïve and sophisticated consumers buy from different retailers and this relaxes price competition on the base good. Indeed, in our model sophisticated consumers end up buying the base good at the monopoly price (if they buy at all).

Within this literature, the papers most related to ours are Heidhues and Kőszegi (2017), Kosfeld and Schüwer (2017), and Michel (2017). Like ours, all these models show that firms can increase their profits thanks to the ability to target naïve consumers. Yet, Heidhues and Kőszegi (2017) and Kosfeld and Schüwer (2017) are models of third-degree price discrimination where firms can condition the terms of their offers on external information about consumers' naïveté. Our model, instead, is one of uniform pricing where retailers only know that a fraction of consumers are naïve, but cannot tell ex-ante which consumers are naïve and which ones are not. Similar to us, Kosfeld and Schüwer (2017) find that educating consumers may backfire as in their model a larger share of sophisticated consumers may trigger an equilibrium reaction by firms that is undesirable for all consumers. Michel (2017) is more in the vein of Heidhues, Kőszegi and Murooka (2016). He explicitly models extended warranties as useless add-on products. As in our model, naïve consumers do not pay attention to the add-on when choosing which store to visit, but then overestimate the add-on's value at the point of sale. In contrast to us, Michel (2017) analyzes a symmetric game

[6]See also Armstrong and Vickers (2012), Dahremöller (2013), Miao (2010), Murooka (2015), Heidhues, Kőszegi and Murooka (2016, 2017) and Johnen (2017).

[7]Analyzing a competitive insurance market with rational and overconfident consumers, Sandroni and Squintani (2007) show that the presence of overconfident (naïve) consumers can hurt rational ones.

between firms and is primarily concerned about the welfare effects of consumer protection policies; e.g. a minimum warranty standard.

Our paper is also related to the literatures on bait-and-switch, add-on pricing and loss leaders. Lazear (1995) studies a model with differentiated goods in which each firm produces only one good and derives the conditions for bait-and-switch to be profitable; in his model bait-and-switch is purely false advertising as a firm claims to sell a different good than the one it actually produces. Hess and Gerstner (1987) develop a model where firms sometimes stock out on advertised products and offer rain checks because consumers buy "impulse goods" whenever they visit a store to buy an advertised product. Gerstner and Hess (1990) present a model of bait-and-switch in which retailers advertise only selected brands, low-priced advertised brands are understocked and in-store promotions are biased towards more expensive substitute brands. Balachander and Farquhar (1994) show that by having occasional stockouts firms can soften price competition and hence "gain more by stocking less." Lal and Matutes (1994) develop a model of loss-leader pricing in which every consumer purchases the same bundle at the same price regardless of whether the prices of add-ons are advertised or not. Verboven (1999) analyzes a model of add-on pricing where consumers differ in their marginal willingness to pay for quality and shows that add-on pricing again has no effect on profits. Ellison (2005) proposes a price-discrimination model in which add-on pricing enables firms to charge high-demand consumers relatively more than low-demand consumers. In his model, search costs make it costly for consumers to observe add-on prices and high add-on markups raise profits by facilitating price discrimination. Finally, Rosato (2016) proposes a model of bait-and-switch in which a retailer offers limited-availability bargains to exploit consumers' loss aversion.

# 2 Baseline Model

Consider a market with two retailers, denoted by $D$ and $T$. Retailer $T$ is an independent local shop managed by its owner. Retailer $D$ is a franchise retailer that belongs to a chain. Both retailers offer the same base product; e.g. a laptop. The prices charged by retailer $D$ and $T$ for the base good are denoted by $p_D$ and $p_T$, respectively. For simplicity we assume that the costs for the base good (wholesale prices) are zero for both retailers. Retailer $D$ can also offer an add-on; e.g. an extended warranty or service plan.[8] The price for the add-on is $f_D$ and selling the add-on is without costs for retailer $D$. Retailer $T$, on the other hand, has prohibitively high costs for

[8] This asymmetric market structure — where one retailer employs an agent and can sell an add-on whereas the other cannot — can be interpreted as the final stage of a two-stage game where in the first stage ex-ante symmetric firms simultaneously choose their organizational structure; e.g., whether to hire an agent and supply the add-on. It is easy to see then that in any (pure-strategy) subgame-perfect equilibrium the two firms will select different organizational structures in the first stage, as otherwise they would both obtain zero profits in the last stage.

offering the add-on and therefore offers only the base good.[9]

There is a unit mass of consumers interested in purchasing one unit of the base good. A consumer's willingness to pay for the base good is denoted by $v$. We assume that $v$ is distributed uniformely on the unit interval; i.e., $v \sim U[0,1]$. Each consumer can be either sophisticated or naïve and the probability of being naïve, which is independent of the willingness to pay, is denoted by $\sigma \in [0,1)$. We assume that the add-on is worthless and that a sophisticated consumer understands this. In other words, owning the add-on does not increase a sophisticated consumer's willingness to pay for the base-good. A naïve consumer, on the other hand, can be convinced by a sales agent that the add-on increases the value of the base good by $\bar{f} \in (0,1)$; i.e., a naïve consumer can be "talked" into paying up to $\bar{f}$ for the add-on if he purchases the base-good as well.[10]

Retailer $T$ is operated by its owner, who chooses the price for the base good in order to maximize the shop's profit $\pi_T$. Retailer $D$ is operated by a sales agent who reacts on the incentive payments offered to him by the chain. When the agent's compensation depends solely on the profits made by the retail outlet, $\pi_D$, he chooses the base good and the add-on prices to maximize $\pi_D$. The chain company could also offer a more complex compensation scheme depending, for instance, on the revenue generated by the add-on sales. Why offering such a scheme, which might create misalignment between the chain company's and the manager's interests, can be optimal will be explained later. We posit that the store manager has an outside option yielding a utility of $\bar{U} = 0$. The sequence of events is as follows:

1. Retailer $D$ offers a contract to its sales agent, who either accepts or rejects the offer. The agent's decision as well as the terms of the contract are observed by $T$.

2. The sales agent of $D$ and the owner of $T$ simultaneously set prices for their products.

3. Consumers with a willingness to pay $v \geq \min\{p_D, p_T\}$ visit the cheaper retailer first. If $T$ is cheaper, all these consumers – sophisticates and naïfs – purchase the base good from $T$. If $D$ is cheaper, the agent decides whether to sell only the bundle — base good + add-on — at price $p_D + f_D$ or to sell also the base good by itself at price $p_D$. In the former case, we say that sophisticated consumers are *walked out* of the shop. If $p_D = p_T$, we assume consumers visit retailer $D$ first.[11]

The analysis is decomposed into two parts. First, we analyze the equilibrium of the pricing game for the case where the agent of $D$ cares only about the profits of the retail outlet he manages.

[9]This is consistent with the observation that many large consumer electronics retailers offer their own extended warranties whereas smaller shops are usually not able to do so; see, for example, OFT (2012) for recent evidence.

[10]Hence, we interpret the add-on offered by the deceptive retailer as a purely worthless product that naïve consumers can be tricked into buying; see Armstrong (2015) for a similar model. For a richer model of "sales talk" with rational and credulous consumers, see Inderst and Ottaviani (2013).

[11]This tie-breaking rule is assumed only for expositional simplicity and to guarantee equilibrium existence. If anything, this assumption favors retailer $D$ and thus reduces the incentives for the chain to use the "commitment strategy" of not serving sophisticated consumers.

This situation is equivalent to the chain company having full control over the strategic decisions of retailer $D$. Thereafter, we assume that the agent has an incentive not to serve sophisticated consumers. We derive the equilibrium of the pricing game under this presumption and then obtain sufficient conditions so that the agent indeed does not want to serve sophisticates. This second scenario can also be thought of as delegation – the chain company delegates all strategic decisions to the sales agent. Finally, we compare the two scenarios and show that *bait-and-ditch* may occur in a subgame perfect equilibrium.

## 2.1 Manager maximizes profits

Suppose that the compensation of the agent of $D$ depends positively on the profits of the chain and on nothing else. Then, both the agent of $D$ and the owner of $T$ choose prices to maximize the profits of their respective stores. Hence, there is Bertrand competition for the base good and the equilibrium prices are

$$\hat{p}_D = \hat{p}_T = 0. \tag{1}$$

The add-on is offered only by $D$ and thus charging the monopoly price for it is optimal; i.e.,

$$\hat{f}_D = \bar{f}. \tag{2}$$

The profits of the retailers are

$$\hat{\pi}_D = \sigma \bar{f} \qquad \hat{\pi}_T = 0. \tag{3}$$

Sophisticated consumers are indifferent between the two retailers and the equilibrium outcome is independent on how we break the indifference.[12]

In order to achieve this outcome, the chain company could offer the following wage contract to its sales agent who manages retailer $D$

$$\hat{w}(\pi_D) = \pi_D - \sigma \bar{f}. \tag{4}$$

The agent accepts this contract and all rents accrue to the chain company, whose profit is

$$\hat{\Pi} = \sigma \bar{f}. \tag{5}$$

In essence, the chain company charges the manager of store $D$ a franchise fee equal to $\sigma \bar{f}$.

[12] In order to see why this is the unique equilibrium outcome, suppose $D$ were to serve only naïve consumers; i.e, it does not serve sophisticates. Now, retailer $T$ can demand a strictly positive price from the unserved sophisticates. This, however, cannot be an equilibrium. Retailer $D$ is not committed to serve only naïfs and therefore has an incentive to undercut the base product price of $T$ and to serve both consumer groups. Hence, regarding the base product's price, the standard Bertrand outcome is the unique equilibrium outcome.

## 2.2 Walking sophisticated consumers

Suppose now that the manager of retailer $D$ has an incentive not to serve sophisticated consumers; i.e., to walk sophisticated consumers out of the store. In the following we characterize an equilibrium of the pricing game in which retailers make "abnormal" profits. We posit that the $D$ is committed to serve only naïve consumers and $T$ is aware of this commitment. Thereafter, we investigate whether this commitment can be achieved by an appropriate incentive scheme offered by the chain company to the manger of $D$.

Assume there is an equilibrium in which $D$ serves only naïve consumers and $T$ serves only sophisticated consumers. If such an equilibrium exists then for any price $p_D$ of the base good that $D$ charges, it is optimal for this retailer to set the price of the add-on good at its highest possible level; i.e., $f_D = \bar{f}$. In the Appendix we formally establish this result by considering deviations on both prices, $p_D$ and $f_D$, simultaneously. The price $p_i$, with $i = D, T$, has to maximize the retail profit $\pi_i$ under the presumed market segmentation. The profit of retailer $D$ is

$$\pi_D(p_D) = \sigma(1 - p_D)(p_D + \bar{f}). \tag{6}$$

All naïve consumers with a willingness to pay of $v \geq p_D$ purchase from retailer $D$. Each naïve consumer purchases next to the base good also the add-on and thus each sale is worth $p_D + \bar{f}$ to the retailer. From the first-order condition we obtain

$$\tilde{p}_D = \frac{1}{2}\left(1 - \bar{f}\right). \tag{7}$$

The corresponding profit of retailer $D$ is

$$\begin{aligned} \tilde{\pi}_D := \pi_D(\tilde{p}_D) &= \sigma\left[1 - \frac{1}{2}(1 - \bar{f})\right]\left[\frac{1}{2}(1 - \bar{f}) + \bar{f}\right] \\ &= \frac{\sigma}{4}(1 + \bar{f})^2. \end{aligned} \tag{8}$$

The profit of retailer $T$ is

$$\pi_T(p_T) = (1 - \sigma)(1 - p_T)p_T. \tag{9}$$

All sophisticated consumer with a willingness to pay of $v \geq p_T$ purchase from retailer $T$. They buy only the base good at price $p_T$. From the first-order condition we obtain

$$\tilde{p}_T = \frac{1}{2}. \tag{10}$$

The corresponding profit of retailer $T$ is

$$\tilde{\pi}_T := \pi_T(\tilde{p}_T) = \frac{1 - \sigma}{4}. \tag{11}$$

Hence, we have the following result:

**Proposition 1.** *Suppose retailer $D$ is committed not to serve sophisticated consumers. Then, if $\sigma \leq \bar{f}^2$ there exists a Nash equilibrium of the pricing game with higher than Bertrand profits. The equilibrium prices and profits are*

$$\tilde{p}_D = \frac{1-\bar{f}}{2}, \quad \tilde{p}_T = \frac{1}{2}, \quad \tilde{f}_D = \bar{f}, \quad \tilde{\pi}_D = \frac{\sigma}{4}(1+\bar{f})^2, \quad \tilde{\pi}_T = \frac{1-\sigma}{4}.$$

If retailer $D$ is able to commit not to serve sophisticated consumers, and if the fraction of naïve consumers in the market is not too high, both retailers are able to achieve higher than Bertrand profits. The intuition for this result is that when retailer $D$ is committed to serve only naïve consumers, complete market segmentation arises in equilibrium with firm $T$ targeting only sophisticated consumers while firm $D$ targets only naïve ones. Hence, the two retailers essentially operate as "local" monopolists. Market segmentation, in turn, softens price competition on the base good so that both retailers are able to charge prices above marginal cost. Furthermore, it is worth highlighting that the Nash equilibrium of the pricing game described in Proposition 1 features price dispersion in the based good's price despite the fact that the retailers supply identical products and have the same costs. Indeed, it is easy to verify that

$$\tilde{p}_D < \tilde{p}_T < \tilde{p}_D + \bar{f}. \tag{12}$$

Intuitively, retailer $D$ has a direct incentive to lower the price of the base good to sell more units as it can extract more per-sale profits via the add-on. This, in principle, would induce retailer $T$ to match (or undercut) retailer $D$ until all profits from the base good are competed away. Yet, if retailer $D$ is committed to serve only naïve consumers, retailer $T$ can charge the monopoly price for the base good and extract the monopoly profit from sophisticated consumers. Extracting monopoly rents from sophisticated consumers leads to a higher profit than slightly undercutting retailer $D$ if the share of sophisticates is sufficiently high, i.e., if $\sigma \leq \bar{f}^2$. Finally, notice that while both retailers achieve strictly positive profits in the equilibrium described in Proposition 1, it is not necessarily the case that retailer $D$ is the one benefiting more in this equilibrium. Indeed, it is easy to verify that

$$\tilde{\pi}_T \geq \tilde{\pi}_D \iff \sigma \leq \frac{1}{1+(1+\bar{f})^2}. \tag{13}$$

Therefore, if the fraction of naïve consumers is low enough, retailer $T$ attains higher profits than retailer $D$, despite the fact that retailer $T$ does not sell an add-on product. This, in turn, generates the novel, interesting implication that even if a firm is not the one obtaining the largest profit in the market, it may still be possible that the firm is serving its product deceptively, thereby exploiting naïve consumers.

## 2.3 Optimal strategy and corresponding sales contract

The question at hand now is: How can the chain company, in the first stage of the game, achieve that its agent does not serve all customers that are willing to pay the base good's price? In other words, how can retailer $D$ credibly commit not to serve sophisticated consumers? The chain company can offer its agent a wage payment $w = w(r_B, r_A)$, which depends both on the base-good revenue, $r_B$, and the add-on revenue, $r_A$, generated by the store. Hence, in order to achieve the outcome of the pricing subgame equilibrium described in Proposition 1, the chain company could offer its agent the following compensation scheme:

$$\widetilde{w}(r_B, r_A) = \min\{r_A, \tilde{r}_A\} + \min\{r_B, \tilde{r}_B\} - F, \tag{14}$$

where $\tilde{r}_B = \frac{\sigma}{4}(1 - \bar{f}^2)$, $\tilde{r}_A = \frac{\sigma}{2}(1 + \bar{f})\bar{f}$ and $F = \tilde{r}_B + \tilde{r}_A$ is a fixed franchise fee. For this compensation scheme, it is readily established that an optimal strategy for the agent is to set $p_D = \tilde{p}_D$, $f_D = \tilde{f}_D$, and not to serve sophisticated consumers. There are two crucial elements in this compensation scheme. First, according to this contract, the agent gets to keep the revenues from both add-on and base-good sales up to the target values $\tilde{r}_B$ and $\tilde{r}_A$. Therefore, there is no incentive for the agent to try to increase the store revenue beyond $\tilde{r}_A + \tilde{r}_B$. The second crucial aspect of this compensation scheme is that it specifies two distinct revenue targets: one for the sales of the base good and one for the add-on sales. If the chain were to specify a target for overall revenue, instead, this would not work as a credible commitment device not to serve sophisticated consumers because it would give the sales agent too much leeway in choosing prices and re-shuffling revenue between sales of the base good and add-on sales. In turn, then, retailer $T$ would price its base good more aggressively in an attempt to gain further market share. Moreover, notice that, as all relevant variables are observable, there is symmetric information between the chain and the agent. Hence, by choosing $F$ appropriately, the chain company can acquire all the rents in the end. The chain's profit – when offering the incentive scheme (14) – is

$$\tilde{\Pi} = \frac{\sigma}{4}(1 + \bar{f})^2. \tag{15}$$

The following proposition summarizes this result:[13]

**Proposition 2.** *Suppose that $\sigma \leq \bar{f}^2$. Then there exists a subgame perfect equilibrium where the chain offers its agent the compensation scheme in (14) so that he has no incentives to sell the base good without the add-on; i.e., the sales agent walks sophisticated customers out of the store.*

[13] For the simple wage scheme (14) the equilibrium outcome is not unique. In particular, $p_D = p_T = 0$ is also part of a subgame perfect equilibrium. For more complex wage schemes the outcome described in Proposition 2 is the unique equilibrium outcome. In order to see this, suppose the manager obtains a sizable bonus for each add-on sale but is mildly punished for each sale of the base good. Under such a scheme the manager has a strict incentive to sell the base good only together with the add-on. This is known by retailer $T$ who now has an incentive to charge a strictly higher price on the base good than retailer $D$, with $p_D < p_T < p_D + f_D$. Hence, zero base good prices are no longer part of a subgame perfect equilibrium.

Hence, by steering the incentives of its agent away from simple (downstream) profit maximization, and providing him instead with an incentive not to serve sophisticated consumers, the chain company is able to sustain an equilibrium with "abnormal" profits. The point that consumer naïveté can generate "abnormal" profits in markets with add-on pricing or deceptive products has already been recognized by several authors, including Ellison (2005), Gabaix and Laibson (2006), Armstrong (2015) and Heidhues, Murooka and Kőszegi (2016, 2017). Yet, in these models the firms are symmetric and can all offer an add-on or deceptive product. In our model, instead, the firms are extremely asymmetric on this dimension, with only one firm being able to sell an add-on; yet, an "exploitative" equilibrium is still possible.[14]

Another difference with respect to the prior literature on consumer naïveté is that in our model the presence of naïve consumers imposes a negative externality on rational ones, whereas in most of the models mentioned above rational consumers benefit from the presence of naïve ones. Indeed, in our model each type of consumer, rational or naïve, would be better off if they were the only type in the market. Moreover, notice that the equilibrium described in Proposition 2 is highly inefficient because a positive measure of naïve as well as sophisticated consumers end up being priced out of the market for the base good. Specifically, all sophisticated consumers with $v < \frac{1}{2}$ and all naïve consumers with $v < \frac{1-\bar{f}}{2}$ end up not buying the base good. Hence, in addition to redistributing surplus away from the consumers and towards the firms, the practice of bait-and-ditch also lowers total welfare in the market. Indeed, as the following proposition shows, welfare would be higher if retailer $D$ were a monopolist.

**Proposition 3.** *Suppose that $\sigma \leq \bar{f}^2$. Then total welfare is higher when the deceptive retailer is a monopolist than when it competes with a transparent retailer.*

Proposition 3 points out that fostering competition in a market where a deceptive firm operates as a monopolist might actually be welfare detrimental. While it may appear counterintuitive at first, the intuition behind this result is as follows. First, notice that if it were a monopolist, retailer $D$ would charge $p_D^m = \frac{1-\sigma\bar{f}}{2}$ for the base good and $f_D^m = \bar{f}$ for the add-on. Hence, the overall fraction of consumers that end up buying the base good is the same. However, compared to the bait-and-ditch outcome under duopoly, a larger fraction of sophisticated consumers would consume the base good (at a lower price) whereas a lower fraction of naïve consumers would consume the bundle (at a higher price). As sophisticate consumers who are served additionally under monopoly have a higher willingness to pay than the naïve consumers who are only served under duopoly, consumer and total welfare is higher under monopoly.

What measures should a social planner undertake to increase welfare? Interestingly, an im-

[14] A notable exception is the model presented by Murooka (2015) where a deceptive and a non-deceptive firm sell to consumers via a common intermediary. He shows that a deceptive equilibrium, whereby only the deceptive firm ends up selling to consumers, is possible despite the firms being asymmetric. Yet, the intuition behind his result does not hinge on market segmentation as a mechanism, but rather on the common agency of the intermediary. Moreover, in his model all consumers are naïve ex-ante (but can be "educated" by the intermediary).

portant implication of our model is that social welfare is non-monotone in the fraction of naïve consumers. Therefore, consumer education policies aimed at increasing consumer sophistication in the market might be counterproductive and welfare detrimental.[15] Indeed, let $\sigma_1$ denote the initial fraction of naïve consumers in the market and suppose $\sigma_1 > \bar{f}^2$. In this case, the Bertrand outcome (for the base good) is the unique equilibrium of the pricing game. It is true that in this equilibrium naïve consumers are taken advantage of since they end up buying a worthless add-on and paying $\bar{f}$ for it. Yet, a policy that reduces the fraction of naïve consumers in the market can hurt both naïve as well as sophisticated consumers. To see why, let $\sigma_2 < \sigma_1$ denote the new fraction of naïve consumers after the policy intervention. Unless $\sigma_2 = 0$, the effect of the policy is ambiguous ex-ante. If $\sigma_2 > \bar{f}^2$, the Bertrand outcome continues to be the only equilibrium, but now the fraction of exploited consumers is reduced; in this case, the policy increases welfare. Yet, if $\sigma_2 < \bar{f}^2$, then the policy is giving the deceptive retailer exactly the commitment power necessary to engage in bait-and-ditch and achieve perfect market segmentation. On the other hand, mandating retailers to issue rainchecks when advertised products are (claimed to be) out of stock would unambiguously improve consumer and total welfare.

Can the chain company achieve the *bait-and-ditch* outcome by (technological) bundling the base good with the add-on good instead of relying on an incentive sales contract? The answer is no. Indeed, naïve consumers would still visit the retailer with the lower total price. Hence, retailer $D$ cannot charge a higher price for the bundle than the one retailer $T$ charges for the base product alone. The usual Bertrand outcome then arises as competition is not relaxed. Importantly, retailer $D$ first has to attract naïve consumers into the store with a low price on the base good, and then it can exploit their naïveté by making them purchase the over-priced add-on. Moreover, the Bertrand outcome can be avoided only if the manger of retailer $D$ does not want to serve the sophisticated consumers who might also be attracted to the store by the low price on the base good. In other words, the agent has to take two important (endogenous) actions: (i) talking naïve consumers into buying the add-on, and (ii) walking out sophisticated consumers empty-handed. While these actions are fairly abstract in our baseline model, in the extension that we discuss in the next section, these actions have to be explicitly incentivized by the chain.

Finally, we point out that there exists an equivalent "standard" version of our model where all consumers are rational; i.e., where naïve consumers have a true willingness to pay for the add-on equal to $\bar{f}$. The same type of equilibria would exist also under this alternative "rational" interpretation. However, the welfare implications are slightly different because consumption of the add-on good is now desirable from a welfare perspective. Nevertheless, market segmentation still results in prices for the base good that are too high and hence detrimental for welfare. Most importantly, under this alternative "rational" interpretation – in contrast to our interpretation

[15] Huck and Weizsäcker (2016) obtain a somewhat similar implication in markets for sensitive personal information where a fraction of consumer is naïve and underestimate the chance that their private information will be revealed to a third party.

where some consumers are naïve – bundling of the two goods is a feasible strategy for the chain to achieve commitment. Hence, in this case there would be no role for the sales agent.

# 3 Extensions and Robustness

In order to clearly highlight the key intuition behind our results, in the baseline model we assumed a duopolistic market structure and symmetric information between the deceptive retailer and its sales agent. In this section we separately relax each of these assumption. Section 3.1 extends our baseline model by allowing the sales agent to privately exert effort in order to enhance the probability that a customer is willing to purchase the add-on good. Hence, the chain now has to offer a contract that mitigates the moral-hazard problem. Section 3.2 extends the baseline model of Section 2 to the case where there are more than two retailers supplying the base good.

## 3.1 Model with moral hazard

There is a mass one of consumers with willingness to pay for the base good equal to $v$, which is uniformly distributed on the unit interval; i.e., $v \sim U[0,1]$. A fraction of these consumers is naïve and willing to purchase the add-on good as long as its price is not larger than $\bar{f}$. The fraction of naïve consumers is $\sigma \in \{L, H\}$, with $0 < L < H < 1$. Crucially, the fraction of naïve consumers is stochastic and the probability distribution over $\sigma$ can be affected by the agent's effort. If the agent works hard, his sales talk is more convincing and thus it is more likely that a customer will buy the add-on. We model this in the following simple way. The agent can choose a binary effort level $e \in \{0,1\}$. The cost of effort is given by $\psi e$, with $\psi > 0$. The probability that a large fraction of customers is naïve depends on the effort level $e$ and is given by

$$\Pr(\sigma = H|\ e) = q_e.$$

We impose the following standard full-support assumption:

**Assumption 1.** $0 < q_0 < q_1 < 1$.

Let $\widehat{\sigma}_e = q_e H + (1 - q_e)L$ denote the expected fraction of naïve consumers conditional on the agent's effort $e \in \{0,1\}$. Notice that by Assumption 1 $\hat{\sigma}_0 < \hat{\sigma}_1$. We assume that the fraction of naïve consumers is always relatively low – independent of the effort choice – compared to the willingness to pay for the add-on:

**Assumption 2.** $\widehat{\sigma}_1 < \bar{f}^2$.

The agent has to suffer a fixed cost $\phi > 0$ in order to "walk out" those consumers who do not wish to buy the add-on.[16] For simplicity we assume that this cost is fixed and does not depend on the number of customers that are walked out empty-handed. Moreover, we assume that it is relatively more costly for the agent to talk consumers into buying the add-on than to "walk out" those consumers who do not wish to buy it:

**Assumption 3.** $\phi \leq \psi$.

The chain company – and also a third party – can verify the number of base goods and add-ons sold at the store. It also knows the prices it charges for both goods. In other words, ex post the chain company observes the state of the world $\sigma$ and whether the agent has served both groups of consumers or only the naïve ones. The agent's remuneration, i.e. his wage, can be contingent on all these variables. Thus, the chain specifies four wage payments:

$$\boldsymbol{w} = \{w_{L,N}, w_{L,S}, w_{H,N}, w_{H,S}\},$$

where $w_{\sigma,j}$ denotes the wage paid by the chain and received by the agent if the state is $\sigma$ and if consumer group $j \in \{N, S\}$ is served. Here, $j = N$ denotes the case when only naïve consumers are served while $j = S$ denotes the case when both naïve and sophisticated consumers are served.

Finally, we assume that the agent is risk neutral but protected by limited liability and thus cannot make any payments to the chain; i.e., the limited-liability constraint,

$$w_{\sigma,j} \geq 0 \quad \forall\, \sigma \in \{L, H\},\ j \in \{N, S\},$$

needs to be satisfied. The sequence of events is as follows:

1. Contracting stage: the chain offers a wage contract $\boldsymbol{w}$ to its agent, who either accepts or rejects the offer. The terms of the contract offered by the chain as well as the agent's decision to accept or reject the contract are publicly observed.

2. Pricing stage: the chain and the local retailer $T$ simultaneously set prices.

3. Effort stage: If the agent accepted the contract, he chooses an effort level $e$ and decides whether or not to sell only the bundle, base good plus add-on; i.e., whether to engage in bait-and-ditch.

4. Purchasing stage: consumers decide whether and where to buy.

[16] This could be interpreted either as the physical cost of having to go through the whole charade of going into the back of the store and pretend to check whether there is any unit of the base-good still availabe; or, alternatively, if one thinks that the agent is intrinsically sympathetic towards the consumers, as the psychological cost of having to lie to the consumers and letting them go empty-handed.

### 3.1.1 Serving both consumer groups

Suppose the chain wants its agent to serve both types of consumers with the base good and additionally to sell the add-on to naïve consumers. Irrespective of the anticipated effort choice of the agent, there is Bertrand competition for the base good and thus the equilibrium prices are $\hat{p}_D = \hat{p}_T = 0$. Retailer $D$ is a monopolist for the add-on good and thus $\hat{f}_D = \bar{f}$. In this case, the chain solves the following maximization program:

$$\max_{e,w_{\sigma,j}} \widehat{\sigma}_e \bar{f} - q_e w_{H,S} - (1-q_e)\, w_{L,S} \tag{S}$$

subject to: for $\widehat{e} \in \{0,1\}$ and $\widehat{e} \neq e$

$$\begin{aligned}
q_e w_{H,S} + (1-q_e) w_{L,S} - e\psi &\geq 0 && (\mathrm{PC}_e^S)\\
q_e w_{H,S} + (1-q_e) w_{L,S} - e\psi &\geq q_{\hat{e}} w_{H,S} + (1-q_{\hat{e}}) w_{L,S} - \hat{e}\psi && (\mathrm{IC}_e^S)\\
q_e w_{H,S} + (1-q_e) w_{L,S} - e\psi &\geq q_e w_{H,N} + (1-q_e) w_{L,N} - e\psi - \phi && (\mathrm{IC}_S^S)\\
q_e w_{H,S} + (1-q_e) w_{L,S} - e\psi &\geq q_{\hat{e}} w_{H,N} + (1-q_{\hat{e}}) w_{L,N} - \hat{e}\psi - \phi && (\mathrm{IC}_{e,S}^S)\\
w_{\sigma,j} &\geq 0 \text{ for all } \sigma \in \{L,H\},\ j \in \{N,S\} && (\mathrm{LL})
\end{aligned}$$

The chain maximizes its expected profit – given that it prefers to serve both sophisticated and naïve consumers – subject to five constraints. First, the agent has to accept the offer; i.e. ($\mathrm{PC}_e^S$) has to hold. Next, the agent has to choose the intended level of effort, constraint ($\mathrm{IC}_e^S$), and has to serve both consumer groups, constraint ($\mathrm{IC}_S^S$). The agent can also jointly deviate; i.e., choosing the wrong effort level and serving only naïve consumers. Therefore, the joint incentive constraint ($\mathrm{IC}_{e,S}^S$) needs to be satisfied. Finally, due to limited liability (LL), the chain has to specify non-negative wages.

The agent has no intrinsic motivation to serve only naïve consumers. This implies that if the chain wants that the agent serves both types, no incentive payment is necessary to achieve this, i.e., the constraints ($\mathrm{IC}_S^S$) and ($\mathrm{IC}_{e,S}^S$) do not impose a binding restriction.

Thus, if the chain wants to induce low effort, $e = 0$, it is straightforward to show that it is optimal to pay a zero wage in all states, $w_{\sigma,j} = 0$ for all $\sigma, j$. The corresponding profit of the chain is

$$\hat{\Pi}_0 = \widehat{\sigma}_0 \bar{f}.$$

Next, suppose the chain prefers that the agents works hard; i.e., $e = 1$. If the limited liability (LL) and the effort incentive constraint ($\mathrm{IC}_1^S$) are satisfied, then also participation ($\mathrm{PC}_1^S$) holds. The optimal wage scheme is:

$$w_{H,S} = \frac{\psi}{q_1 - q_0}, \quad w_{L,S} = w_{H,N} = w_{L,N} = 0.$$

The chain's expected profit amounts to

$$\hat{\Pi}_1 = \widehat{\sigma}_1 \bar{f} - \frac{q_1}{q_1 - q_0}\psi.$$

Thus, if the chain wants to serve both types of consumers, it induces its agent to exert high effort if and only if

$$\psi \leq \frac{(H-L)(q_1-q_0)^2 \bar{f}}{q_1} =: \hat{\psi}.$$

### 3.1.2 The chain serves only naïve consumers

Suppose now the chain can credibly commit to serve only those consumers who purchase the add-on good in addition to the base good; i.e., only naïve consumers. If this is the case, the price of the add-on is $\tilde{f}_D = \bar{f}$ and the prices of the base good are $\tilde{p}_D = (1-\bar{f})/2$ and $\tilde{p}_T = 1/2$. The chain solves the following maximization program:

$$\max_{e, w_{\sigma,j}} \frac{\widehat{\sigma}_e \left(1+\bar{f}\right)^2}{4} - q_e w_{H,N} - (1-q_e)\, w_{L,N} \tag{N}$$

subject to: for $\widehat{e} \in \{0,1\}$ and $\widehat{e} \neq e$

$$q_e w_{H,N} + (1-q_e) w_{L,N} - e\psi - \phi \geq 0 \tag{PC$_e^N$}$$

$$q_e w_{H,N} + (1-q_e) w_{L,N} - e\psi - \phi \geq q_{\hat{e}} w_{H,N} + (1-q_{\hat{e}}) w_{L,N} - \hat{e}\psi - \phi \tag{IC$_e^N$}$$

$$q_e w_{H,N} + (1-q_e) w_{L,N} - e\psi - \phi \geq q_e w_{H,S} + (1-q_e) w_{L,S} - e\psi \tag{IC$_N^N$}$$

$$q_e w_{H,N} + (1-q_e) w_{L,N} - e\psi - \phi \geq q_{\hat{e}} w_{H,S} + (1-q_{\hat{e}}) w_{L,S} - \hat{e}\psi \tag{IC$_{e,N}^N$}$$

$$w_{\sigma,j} \geq 0 \text{ for all } \sigma \in \{L,H\},\ j \in \{N,S\} \tag{LL}$$

The difference with respect to the previous program is that the chain now has to insure that the agent does not serve sophisticates who are only interested in purchasing the base good. As the agent experiences a disutility if he has to walk out customers empty-handed, the problem now is more intricate.

Suppose the chain wants to induce low effort, $e = 0$, and thus does not need to specify an incentive payment which motivates the agent to work hard. Importantly, the chain can perfectly monitor the fraction of add-on sales over total sales and thus observes whether or not sophisticates are served. This implies that there is no moral hazard problem between the chain and the agent regarding the served types of consumers. The chain simply has to compensate the agent for the disutility associated with walking out sophisticated consumers. The optimal wages are $w_{H,S} = w_{L,S} = 0$ and $w_{H,N} = w_{L,N} = \phi$. The chain's corresponding profit is

$$\tilde{\Pi}_0 = \frac{\widehat{\sigma}_0(1+\bar{f})^2}{4} - \phi.$$

Next, suppose the chain wants to induce high effort; i.e., $e = 1$. By the same argument as above, it is optimal to specify $w_{H,S} = w_{L,S} = 0$. Now, satisfying the participation constraint ($\text{PC}_1^N$) is sufficient to guarantee that the agent does not want to serve also sophisticated consumers, i.e., the constraints ($\text{IC}_{1,N}^N$) and ($\text{IC}_N^N$) are redundant. As in a standard moral-hazard problem, the effort incentive constraint ($\text{IC}_1^N$) will always be binding. The important question, therefore, is whether the limited liability (LL) or the participation constraint ($\text{PC}_1^N$) is more restrictive. Under Assumption 3, the limited liability constraint (LL) is binding while the participation constraint ($\text{PC}_1^N$) is slack. Hence, the optimal wages are

$$w_{L,N} = w_{H,S} = w_{L,S} = 0, \quad w_{H,N} = \frac{\psi}{q_1 - q_0}.$$

Importantly, the expected wage cost of the chain is the same as in the case where it induces high effort and serves both types of consumers. Intuitively, under Assumption 3, the chain's cost of inducing the agent to work hard on its sales talk is larger than the agent's cost from walking out consumers who do not want to purchase the add-on. Hence, it is sufficient for the chain to offer a contract that induces the agent to work hard. The disutlity of the agent from walking out sophisticated consumers does not create extra wage costs for the chain. The chain's profit in this case is

$$\tilde{\Pi}_1 = \frac{\widehat{\sigma}_1(1+\bar{f})^2}{4} - \frac{q_1}{q_1 - q_0}\psi.$$

If the chain serves only naïve consumers, it induces its agent to exert high effort if and only if

$$\psi \leq \frac{(H-L)(q_1-q_0)^2}{q_1}\frac{(1+\bar{f})^2}{4} + \frac{q_1-q_0}{q_1}\phi =: \tilde{\psi}.$$

### 3.1.3 Comparison

We now investigate the overall optimal behavior of the chain; i.e., whether it prefers to serve all consumers or to commit to serve only naïve ones. A first important observation is obtained by comparing the critical levels of the effort cost. Indeed, it easy to verify that:

$$\tilde{\psi} > \hat{\psi}. \tag{16}$$

Hence, the chain is more likely to implement high effort if it is able to commit not to serve sophisticates. From a welfare perspective low effort is preferred because effort is costly, but it does not increase the total surplus. Moreover, the pricing equilibrium where retailer $D$ does not serve sophisticates is also less efficient, from a social point of view, than the Bertrand equilibrium. Therefore, our model features a "complementarity between inefficiencies" in the sense that the chain's gain from implementing high effort is larger when it commits not to serve sophisticates.

The chain prefers that the agent works hard if the effort cost is not too high. Importantly, the critical effort cost is higher when the chain serves only naïve consumers than when it serves both consumer groups. Comparing the respective profit expressions yields the next result.

**Proposition 4.** *Suppose Assumptions 1-3 hold.*

*(i)* *For $\psi \leq \hat{\psi}$, the chain always offers its agent an incentive scheme such that he has no incentives to sell the base good without the add-on; i.e., the agent walks sophisticated customers out of the store.*

*(ii)* *For $\hat{\psi} < \psi \leq \tilde{\psi}$, the chain offers its agent an incentive such that he has no incentives to sell the base good without the add-on if and only if the agent's effort cost is not too high; i.e., if and only if $\psi \leq \frac{q_1 - q_0}{q_1} \frac{\widehat{\sigma}_0 (1-\bar{f})^2}{4} + \frac{(q_1 - q_0)^2}{q_1} \frac{(1+\bar{f})^2}{4} (H - L)$.*

*(iii)* *For $\psi \geq \tilde{\psi}$, the chain offers its agent an incentive scheme such that he has no incentives to sell the base good without the add-on if and only if the agent's disutility of doing so is not too high; i.e., if and only if $\phi \leq \frac{\widehat{\sigma}_0 (1-\bar{f})^2}{4}$.*

According to part (i) of Proposition 4, if the cost of effort is relatively low, the chain will always induce the agent to walk out sophisticated consumers, irrespective of his disutility for doing so. Intuitively, when the add-on good has a high profit margin, the gain from market segmentation becomes so large that the chain never considers serving sophisticated consumers. Moreover, part (ii) of Proposition 4 shows that, for intermediate levels of the effort cost, the decision as to whether sophisticated consumers should be walked out is independent of the agent's disutility for doing so. This is a by-product of Assumption 3 which says that it is more expensive for the chain to motivate the agent to work hard than not to serve sophisticates. Finally, in part (iii) of Proposition 4 if the cost of walking out consumers empty-handed is not too high, the chain will design a compensation scheme that induces its agent not to serve sophisticated consumers.

In this section, we have assumed that the fraction of naïve consumers who can be exploited by retailer $D$ directly depends on the effort exerted by its agent. Moreover, we also assumed that the agent incurs a disutility if he has to walk out consumers empty-handed. The addition of this two-task agency problem makes the bait-and-ditch strategy less profitable compared to the baseline model of Section 2. Nevertheless, it is often profitable for the chain company to offer an incentive scheme to its agent so that he engages in bait-and-ditch. Interestingly, the chain's decision of whether to engage in bait-and-ditch may be independent of the agent's disutility associated with walking out customers empty-handed. Indeed, the rent that the agent demands in order to exert effort may already compensate him also for the disutility arising from not serving sophisticated consumers. In this case, incentivizing the agent to serve only naïve consumers comes without additional costs for the deceptive retailer.

### 3.2 More than two retailers

Our main analysis focuses on the case of duopoly. While the general question of how the degree of competitiveness of the market affects the incentives for a deceptive retailer to engage in bait-and-ditch is beyond the scope of the current paper, in this section we discuss a simple form of competition between more than two retailers and show that our main result relies on some amount of market power.

Consider a market with $N \geq 3$ retailers. Retailer $D$ sells a base product and an add-on while retailer $T$ sells only the base product. As in Section 2, the cost of both products are normalized to zero and the add-on generates per-sale profits up to $\overline{f}$. The remaining $N-2$ retailers belong to a competitive fringe and supply a base product at zero cost. There is a unit mass of consumers interested in buying at most one of the base products. The base products supplied by $D$ and $T$ are perfect substitutes. A consumer's value for one of these products is denoted by $v \in [0,1]$. We assume that $v$ is distributed according to C.D.F. $F(v) = v$. Each consumer can be either sophisticated or naïve and the probability of being naïve, which is independent of the willingness to pay, is denoted by $\sigma \in [0,1)$. A sophisticated consumer understands that the add-on is worthless whereas a naïve consumer can be "talked" into paying up to $\bar{f}$ for the add-on if he purchases the base-good as well. The fringe supplies an imperfect substitute base good that consumers value at $v_F = kv$, with $k \in [0,1]$. The parameter $k$ measures the substitutability of the base product supplied by the fringe: For $k = 1$ the fringe's product is a perfect substitute, while for $k = 0$ the fringe product is not a valuable substitute and we are back to the case previously analyzed. Firms compete by simultaneously choosing prices for their base goods.

If retailer $D$ is not committed to serve only naïve consumers, the unique equilibrium of the pricing game takes the following form:

$$p_F = p_D = p_T = 0 \text{ and } f_D = \overline{f}.$$

With these prices, all consumers buy from retailer $D$ and profits equal:

$$\pi_F = \pi_T = 0 \text{ and } \pi_D = \sigma\overline{f}.$$

Next, we look for an equilibrium where retailer $D$ serves only naïve consumers. Firms in the competitive fringe must make zero profits, hence $p_F^* = 0$. Therefore, when buying from a firm in the fringe, a consumer with type $v$ obtains surplus equal to $kv$.

Under the presumed market segmentation, a sophisticated consumer will not be served by $D$. Hence, a sophisticated consumer with valuation $v$ will buy from $T$ (rather than $F$) if

$$v - p_T \geq kv \Leftrightarrow v \geq \frac{p_T}{1-k}.$$

From the inequality above we immediately obtain the demand function of retailer $T$. Hence, retailer $T$ solves the following problem:

$$\max_{p_T} \left[1 - \frac{p_T}{1-k}\right] p_T (1-\sigma).$$

Taking the first-order condition and re-arranging yields

$$p_T^* = \frac{1-k}{2}.$$

Retailer $D$, on the other hand, targets only naïve consumers. A naïve consumer with valuation $v$ will buy from $D$ rather than $F$ if

$$v - p_D \geq kv \Leftrightarrow v \geq \frac{p_D}{1-k}.$$

Hence, firm $D$ solves the following problem:

$$\max_{p_D} \left[1 - \frac{p_D}{1-k}\right] \left(p_D + \overline{f}\right) \sigma.$$

Taking the first-order condition and re-arranging yields

$$p_D^* = \frac{1-k-\overline{f}}{2}.$$

In order to avoid corner solutions, we shall impose the following assumption:

**Assumption 4.** $\bar{f} + k < 1$.

Assumption 4 imposes an upper bound on the substitutability of the fringe's product: i.e., $k < 1 - \bar{f}$. We obtain the following result:

**Proposition 5.** *Suppose retailer $D$ is committed not to serve sophisticated consumers and Assumption 4 holds. Then, if $\sigma (1-k)^2 \leq \bar{f}^2$ there exists a Nash equilibrium of the pricing game with higher than Bertrand profits for retailers $D$ and $T$. The equilibrium prices and profits are*

$$p_F^* = 0, \quad p_D^* = \frac{1-k-\overline{f}}{2}, \quad p_T^* = \frac{1-k}{2}, \quad f_D^* = \bar{f}$$

*and*

$$\pi_F^* = 0, \quad \pi_D^* = \frac{\sigma\left(1-k+\overline{f}\right)^2}{4(1-k)}, \quad \pi_T^* = \frac{(1-\sigma)(1-k)}{4}.$$

At these prices, all naïve consumers with $v \in \left[\frac{1-k-\overline{f}}{2(1-k)}, 1\right]$ buy from $D$, all sophisticated consumers with $v \in \left[\frac{1}{2}, 1\right]$ buy from $T$ and all remaining consumers buy from the fringe.[17] Hence, market segmentation still arises in equilibrium. Notice that the equilibrium prices and profits of $D$ and $T$ are decreasing in $k$ since, as the product supplied by the fringe becomes a better substitute, the market power of $D$ and $T$ is reduced. Intuitively, the addition of a competitive fringe represents an attractive outside option for some consumers; this, in turn, forces $D$ and $T$ to charge lower prices and it reduces their profits compared to the model of Section 2. Notice, however, that the condition for an equilibrium with market segmentation to exist is less restrictive than in the duopoly model of Section 2 as the critical threshold on the fraction of naïve consumers is higher. While this might appear counterintuitive at first, the intuition is that the incentives to deviate for the transparent retailer are now weaker. Indeed, exactly because of the outside option represented by the fringe, the gains for retailer $T$ to undercut retailer $D$ are reduced: the necessary price cut is now relatively high compared to the lower markup. Nevertheless, as the product supplied by the fringe is an imperfect substitute for the one supplied by $D$ and $T$, these two retailers still retain some market power which enables them to avoid the Bertrand trap. Hence, retailers $D$ and $T$ need to retain sufficient market power for our main result to extend beyond duopoly as otherwise Assumption 4 would be violated.[18]

# 4 Conclusion

The recent literature in Behavioral Industrial Organization has highlighted how consumer naïveté affects firms' pricing and advertising strategies and how these, in turn, affect consumer and total welfare in many different markets. Our paper contributes to this literature by showing how firms' attempts to exploit consumer naïveté may have important implications for the design of employees' compensation schemes. In particular, our analysis suggests that incentive schemes that at first glance may appear counterproductive — like enforcing a target on add-on sales that pushes employees to forgo a sale altogether rather than selling a product without an add-on — may actually increase firms' profits. Moreover, our model delivers several new, interesting welfare implications. First, naïve consumers might exercise a negative externality on rational consumers who end up facing higher prices because of the formers. Second, welfare might be not monotone in the fraction of naïve consumers so that educating/de-biasing naïve consumers could actually lower total welfare in the market.

While we have framed our analysis in the context of a retail market for products like consumer

[17] It is easy to see that the chain company can design a compensation scheme, along the lines of the one derived in Section 2, that would induce the manager of retailer $D$ not to serve sophisticated consumers. For the sake of brevity we omit the details.

[18] This is a feature shared by virtually all models with add-on pricing and shrouded attributes: with perfect (or Bertrand) competition all add-on profits are competed away by reducing the base good's price. In order to have an equilibrium with strictly positive profits, some authors have assumed product differentiation; see Ellison (2005), Dahremöller (2013) and Heidhues and Kőszegi (2017). Others, instead, have introduced an exogenous price floor for the base good; see Heidhues, Kőszegi and Murooka (2016, 2017).

electronics, we believe that our model applies also to retail financial services such as credit cards, insurance policies, and mortgages. Indeed, it is not uncommon for firms operating in this industry to bundle basic financial products, like a checking account, together with expensive add-ons, like an overdraft service, and offer them as an indivisible package.[19] For instance, in what has become known as the UK payment protection insurance misselling scandal, financial institutions sold consumer credit lines together with payment protection insurance (PPI) also called credit insurance. In order to obtain the credit, consumers were often forced to purchase also the PPI. The PPI was not only heftily priced but also often useless to the consumers since the fraction of rejected claims was high compared to other types of insurance. Bank clerks had strong incentives to sell these products via huge commissions.[20]

An important assumption in our model is that the contract of the deceptive retailer's manager is observable to the other firms in the market as this makes the contract work as a credible commitment device. We think this is a reasonable assumption since employment contracts usually last for several years and cannot be adjusted as easily or frequently as prices. Nevertheless, analyzing the case of unobservable (or imperfectly observable) contracts is an interesting question left for future research.

Another interesting question is whether, in our framework, firms would have an incentive to educate consumers by disclosing/unshrouding information about the add-on. We have chosen not to focus on this question in our paper as the environment that we consider is a highly asymmetric one, with only one deceptive firm in the market that can offer the add-on. One might conjecture that transparent firms would have a strong incentive to educate consumers and warn them about the deceptive firm's add-on. Yet, as our analysis shows, a transparent firm also benefits from the deceptive firm's bait-and-ditch strategy and the resulting market segmentation. Hence, our model suggests that even transparent firms might prefer to keep naïve consumers in the dark.

[19] In the wake of the recent Wells Fargo fake accounts scandal in the US, initial reports blamed individual Wells Fargo branch managers for the problem, claiming that they give their branch employees strong sales incentives for selling multiple financial products. This blame was later shifted to a pressure from higher-level management to open as many accounts as possible through cross-selling — the practice of selling an additional product or service to an existing customer.

[20] For more details regarding the payment protection insurance mis-selling scandal in the UK see Ferran (2012).

# A Proofs

**Proof of Proposition 1:** The prices $\tilde{p}_D$ and $\tilde{p}_T$ constitute a Nash equilibrium only if no retailer has an incentive to deviate. Under the presumption that the manager of retailer $D$ is committed not to serve sophisticated consumers, there is no profitable deviation for him. Retailer $T$, on the other hand, is not committed to serve only sophisticated consumers. It could slightly undercut $D$ by offering the base good at price $p_T = \tilde{p}_D - \varepsilon$ and serve both types of consumers. For $\varepsilon \to 0$, retailer $T$'s profit from this deviation is

$$\begin{aligned}\pi_T^{DEV} &= \left[1 - \frac{1}{2}\left(1-\bar{f}\right)\right]\frac{1}{2}\left(1-\bar{f}\right) \\ &= \frac{1}{4}\left(1-\bar{f}^2\right)\end{aligned}$$

The deviation is not profitable if

$$\frac{1}{4}(1-\sigma) \geq \frac{1}{4}\left(1-\bar{f}^2\right) \iff \bar{f}^2 \geq \sigma.$$

Hence, prices $\tilde{p}_D$ and $\tilde{p}_T$ constitute a Nash equilibrium of the pricing game. ■

**Proof of Proposition 2:** Suppose $\sigma \leq \bar{f}^2$. To prove that we have a subgame-perfect equilibrium we need to show that no player has an incentive to deviate at each stage of the game. We know from Proposition 1 that retailer $T$ has no incentive to deviate if $\sigma \leq \bar{f}^2$. Next, we need to show that fixing retailer $T$'s strategy and the contract signed between the chain company and the manager of $D$, the latter does not want to deviate. Recall that the compensation scheme offered by the chain company is:

$$\widetilde{w}(r_B, r_A) = \min\{r_A, \tilde{r}_A\} + \min\{r_B, \tilde{r}_B\} - F,$$

where $\tilde{r}_B = \frac{\sigma}{4}(1-\bar{f}^2)$, $\tilde{r}_A = \frac{\sigma}{2}(1+\bar{f})\bar{f}$ and $F = \tilde{r}_B + \tilde{r}_A$. Given this scheme, if the manager follows the presumed equilibrium strategy of charging $p_D = \tilde{p}_D$, $f_D = \tilde{f}_D$, and not serving sophisticated consumers, his utility is exactly zero. The manager of $D$ could deviate by serving sophisticates at the presumed equilibrium prices and/or by changing the prices as well. Yet, any deviation is (weakly) dominated. Indeed, if he were to raise a revenue from add-on (resp. base good) sales lower than $\tilde{r}_A$ (resp. $\tilde{r}_B$), the manager would attain a strictly negative payoff. On the other hand, if he were to raise a higher revenue on either product, his compensation would not increase. Hence, there are no profitable deviations for the manager of store $D$.

Finally, we need to show that at the first stage the manager is willing to accept the proposed contract and that the chain company cannot do better by offering a different contract. First, given that the manager's outside option is $\overline{U} = 0$, he is indifferent between rejecting the contract and accepting it. Next, notice that any contract that induces the manager to maximize downstream profits would result in Bertrand pricing for the base good so that the chain's profits would be $\hat{\Pi} = \sigma\bar{f}$. By offering the contract $\widetilde{w}(r_B, r_A)$, instead, the chain's profits are $\tilde{\Pi} = \frac{\sigma}{4}(1+\bar{f})^2$. We have that

$$\frac{\sigma}{4}(1+\bar{f})^2 > \sigma\bar{f} \Leftrightarrow \left(1-\bar{f}\right)^2 > 0.$$

Therefore, we have that the proposed strategy profile constitutes a subgame-perfect equilibrium.

A final remark regarding equilibrium existence is in order. With the contract space being unrestricted, existence of a subgame-perfect equilibrium cannot be guaranteed. For instance, if the agent's wage is increasing in $r_B$ for $r_B$ strictly smaller than a certain threshold, then the agent's best response is not well defined. In order to avoid this issue, we have to assume that the wage payment can be contingent only on a discrete set of revenues $\mathcal{R} = \{(r_A, r_B)\}$ that always includes $(\tilde{r}_A, \tilde{r}_B)$. For any $|\mathcal{R}| > 1$ – in particular for $|\mathcal{R}| \to \infty$ – equilibrium existence is guaranteed and the outcome described in the proposition is an equilibrium outcome. ■

**Proof of Proposition 3:** First, it is easy to see that when retailer $D$ is a monopolist, it is optimal to charge $f_D^m = \bar{f}$ for the add on. Then, for the base good, retailer $D$ chooses the price that maximizes the following expression

$$\pi_D^m(p_D) = (1 - p_D)\left(p_D + \sigma \bar{f}\right).$$

Taking the first-order condition and re-arranging yields

$$p_D^m = \frac{1 - \sigma \bar{f}}{2}.$$

Hence, profits and consumer welfare in the market equal

$$\pi_D^m = \frac{\left(1 + \sigma \bar{f}\right)^2}{4}$$

$$\text{and } CS^m = \sigma \int_{p_D^m}^1 \left(v - p_D^m - \bar{f}\right) dv + (1 - \sigma) \int_{p_D^m}^1 (v - p_D^m)\, dv = \frac{1}{8}\left(1 - 2f\sigma - 3f^2\sigma^2\right).$$

On the other hand, under duopoly and bait-and-ditch we have

$$\tilde{\pi}_T = \frac{1 - \sigma}{4} \qquad \tilde{\pi}_D = \frac{\sigma}{4}(1 + \bar{f})^2$$

$$\text{and } \widetilde{CS} = \sigma \int_{\tilde{p}_D}^1 \left(v - \tilde{p}_D - \bar{f}\right) dv + (1 - \sigma) \int_{\tilde{p}_T}^1 (v - \tilde{p}_T)\, dv = \frac{1}{8}\left(1 - 2f\sigma - 3f^2\sigma\right).$$

It is easy to verify that $\widetilde{CS} < CS^m$ and $\pi_D^m < \tilde{\pi}_T + \tilde{\pi}_D$. The result then follows since the overall measure of consumers who buy is the same under both scenarios; yet, more sophisticates buy when when retailer $D$ is a monopolist. In other words, when moving from monopoly to duopoly with bait-and-ditch, consumption is shifted away from high-value sophisticated consumers to low value naïve consumers. ■

In the proof of Proposition 4 we use the two following results:

**Lemma 1.** *Suppose the chain wants to serve both types of consumers. Then, it induces its agent to exert high effort if and only if $\psi \leq \hat{\psi}$, with*

$$\hat{\psi} := \frac{(H - L)(q_1 - q_0)^2 \bar{f}}{q_1}.$$

**Proof of Lemma 1:** The optimal contracts for $e = 0$ and $e = 1$ are derived in the main text as well as the corresponding profits. The chain prefers to induce high effort if and only if $\hat{\Pi}_1 \geq \hat{\Pi}_0$, which is equivalent to

$$\psi \leq \frac{(H - L)(q_1 - q_0)^2 \bar{f}}{q_1} =: \hat{\psi}.$$

Hence, the stated result follows. ■

**Lemma 2.** *Suppose the chain wants to serve only naïve consumers. Then, it induces its agent to exert high effort if and only if* $\psi \leq \tilde{\psi}$*, with*

$$\tilde{\psi} := \frac{(H-L)(q_1-q_0)^2}{q_1}\frac{(1+\bar{f})^2}{4} + \left(\frac{q_1-q_0}{q_1}\right)\phi.$$

**Proof of Lemma 2:** First, suppose the chain wants to induce low effort, $e=0$. As explained in the main text, in this case the optimal wages are:

$$w_{H,S} = w_{L,S} = 0 \quad \text{and} \quad w_{H,N} = w_{L,N} = \phi.$$

The chain's corresponding profit is

$$\tilde{\Pi}_0 = \frac{\widehat{\sigma}_0(1+\bar{f})^2}{4} - \phi.$$

Now, suppose the chain wants to induce $e=1$. It is easy to verify that under the optimal contract we have

$$w_{H,S} = w_{L,S} = 0.$$

Moreover, if ($PC_1^N$) holds, ($IC_{1,N}^N$) and ($IC_N^N$) are automatically satisfied. The remaining constraints are:

$$w_{L,N} + q_1(w_{H,N} - w_{L,N}) \geq \phi + \psi \tag{$PC_1^N$}$$

$$(q_1 - q_0)(w_{H,N} - w_{L,N}) \geq \psi \tag{$IC_1^N$}$$

$$w_{H,N} \geq 0 \quad w_{L,N} \geq 0 \tag{LL}$$

The chain wants to minimize the expected wage payment. Thus, the constraint ($IC_1^N$) will always be binding. The question is whether (LL) or ($PC_1^N$) is slack. If (LL) does not bind, we obtain

$$w_{L,N} = \phi - \psi\frac{q_0}{q_1-q_0}$$
$$w_{H,N} = \phi + \psi\frac{1-q_0}{q_1-q_0}$$

Under Assumption 3 we have that $w_{L,N} < 0$ and thus constraint (LL) is violated. Hence, under the optimal contract, the limited liability constraint is binding while the participation constraint is slack. Formally,

$$w_{L,N} = w_{H,S} = w_{L,S} = 0, \quad w_{H,N} = \frac{\psi}{q_1 - q_0}.$$

The chain's profit in this case is

$$\tilde{\Pi}_1 = \frac{\widehat{\sigma}_1(1+\bar{f})^2}{4} - \frac{q_1}{q_1-q_0}\psi.$$

The chain prefers to induce high effort; i.e., $\tilde{\Pi}_1 \geq \tilde{\Pi}_0$, if and only if

$$\psi \leq \frac{(H-L)(q_1-q_0)^2}{q_1}\frac{(1+\bar{f})^2}{4} + \frac{q_1-q_0}{q_1}\phi =: \tilde{\psi}.$$

This concludes the proof of the lemma. ■

**Proof of Proposition 4:** From the above two lemmas it follows that we can distinguish three cases depending on the size of $\psi$ – cases (i) - (iii) from the proposition.

Part (i) of the proposition: The claim is true if and only if $\hat{\Pi}_1 < \tilde{\Pi}_1$, which is equivalent to

$$\begin{aligned} \widehat{\sigma}_1 \bar{f} - \frac{q_1}{q_1-q_0}\psi &> \frac{\widehat{\sigma}_1(1+\bar{f})^2}{4} - \frac{q_1}{q_1-q_0}\psi \\ \iff 0 &< \frac{\widehat{\sigma}_1(1-\bar{f})^2}{4}. \end{aligned}$$

Next, we prove part (ii) of the proposition. Note that $\hat{\Pi}_0 \leq \tilde{\Pi}_1$ is equivalent to

$$\widehat{\sigma}_0 \bar{f} \leq \frac{\widehat{\sigma}_1(1+\bar{f})^2}{4} - \frac{q_1}{q_1-q_0}\psi$$

$$\iff \quad \frac{q_1}{q_1-q_0}\psi \leq \frac{\widehat{\sigma}_0(1-\bar{f})^2}{4} + (q_1-q_0)(H-L)\frac{(1+\bar{f})^2}{4}.$$

By multiplying the both sides of the above inequality by $(q_1-q_0)/q_1$, we obtain the inequality displayed in the proposition.

Finally, in case (iii), not serving sophisticated consumers is optimal if and only if $\hat{\Pi}_0 < \tilde{\Pi}_0$. This is equivalent to

$$\begin{aligned} \widehat{\sigma}_0 \bar{f} &< \frac{\widehat{\sigma}_0(1+\bar{f})^2}{4} - \phi \\ \iff \phi &< \frac{\widehat{\sigma}_0(1-\bar{f})^2}{4}. \end{aligned}$$

which completes the proof. ■

**Proof of Proposition 5**: The prices $p_F^*$, $p_D^*$ and $p_T^*$ constitute a Nash equilibrium of the pricing game only if no retailer has an incentive to deviate. Firms in the fringe cannot deviate because they have to make zero profits. Under the presumption that the manager of retailer $D$ is committed not to serve sophisticated consumers, there is no profitable deviation for him either. Retailer $T$, on the other hand, is not committed to serve only sophisticated consumers. It could slightly undercut $D$ by offering the base good at price $p_T = p_D^* - \varepsilon$ and serve both types of consumers. For $\varepsilon \to 0$, retailer $T$'s profit from this deviation is

$$\begin{aligned} \pi_T^{DEV} &= \left[1 - \frac{1-k-\overline{f}}{2(1-k)}\right]\frac{1-k-\overline{f}}{2} \\ &= \frac{(1-k)^2 - \bar{f}^2}{4(1-k)}. \end{aligned}$$

The deviation is not profitable if

$$\frac{1-\sigma}{1-k}\left(\frac{1-k}{2}\right)^2 \geq \frac{(1-k)^2-\bar{f}^2}{4(1-k)} \iff \bar{f}^2 \geq \sigma(1-k)^2 .$$

Hence, prices $p_F^*$, $p_D^*$ and $p_T^*$ constitute a Nash equilibrium of the pricing game. ■

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