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## **BAIT AND DITCH: CONSUMER NAIVETÉ AND SALESFORCE INCENTIVES**

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# BAIT AND DITCH: CONSUMER NAIVETÉ AND SALESFORCE INCENTIVES

## 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 naive. 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 retailers sell an identical base product, but the deceptive one also offers an add-on. Rational consumers never consider buying the add-on, yet naive 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 market segmentation with the deceptive retailer targeting only naive consumers whereas the transparent retailer serves only rational ones. Welfare is not monotone in the fraction of naive consumers in the market. Hence, policy interventions designed to de-bias naive consumers might backfire.

JEL Classification: D03, D18, D21, L13, M52

Keywords: Add-On Pricing, Bait and Switch, Consumer Naiveté, Incentive Contracts.

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# Bait and Ditch: Consumer Naïveté and Salesforce Incentives\*

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January 11, 2018

## 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 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 market segmentation with the deceptive retailer targeting only naïve consumers whereas the transparent retailer serves only rational ones. Welfare is not monotone in the fraction of naïve consumers in the market. Hence, policy interventions designed to de-bias naïve consumers might 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, they discover that the advertised goods either are not available, or are not as good as expected, and 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.<sup>1</sup>

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.<sup>2</sup> 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.<sup>3</sup>

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 —

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<sup>1</sup>The journalist also adds a personal bit of anecdotal evidence: “I once knew a guy who worked as a salesman at a mattress chain in the Washington area. Every week, the chain ran a full-page ad in The WashingtonPost, advertising deep discounts on one make and model of mattress. And the rule among sales staff could not be simpler: if you sold any customers that discounted mattress, you were fired.”

<sup>2</sup>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).

<sup>3</sup>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.

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 intuition is that the contract between the retailer and its salesforce acts as a credible commitment 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 a manager (or clerk) 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, and the probability of being naïve is independent of their willingness to pay for the base product. 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 a clerk that the add-on increases the value of the base good; i.e., s/he can be “talked” by the clerk into buying the add-on next to the base product.

Our main result shows 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. 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.

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 make use of seemingly perverse incentives. For instance, Fershtman and Judd (1987) showed that with price competition owners will pay their managers to keep their sales low. Moreover, delegation can also be used to collude more effectively as shown by Fershtman, Judd and Kalai (1991) and Lee (2010). 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.

By showing 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, our model also delivers the interesting implication that pure bundling can outperform mixed bundling. For a monopolist screening fully rational consumers, mixed bundling is generally at least as profitable as pure bundling as shown by Adams and Yellen (1976), McAfee, McMillan and Whinston (1989) and Armstrong (1996).<sup>4</sup> Similarly, firms tend to prefer mixed bundling over pure bundling also in competitive environments; see Thanassoulis (2007), Armstrong and Vickers (2001, 2010) and Zhou (2017). In our model, instead, committing to sell only the bundle — base good plus add-on — allows a retailer to target naïve consumers and avoid competing for rational ones, thereby achieving higher profits.<sup>5</sup> This is consistent with the observation that many consumer electronics retailers offer special deals whereby a product, like a laptop, can only be purchased in conjunction with an additional service, like an extended warranty or a specific software. Similarly, most cable and internet providers do not let customers pick individual channels or services, and instead force them to buy a pre-mixed package.

Another interesting and novel implication of our model is that welfare is not monotone in the fraction of naïve consumers in the market.<sup>6</sup> 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 give the retailers exactly the commitment power necessary to engage in bait-and-ditch and achieve perfect market segmentation.

In order to highlight the key intuition behind our results, in the baseline model we keep the contracting problem as simple as possible by assuming symmetric information between the chain company and its store manager. In Section 3 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, we assume that the manager incurs a disutility from 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 employee. 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.<sup>7</sup>

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<sup>4</sup>There are however some notable exceptions; see Pierce and Winter (1996) and Stremersch and Tellis (2002).

<sup>5</sup>That bundling can be used to relax price competition was first shown by Chen (1997). He 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. Notice, however, that the optimality of pure bundling in our model is intrinsically connected to the fact that the deceptive retailer uses a compensation scheme that induces its employees to target only naïve consumers. If the deceptive retailer were to simply post a price for the bundle without relying on a particular incentive contract for its salesforce, then market segmentation would not arise in equilibrium.

<sup>6</sup>This finding is shared by Johnen (2017).

<sup>7</sup>Inderst and Ottaviani (2009) analyze a two-task agency model of sales where an agent needs to prospect for

In Section 4 we analyze various extensions and modifications of our main framework. Section 4.1 re-considers the moral-hazard model of Section 3 when the clerk’s cost for walking consumers out of the store is higher than the chain’s cost to induce the clerk to exert high effort. Section 4.2 extends the same moral-hazard model to the case where the clerk’s incentive constraint for walking the consumers needs to hold ex-post. Section 4.3 extends the baseline model of Section 2 beyond the case of duopoly. For all these extensions, we show how a deceptive firm can attain higher profits by pushing its salesforce to exclusively target naïve consumers.

Section 5 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 discusses the literature most closely related to our paper.

Our paper joins the recent literature on consumer naïveté and hidden attributes. 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.<sup>8</sup> 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.<sup>9</sup> 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 closest related to ours are Heidhues and Kőszegi (2017), Kosfeld and Schüwer (2017), and Michel (2017).

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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.

<sup>8</sup>See also Armstrong and Vickers (2012), Dahremöller (2013), Miao (2010), Shulman and Geng (2013), Murooka (2015), Heidhues, Kőszegi and Murooka (2016, 2017) and Johnen (2017).

<sup>9</sup>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.

All these models share with our model that firms 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), but he explicitly models extended warranties as useless add-on products. As in our model, naïve consumers do not pay attention to the add-on before making base product choice, but overestimate the add-on's value at the point of sale. In contrast to us, Michel analyzes a symmetric game 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. He also considers an extension incorporating unsophisticated consumers who would not buy a base good if they anticipated its total cost including the add-on. 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  $T$ .<sup>10</sup> 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. 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 offering the add-on and therefore offers only the base good.<sup>11</sup>

There is a mass one of consumers interested in purchasing (at most) 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 according to c.d.f.  $F(v) = v$  on the unit interval,  $v \in [0, 1]$ . 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 clerk that the add-on increases the value of the base good by  $\bar{f} > 0$ ; i.e., a naïve consumer can be “talked” by a clerk into paying up to  $\bar{f}$  for the add-on if he purchases the base-good as well.<sup>12</sup>

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 manager who reacts on the incentive payments offered to him by the chain. When the manager’s compensation depends solely on the profits made by the retail outlet, 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 shop manager, who either accepts or rejects the offer. The manager’s decision as well as the terms of the contract are observed by  $T$ .<sup>13</sup>

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<sup>10</sup>We consider a market with more than two retailers in Section 4.3.

<sup>11</sup>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.

<sup>12</sup>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).

<sup>13</sup>We assume that the contract between the retailer  $D$  and its shop manager, while observable by retailer  $T$ , it is not observable by the consumers. See Kalra, Shi and Srinivasan (2003) for a model that analyzes the impact of consumer inferences on the design of incentive schemes.

2. The manager 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.<sup>14</sup> If  $T$  is cheaper, all these consumers – sophisticates and naïfs – purchase the base good from  $T$ . If  $D$  is cheaper, the manager 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.<sup>15</sup>

The analysis is decomposed into two parts. First, we analyze the equilibrium of the pricing game for the case where the manager of  $D$  cares only about the profits of the retail outlet he manages. This situation is equivalent to the chain company having full control over the strategic decisions of retailer  $D$ . Thereafter, we assume that the manager 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 manager 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 store manager. Finally, we compare the two scenarios and show that *walking the customer* may occur in a subgame perfect equilibrium.

## 2.1 Manager maximizes profits

Suppose that the compensation of the manager of  $D$  depends positively on the profits of the chain and on nothing else. Then, both the manager 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

$$\hat{p}_D = \hat{p}_T = 0. \quad (1)$$

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

$$\hat{f}_D = \bar{f}. \quad (2)$$

The profits of the retailers are

$$\hat{\pi}_D = \sigma \bar{f} \quad \hat{\pi}_T = 0. \quad (3)$$

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<sup>14</sup>This assumption is made only for the purpose of story-telling so that indeed sophisticated customers visit retailer  $D$  first and then may leave it empty-handed. Our main result, however, holds also if sophisticated consumers directly visit the retailer where they will eventually buy. For instance, consider the case where retailer  $D$  explicitly writes in the fine print that the low-price offer on the base good is available only in conjunction with the purchase of the add-on. In this case, sophisticates read and understand the fine print and so do not bother visiting retailer  $D$ , while naïve consumers do not pay attention to the fine print and visit retailer  $D$ .

<sup>15</sup>This tie-breaking assumption is made only for expositional simplicity and to guarantee equilibrium existence. If anything, this tie-breaking rule favors retailer  $D$  and thus reduces the incentives for the chain to use the “commitment strategy” of not serving sophisticated consumers.

Sophisticated consumers are indifferent between the two retailers and the equilibrium outcome is independent on how we break the indifference.<sup>16</sup>

In order to achieve this outcome, the chain company could offer the following wage contract to the manager of retailer  $D$

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

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

$$\hat{\Pi} = \sigma \bar{f}. \quad (5)$$

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

## 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 manager of  $D$  is committed to serve only naïve consumers and that the owner of  $T$  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 manager 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

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

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

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

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

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<sup>16</sup>In order to see why this is the unique equilibrium outcome, suppose  $D$  were to target 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.

**Assumption 1.**  $\bar{f} < 1$ .

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 and Assumption 1 holds. 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 to highlight 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. 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

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

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 Comparison

The question at hand now is: How can the chain company, in the first stage of the game, achieve that its store manager 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 manager 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 manager the following compensation scheme:

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

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 manager is to set  $p_D = \tilde{p}_D$ ,  $f_D = \tilde{f}_D$ , and not to serve sophisticated consumers.<sup>17</sup> There are two crucial elements in this compensation scheme. First, according to this contract, the manager 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 manager 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

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<sup>17</sup>This is not always the unique optimal strategy for the manager. In particular if  $\sigma$  is low, other strategies where both naïfs and sophisticates are served are optimal as well.

consumers because it would give the store manager 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 manager. 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

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

The following proposition summarizes this result:<sup>18</sup>

**Proposition 2.** *Suppose Assumption 1 holds and that  $\sigma \leq \bar{f}^2$ . Then there exists a subgame perfect equilibrium where the chain offers its store manager the compensation scheme in (14) so that he has no incentives to sell the base good without the add-on; i.e., the manager walks sophisticated customers out of the store.*

Hence, by steering the incentives of its manager 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 all firms are symmetric in the sense that they 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.<sup>19</sup>

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.<sup>20</sup> Indeed in our model each type of consumer, rational or naïve, would be better off if they were the only

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<sup>18</sup>For the simple wage scheme (14) the equilibrium outcome is not unique; see also the previous footnote. 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.

<sup>19</sup>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 also 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).

<sup>20</sup>Shulman and Geng (2013) also obtain a similar result whereby the existence of naïve consumers can sometimes hurt sophisticated ones. Yet, differently from our paper, the mechanism driving their result hinges on the fact that in their model sophisticated consumers buy also the add-on.

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. This happens because the retailers are operating as monopolists essentially. 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, total welfare would be higher if retailer  $D$  were a monopolist. To see why, notice that in this case  $D$  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, 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). Yet, as sophisticated consumers always get a (weakly) higher net surplus than naïve ones, total welfare in the market would increase.

What measures should a social planner undertake to increase welfare? Interestingly, an important 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.<sup>21</sup> 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 retailers 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.

### 3 Model with Moral Hazard

In this section we extend the baseline model by allowing the clerk to privately exert effort in order to enhance the probability that a customer is willing to purchase the add-on good. Hence, the chain has to offer a contract that mitigates the moral hazard problem. In other words, the chain now faces a meaningful contracting problem and it may have to leave an information rent

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<sup>21</sup>Huck and Weizsäcker (2016) obtain a somewhat similar implication for markets for sensitive personal information where a fraction of consumer is naïve and underestimates the chances that her private information will be revealed to a third party.

to the clerk; i.e., delegation is costly. Moreover, we also allow the chain company to set the prices for the goods sold at its stores.

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 clerk’s effort. If the clerk 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 clerk 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 standard full support assumption:

**Assumption 2.**  $0 < q_0 < q_1 < 1$ .

Let  $\mathbb{E}[\sigma|e] = q_e H + (1 - q_e)L$  denote the expected fraction of naïve consumers conditional on the clerk’s effort  $e$ . We also posit that the clerk has to suffer a fixed cost  $\phi > 0$  in order to “walk out” those consumers who do not wish to buy the add-on.<sup>22</sup> 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 more expensive for the chain to motivate the clerk to work hard than not to serve sophisticates:

**Assumption 3.**  $\phi \leq \psi \frac{q_0}{q_1 - q_0}$ .<sup>23</sup>

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 clerk has served both groups of consumers or only the naïve ones. The clerk’s remuneration, i.e. his wage, can be contingent on all these variables. Thus, the chain specifies four wage payments:

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

where  $w_{\sigma,j}$  denotes the wage paid by the chain and received by the clerk 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.

<sup>22</sup>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 available; or, alternatively, if one thinks that the clerk is intrinsically sympathetic towards the consumers, as the psychological cost of having to lie to the consumers and letting them go empty-handed.

<sup>23</sup>We relax this assumption in Section 4.1

The chain maximizes its expected profit subject to several constraints. First, the clerk has to accept the contract; i.e., the participation constraint needs to be satisfied. Second, the contract has to induce the clerk to choose the desired effort level and to serve the consumer type(s) he is supposed to serve; i.e., the incentive constraints need to hold. Finally, we assume that the clerk 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  $\mathbf{w}$  to its clerk, who either accepts or rejects the offer. The terms of the contract offered by the chain as well as the clerk'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 clerk 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.

The analysis is decomposed into two parts. First, we analyze the case where retailer  $D$  serves both consumer groups. Thereafter, we study the case where the chain company wants its clerk not to serve sophisticated consumers. Finally, we compare the two scenarios and derive necessary and sufficient conditions for bait-and-ditch to arise in equilibrium.

### 3.1 Serving both consumer groups

First, suppose the chain wants its clerk 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 clerk, 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:

$$\max_{e, w_{\sigma,j}} \mathbb{E}[\sigma|e] \bar{f} - q_e w_{H,S} - (1 - q_e) w_{L,S} \tag{S}$$

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

$$q_e w_{H,S} + (1 - q_e) w_{L,S} - e\psi \geq 0 \quad (\text{PC}_e^S)$$

$$q_e w_{H,S} + (1 - q_e) w_{L,S} - e\psi \geq q_{\hat{e}} w_{H,S} + (1 - q_{\hat{e}}) w_{L,S} - \hat{e}\psi \quad (\text{IC}_e^S)$$

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

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

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

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

Suppose the chain wants to induce low effort,  $e = 0$ . It is straightforward to show that the optimal wage scheme is

$$w_{\sigma,j} = 0 \quad \forall \sigma, j.$$

The corresponding profit of the chain is

$$\hat{\Pi}_0 = \mathbb{E}[\sigma|0] \bar{f}.$$

Next, suppose the chain prefers that the clerk works hard; i.e.,  $e = 1$ . Using standard techniques, it can be readily established that the binding constraints are (LL) and  $(\text{IC}_1^S)$ . Thus, the optimal wage scheme is:

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

With this wage schedule, the clerk is rewarded for selling many add-on goods; that is, he receives a strictly positive wage only if the state of the world is  $H$  and he serves both types of consumers. The chain's expected profit amounts to

$$\hat{\Pi}_1 = \mathbb{E}[\sigma|1] \bar{f} - \frac{q_1}{q_1 - q_0} \psi.$$

The following lemma identifies the critical threshold on the cost of effort for the chain to induce the clerk to exert high effort.

**Lemma 1.** *Suppose the chain wants to serve both types of consumers. Then, it induces its clerk*

to exert high effort if and only if  $\psi \leq \hat{\psi}$ , with

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

Intuitively, the chain prefers to induce high effort if the returns from doing so, in terms of the increase in profits, exceed the clerk's cost of effort plus his information rent.

### 3.2 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  $\hat{f}_D = \bar{f}$ , and the prices of the base good are<sup>24</sup>

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

The chain now solves the following maximization program:

$$\max_{e, w_{\sigma, j}} \mathbb{E}[\sigma|e] \frac{(1 + \bar{f})^2}{4} - q_e w_{H, N} - (1 - q_e) w_{L, N} \quad (\text{N})$$

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

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

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

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

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

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

The difference with respect to the previous section is that the chain now has to insure that the clerk does not serve sophisticates who are only interested in purchasing the base good. As the clerk 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; i.e.,  $e = 0$ . Specifying  $w_{\sigma, S}$  as low as possible relaxes  $(\text{IC}_N^N)$  and  $(\text{IC}_{0, N}^N)$ . Except (LL), all the other constraints are independent of  $w_{\sigma, S}$ ; thus, setting  $w_{H, S} = w_{L, S} = 0$  is optimal. If  $(\text{PC}_0^N)$  is satisfied, then  $(\text{IC}_N^N)$  and  $(\text{IC}_{0, N}^N)$  are automatically satisfied as well. Hence, in the case of serving only naïve consumers, a fixed wage that just compensates the clerk for the disutility associated with walking out sophisticated consumers is

<sup>24</sup>Here, we posit that Assumption 1 still holds.

optimal, i.e., the optimal wages are  $w_{H,N} = w_{L,N} = \phi$ . The chain's corresponding profit is

$$\tilde{\Pi}_0 = \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4} - \phi.$$

As it can perfectly monitor the fraction of add-on sales over total sales, the chain does not need to pay an information rent to its clerk. Hence, it is sufficient for the chain to compensate the clerk for the cost of walking out sophisticated consumers.

Next, suppose the chain wants to induce high effort; i.e.,  $e = 1$ . By the same argument as above, it is optimal to specify  $w_{H,S} = w_{L,S} = 0$ . Moreover, if  $(PC_1^N)$  holds, then  $(IC_{1,N}^N)$  and  $(IC_N^N)$  are automatically satisfied. Furthermore, as in a standard moral-hazard problem, the effort incentive constraint  $(IC_1^N)$  will always be binding. The important question, therefore, is whether  $(LL)$  or  $(PC_1^N)$  is slack. As we show in Appendix A, under Assumption 3, in the optimal contract  $(LL)$  is binding while  $(PC_1^N)$  is slack. Hence, the optimal wages are

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

Intuitively, under Assumption 3, the chain's cost of inducing the clerk to work hard on its sales talk is larger than the clerk'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 clerk to work hard. The chain's profit in this case is

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

The following lemma identifies the critical threshold on the cost of effort for the chain to induce the clerk to exert high effort.

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

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

Notice that the threshold  $\tilde{\psi}$  is increasing in  $\phi$ ; hence, the higher is the clerk's cost of walking out sophisticated consumers empty-handed, the more likely the chain is to induce him to exert high effort in his sales talk.

### 3.3 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.

**Observation 1.**  $\tilde{\psi} > \hat{\psi}$ .

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.

It is easy to see that an equilibrium where retailer  $D$  commits not to serve sophisticates cannot exist if  $\mathbb{E}[\sigma|0] > \bar{f}^2$ . Intuitively, as in the baseline model of Section 2, if the fraction of naïve consumers in the market — even when the clerk does not exert any effort — is too high, retailer  $T$  has a strong incentive to undercut retailer  $D$  in order to attract naïve consumers in addition to the sophisticated ones. Hence,  $\mathbb{E}[\sigma|0] \leq \bar{f}^2$  is a necessary condition for the existence of an equilibrium featuring bait-and-ditch. In particular, depending on the size of  $\psi$  and  $\bar{f}$ , we can distinguish six cases, as shown in the following table.

	$\mathbb{E}[\sigma 0] \leq \bar{f}^2 < \mathbb{E}[\sigma 1]$	$\bar{f}^2 \geq \mathbb{E}[\sigma 1]$
$\psi \leq \hat{\psi}$	(a) $\hat{\Pi}_1 \leq \tilde{\Pi}_0$	(d) $\hat{\Pi}_1 \leq \tilde{\Pi}_1$
$\hat{\psi} < \psi \leq \tilde{\psi}$	(b) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$	(e) $\hat{\Pi}_0 \leq \tilde{\Pi}_1$
$\psi > \tilde{\psi}$	(c) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$	(f) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$

First, we consider the cases with an intermediate value of the maximum add-on price; i.e.,  $\mathbb{E}[\sigma|0] \leq \bar{f}^2 < \mathbb{E}[\sigma|1]$ . In these cases the commitment strategy of not serving sophisticated consumers is feasible only if the share of naïve consumers is relatively low. In other words, if the chain prefers to serve only naïve consumers it has to induce low effort  $e = 0$ . Thus, its profit when not serving sophisticated consumers is always  $\tilde{\Pi}_0$ . If, on the other hand, the chain prefers to serve both naïve and sophisticated consumers, then it prefers to induce high effort if the effort cost is relatively low; i.e., if  $\psi \leq \hat{\psi}$ . Hence, the chain’s profit is  $\hat{\Pi}_1$  for  $\psi \leq \hat{\psi}$  and  $\hat{\Pi}_0$  otherwise. Comparing the profit expressions for cases (a), (b), and (c) yields the following result.

**Proposition 3.** *Suppose Assumptions 2 and 3 hold and  $\mathbb{E}[\sigma|0] \leq \bar{f}^2 < \mathbb{E}[\sigma|1]$ . Then the chain offers its clerk an incentive scheme such that he has no incentives to sell the base good without the add-on (i.e., the clerk walks sophisticated customers out of the store), if and only if the clerk’s disutility of doing so is not too high. Formally, if and only if*

$$\phi \leq \begin{cases} \mathbb{E}[\sigma|0] \frac{(1-\bar{f})^2}{4} - \frac{q_1}{q_1 - q_0} (\hat{\psi} - \psi) & \text{if } \psi \leq \hat{\psi} \\ \mathbb{E}[\sigma|0] \frac{(1-\bar{f})^2}{4} & \text{if } \psi > \hat{\psi} \end{cases}.$$

Intuitively, if the cost of walking out consumers empty-handed is not too high, the chain will design a compensation scheme that induces its clerk not to serve sophisticated consumers.

Next, we consider the cases where the maximum add-on price is (relatively) high; i.e.,  $\bar{f}^2 \geq \mathbb{E}[\sigma | 1]$ . In these cases, the commitment strategy is feasible also if the clerk works hard. Thus, the chain prefers that the clerk 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 profit expressions for cases (d), (e), and (f) yields the next result.

**Proposition 4.** *Suppose Assumptions 2 and 3 hold and  $\bar{f}^2 \geq \mathbb{E}[\sigma | 1]$ .*

- (i) *For  $\psi \leq \hat{\psi}$ , the chain always offers its clerk an incentive scheme such that he has no incentives to sell the base good without the add-on; i.e., the clerk walks sophisticated customers out of the store.*
- (ii) *For  $\hat{\psi} < \psi \leq \tilde{\psi}$ , the chain offers its clerk an incentive such that he has no incentives to sell the base good without the add-on if and only if the clerk's effort cost is not too high; i.e., if and only if  $\psi \leq \frac{q_1 - q_0}{q_1} \mathbb{E}[\sigma | 0] \frac{(1 - \bar{f})^2}{4} + \frac{(q_1 - q_0)^2}{q_1} \frac{(1 + \bar{f})^2}{4} (H - L)$ .*
- (iii) *For  $\psi \geq \tilde{\psi}$ , the chain offers its clerk an incentive scheme such that he has no incentives to sell the base good without the add-on if and only if the clerk's disutility of doing so is not too high; i.e., if and only if  $\phi \leq \mathbb{E}[\sigma | 0] \frac{(1 - \bar{f})^2}{4}$ .*

Notice that, differently from the result in Proposition 3, part (i) of Proposition 4 says that if the cost of effort is relatively low, the chain will always induce the clerk 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 clerk'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 clerk to work hard than not to serve sophisticates. Finally, for part (iii) of Proposition 4 the intuition is the same as in Proposition 3.

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 store manager. Moreover, we also assumed that the store manager 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 manager so that he engages in bait-and-ditch. If the markup charged on the add-on good is relatively low, the bait-and-ditch strategy is preferred when the manager's disutility from not serving sophisticated consumers is sufficiently low. By contrast, if the add-on markup is relatively high, the chain's decision may be independent of the manager's

disutility associated with walking out customers empty-handed. Indeed, the rent that the manager 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 manager to serve only naïve consumers comes without additional costs for the deceptive retailer.

## 4 Extensions and Robustness

In this section we analyze three extensions of our baseline models. Section 4.1 re-considers the moral-hazard model of Section 3 when the clerk's cost for walking consumers out of the store is higher than the chain's cost to induce the clerk to exert high effort; that is, when Assumption 3 is violated. Section 4.2 extends the same moral-hazard model to the case where the clerk's incentive constraint needs to hold ex-post. Section 4.3 extends the baseline model of Section 2 to the case where there are more than two retailers supplying the base good.

### 4.1 High cost for walking sophisticated consumers

In this subsection, we re-analyze the model of Section 3 for the case when Assumption 3 is violated; that is, when  $\phi > \psi \frac{q_0}{q_1 - q_0}$ . The optimization problems are the same as in the previous section: If the chain wants to serve both consumer groups, it solves program (S), while it solves program (N) if it prefers to sell only to naïve consumers.

Whether Assumption 3 holds or not does not affect the solution to program (S). Hence, when the chain wants to serve both types of consumers the profit expressions are the same as in Section 3 and it prefers to induce high effort if and only if  $\psi \leq \hat{\psi}$ .

Now, consider the case where the chain wants to serve only naïve consumers and thus solves program (N). If it wants to induce low effort, it is readily established that the optimal wages are  $w_{H,N} = w_{L,N} = \phi$  and  $w_{H,S} = w_{L,S} = 0$ . The chain's profit in this case amounts to  $\tilde{\Pi}_0^H = \mathbb{E}[\sigma|0](1 + \bar{f})^2/4 - \phi$  just like in the previous section; that is,  $\tilde{\Pi}_0^H = \tilde{\Pi}_0$ .

If the chain wants to induce high effort, then constraint (LL) is slack while constraint (PC<sub>1</sub><sup>N</sup>) is binding. Otherwise, the analysis and the binding constraints are the same as in the previous section. The optimal wages now are  $w_{H,N} = (\psi + \phi)/q_1$  and  $w_{L,N} = w_{H,S} = w_{L,S} = 0$ . The profits of the chain store are

$$\tilde{\Pi}_1^H = \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - (\psi + \phi).$$

It is easy to verify that  $\tilde{\Pi}_1^H < \tilde{\Pi}_1$  when Assumption 3 is violated. Intuitively, a higher cost for the clerk to walk out sophisticates reduces the chain's profits when it wants to serve only naïfs. Hence, the chain prefers to induce high effort if and only if  $\tilde{\Pi}_1^H \geq \tilde{\Pi}_0^H$ , which is equivalent to

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

As in Section 3, the chain is more likely to induce the clerk to work hard when it serves only naïve consumers:

**Observation 2.**  $\tilde{\psi}^H > \hat{\psi}$ .

Again we can distinguish six cases, (a)–(f), as displayed in the following table:

	$\mathbb{E}[\sigma 0] \leq \bar{f}^2 < \mathbb{E}[\sigma 1]$	$\bar{f}^2 \geq \mathbb{E}[\sigma 1]$
$\psi \leq \hat{\psi}$	(a) $\hat{\Pi}_1 \leq \tilde{\Pi}_0$	(d) $\hat{\Pi}_1 \leq \tilde{\Pi}_1^H$
$\hat{\psi} < \psi \leq \tilde{\psi}^H$	(b) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$	(e) $\hat{\Pi}_0 \leq \tilde{\Pi}_1^H$
$\psi > \tilde{\psi}^H$	(c) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$	(f) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$

Only the cases (d) and (e) are conceptually different than in the previous section.<sup>25</sup> The results for the cases (d) and (e) are summarized in the next proposition.

**Proposition 5.** *Suppose Assumption 2 holds,  $\phi > \psi q_0/(q_1 - q_0)$ , and  $\bar{f}^2 \geq \mathbb{E}[\sigma|1]$ . Then:*

(i) *For  $\psi \leq \hat{\psi}$  the chain prefers to serve only naïve consumers if and only if*

$$\phi \leq \mathbb{E}[\sigma|1] \frac{(1 - \bar{f})^2}{4} + \left( \frac{q_0}{q_1 - q_0} \right) \psi.$$

(ii) *For  $\hat{\psi} < \psi \leq \tilde{\psi}^H$  the chain prefers to serve only naïve consumers if and only if*

$$\phi \leq \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} + \tilde{\psi}^H - \psi.$$

Comparing the conditions in Proposition 5 with the ones in Proposition 4, reveals that when  $\phi > \psi q_0/(q_1 - q_0)$ , the chain is less likely to engage in bait-and-ditch as the agent’s cost of walking sophisticates is higher. Nevertheless, bait-and-ditch is still the chain’s preferred strategy for some parameter constellations.

## 4.2 Ex-post IC regarding walking out sophisticates

In this subsection, we analyze the case in which the clerk’s incentive constraint to (not) serve sophisticated consumers needs to be satisfied ex-post; i.e., after the state of market demand has been realized. As in Section 3, we impose Assumption 3.

First, it is easy to see that if the chain company wants to serve both types of consumers, the analysis is the same as in Section 3. Indeed, as serving both types of consumers does not impose any disutility on the part of the clerk, it does not matter whether the corresponding incentive constraints needs to be satisfied ex ante or ex post.

<sup>25</sup>The boundaries of the cases are slightly different as  $\tilde{\psi}$  needs to be replaced with  $\tilde{\psi}^H$ .

Next, consider the case in which the chain company wants to induce the clerk to serve only naïve consumers. The chain company solves the following program:

$$\max_{e, w_{\sigma, j}} \mathbb{E}[\sigma|e] \frac{(1 + \bar{f})^2}{4} - q_e w_{H, N} - (1 - q_e) w_{L, N} \quad (\text{EP})$$

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

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

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

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

$$w_{H, N} - \phi \geq w_{H, S} \quad (\text{IC}_H^{EP})$$

$$w_{L, N} - \phi \geq w_{L, S} \quad (\text{IC}_L^{EP})$$

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

It can readily be established that if the chain wants to induce low effort  $e = 0$ , the formerly optimal contract is still optimal:  $w_{H, N} = w_{L, N} = \phi$  and  $w_{H, S} = w_{L, S} = 0$ . The corresponding profit is  $\tilde{\Pi}_0^{EP} = \mathbb{E}[\sigma|0](1 + \bar{f})^2/4 - \phi$  just like in the previous section; that is,  $\tilde{\Pi}_0^{EP} = \tilde{\Pi}_0$ .

Now, suppose the chain seeks to incentivize the clerk to exert high effort, i.e.  $e = 1$ . The formerly optimal contract is no longer optimal because it violates  $(\text{IC}_L^{EP})$ . By the usual arguments, it is optimal to pay the lowest feasible wages if the clerk serves also sophisticated consumers. Thus,

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

The two remaining wages are pinned down by the binding  $(\text{IC}_L^{EP})$  and  $(\text{IC}_1^N)$  constraints and thus are:

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

The corresponding profit of the chain is:

$$\tilde{\Pi}_1^{EP} = \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \phi - \frac{q_1}{q_1 - q_0} \psi.$$

A comparison of the two profit expression reveals that the chain prefers to induce high effort – if it prefers to serve only naïve consumers – if and only if

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

As in the case with interim incentives, the chain is more likely to induce the clerk to work hard when it serves only naïve consumers:

**Observation 3.**  $\tilde{\psi}^{EP} > \hat{\psi}$ .

Again we can distinguish six cases, (a)–(f), as displayed in the following table:

	$\mathbb{E}[\sigma 0] \leq \bar{f}^2 < \mathbb{E}[\sigma 1]$	$\bar{f}^2 \geq \mathbb{E}[\sigma 1]$
$\psi \leq \hat{\psi}$	(a) $\hat{\Pi}_1 \leq \tilde{\Pi}_0$	(d) $\hat{\Pi}_1 \leq \tilde{\Pi}_1^{EP}$
$\hat{\psi} < \psi \leq \tilde{\psi}^{EP}$	(b) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$	(e) $\hat{\Pi}_0 \leq \tilde{\Pi}_1^{EP}$
$\psi > \tilde{\psi}^{EP}$	(c) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$	(f) $\hat{\Pi}_0 \leq \tilde{\Pi}_0$

Only the cases (d) and (e) are conceptually different than in Section 3.<sup>26</sup> The results for the new cases (d) and (e) are presented in the following proposition.

**Proposition 6.** *Suppose that the incentive constraints not to serve sophisticated consumers need to hold ex post, that Assumption 2 and 3 hold, and that  $\bar{f}^2 \geq \mathbb{E}[\sigma|1]$ .*

(i) *For  $\psi \leq \hat{\psi}$  the chain prefers to serve only naïve consumers if and only if*

$$\phi \leq \mathbb{E}[\sigma|1] \frac{(1 - \bar{f})^2}{4}.$$

(ii) *For  $\hat{\psi} < \psi \leq \tilde{\psi}^{EP}$  the chain prefers to serve only naïve consumers if and only if*

$$\phi \leq \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} + \frac{q_1}{q_1 - q_0} (\tilde{\psi}^{EP} - \psi).$$

Intuitively, compared to the situation described in Proposition 4, it is more costly now for the chain to induce the agent to walk sophisticated consumers. Yet, for  $\phi$  not too high, bait-and-ditch is still the chain's preferred strategy.

### 4.3 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  $\bar{f}$ . 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

<sup>26</sup>The boundaries of the cases are slightly different because  $\tilde{\psi}$  needs to be replaced by  $\tilde{\psi}^{EP}$ .

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:

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

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

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

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:

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

Taking the first-order condition and re-arranging yields

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

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 7.** *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*

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

and

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

At these prices, all naïve consumers with  $v \in \left[ \frac{1-k-\bar{f}}{2(1-k)}, 1 \right]$  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.<sup>27</sup> 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.

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<sup>27</sup>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.

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. Recall that retailers need to retain sufficient market power for our main result to extend beyond duopoly because otherwise Assumption 4 is violated.<sup>28</sup>

## 5 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 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.<sup>29</sup> 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.

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<sup>28</sup>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).

<sup>29</sup>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.

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.<sup>30</sup>

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.

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<sup>30</sup>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  $\varepsilon \rightarrow 0$ , retailer  $T$ 's profit from this deviation is

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

The deviation is not profitable if

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

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

**Proof of Proposition 2:** Suppose Assumption 1 holds and that  $\sigma \leq \bar{f}^2$ . 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 deviate. Recall that the compensation scheme offered by the chain company is:

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

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  $\bar{U} = 0$ , 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  $\tilde{w}(r_B, r_A)$ , instead, the chain's profits are  $\tilde{\Pi} = \frac{\sigma}{4}(1 + \bar{f})^2$ . We have that

$$\frac{\sigma}{4}(1 + \bar{f})^2 \geq \sigma\bar{f} \iff (1 - \bar{f})^2 > 0$$

which holds by Assumption 1. 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 clerk's wage is increasing in  $r_B$  for  $r_B$  strictly smaller than a certain threshold, then the clerk'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  $|\mathcal{R}| \rightarrow \infty$  – equilibrium existence is guaranteed and the outcome described in the proposition is an equilibrium outcome. ■

**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. ■

**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

$$\tilde{\Pi}_0 = \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4} - \phi.$$

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:

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

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

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

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

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

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

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

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

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

This concludes the proof. ■

**Proof of Proposition 3:** In case (a), not serving sophisticated consumers is optimal for the chain if  $\hat{\Pi}_1 < \tilde{\Pi}_0$ , which is equivalent to

$$\begin{aligned} \mathbb{E}[\sigma|1] \bar{f} - \frac{q_1}{q_1 - q_0} \psi &< \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4} - \phi \\ \iff \phi &< \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} - \frac{q_1}{q_1 - q_0} \underbrace{\left[ \frac{(H - L) \bar{f} (q_1 - q_0)^2}{q_1} \right]}_{=\hat{\psi}} + \frac{q_1}{q_1 - q_0} \psi \\ \iff \phi &< \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} - \frac{q_1}{q_1 - q_0} (\hat{\psi} - \psi). \end{aligned}$$

In cases (b) and (c) not serving sophisticated consumers is optimal if

$$\hat{\Pi}_0 < \tilde{\Pi}_0 \iff \mathbb{E}[\sigma|0] \bar{f} < \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4} - \phi \iff \phi < \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4}. \quad \blacksquare$$

**Proof of Proposition 4:** First, we prove part (i) of the proposition, which corresponds to case (d) in the table. The claim is true if and only if  $\hat{\Pi}_1 < \tilde{\Pi}_1$ , which is equivalent to

$$\begin{aligned} \mathbb{E}[\sigma|1] \bar{f} - \frac{q_1}{q_1 - q_0} \psi &> \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \frac{q_1}{q_1 - q_0} \psi \\ \iff 0 &< \mathbb{E}[\sigma|1] \frac{(1 - \bar{f})^2}{4} \end{aligned}$$

which is always satisfied under the imposed assumptions.

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

$$\begin{aligned} \mathbb{E}[\sigma|0] \bar{f} &\leq \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \frac{q_1}{q_1 - q_0} \psi \\ \iff \frac{q_1}{q_1 - q_0} \psi &\leq \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} + (q_1 - q_0)(H - L) \frac{(1 + \bar{f})^2}{4}. \end{aligned}$$

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, case (iii) is established already in the proof of Proposition 3. ■

**Proof of Proposition 5:** The interesting case is the one where the chain wants to serve only naïve consumers and thus solves program (N) from Section 3.

If the chain wants to induce low effort, it is easy to see that it is optimal for the chain company to set  $w_{i,S} = 0$  for all  $i \in \{L, H\}$ . Hence, if the  $(PC_0^N)$  constraint holds, constraint  $(IC_{0,N}^N)$  must hold as well. Moreover, as the company wants to induce the clerk to exert low effort, it is optimal to set  $w_{H,N} = w_{L,N}$ . The  $(IC_N^N)$  and  $(IC_0^N)$  constraints are both satisfied if the  $(PC_0^N)$  constraint holds; and the same is true for the (LL) constraint. Thus, the crucial constraint is the  $(PC_0^N)$  constraint and the optimal wage scheme is  $w_{H,N} = w_{L,N} = \phi$  and  $w_{L,S} = w_{H,S} = 0$ .

If it wants to induce high effort, it is easy to see that it is optimal for the chain company to set  $w_{i,S} = 0$  for all  $i \in \{L, H\}$ . When Assumption 3 is violated, the optimal wages are  $w_{H,N} = (\psi + \phi)/q_1$  and  $w_{L,N} = w_{H,S} = w_{L,S} = 0$ . This follows from the arguments outlined in Section 3. Intuitively, when the cost of walking out sophisticates is greater than the cost of convincing naïve consumers to buy the add-on, the  $(PC_1^N)$  constraint must bind.

Now, we can consider the profit comparisons for the two relevant cases.

Case (d): The chain prefers to serve only naïve consumers if  $\hat{\Pi}_1 \leq \tilde{\Pi}_1^H$ , which is equivalent to

$$\phi \leq \mathbb{E}[\sigma|1] \frac{(1 - \bar{f})^2}{4} + \left( \frac{q_0}{q_1 - q_0} \right) \psi.$$

Case (e): Here, the chain prefers to serve only naïve consumers if  $\hat{\Pi}_0 \leq \tilde{\Pi}_1^H$ , which is equivalent to

$$\begin{aligned} \mathbb{E}[\sigma|0]\bar{f} &\leq \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \psi - \phi \\ \iff \phi &\leq \underbrace{\mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4}}_{\equiv \tilde{\psi}^H} + \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4} - \mathbb{E}[\sigma|0]\bar{f} - \psi \\ \iff \phi &\leq \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} + \tilde{\psi}^H - \psi. \end{aligned}$$

This concludes the proof. ■

**Proof of Proposition 6:** First, as explained in the main text, if the chain company wants to serve both types of consumers, the analysis is the same as in Section 3.

Consider the case in which the chain company wants to induce the clerk to serve only naïve consumers. The chain company solves program (EP) given in the main text.

If the chain wants to induce low effort  $e = 0$ , the formerly optimal contract is still optimal:

$$\begin{aligned} w_{H,N} &= w_{L,N} = \phi, \\ w_{H,S} &= w_{L,S} = 0. \end{aligned}$$

The corresponding profit is  $\tilde{\Pi}_0 = \mathbb{E}[\sigma|0](1 - \bar{f})^2/4 - \phi$ .

Now, suppose the chain seeks to incentivize the clerk to exert high effort; i.e.,  $e = 1$ . By the usual arguments it is optimal to pay the lowest feasible wages if the clerk serves also sophisticated consumers. Thus,

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

The constraints  $(PC_1^N)$  and  $(IC_{1,N}^N)$  now coincide. The chain has to satisfy the following four constraints:

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

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

$$w_{H,N} \geq \phi \quad (IC_H^{EP})$$

$$w_{L,N} \geq \phi. \quad (IC_L^{EP})$$

Notice that if  $(IC_L^{EP})$  and  $(IC_1^N)$  are satisfied, then  $(IC_H^{EP})$  and  $(PC_1^N)$  automatically hold. Specifying the wages as low as possible yields

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

Under Assumption 3 the participation constraint is satisfied for these wages. The corresponding profit of the chain is:

$$\tilde{\Pi}_1^{EP} = \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \phi - \frac{q_1}{q_1 - q_0} \psi.$$

From the six cases, (a)–(f), only the cases (d) and (e) are different than in Section 3.

Case (d): The chain prefers to serve only naïve consumers if  $\hat{\Pi}_1 \leq \tilde{\Pi}_1^{EP}$ , which is equivalent to

$$\phi \leq \mathbb{E}[\sigma|1] \frac{(1 - \bar{f})^2}{4}.$$

Case (e): Here, the chain prefers to serve only naïve consumers if  $\hat{\Pi}_0 \leq \tilde{\Pi}_1^{EP}$ , which is equivalent to

$$\begin{aligned} \mathbb{E}[\sigma|0] \bar{f} &\leq \mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \phi - \frac{q_1}{q_1 - q_0} \psi \\ \iff \phi &\leq \underbrace{\mathbb{E}[\sigma|1] \frac{(1 + \bar{f})^2}{4} - \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4}}_{= \frac{q_1}{q_1 - q_0} \tilde{\psi}^{EP}} + \mathbb{E}[\sigma|0] \frac{(1 + \bar{f})^2}{4} - \mathbb{E}[\sigma|0] \bar{f} - \frac{q_1}{q_1 - q_0} \psi \\ \iff \phi &\leq \mathbb{E}[\sigma|0] \frac{(1 - \bar{f})^2}{4} + \frac{q_1}{q_1 - q_0} (\tilde{\psi}^{EP} - \psi). \end{aligned}$$

This concludes the proof. ■

**Proof of Proposition 7:** 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  $\varepsilon \rightarrow 0$ , retailer  $T$ 's profit from this deviation is

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

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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