Supplemental Appendix to
“Bait and Ditch: Consumer Naïveté and Salesforce Incentives”

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In this appendix we present, discuss and prove results that we have alluded to in Section 3.3 of the paper.

1 Model with Moral Hazard

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

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

We impose the following standard full-support assumption:

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

Let $\hat{\sigma}_e = q_e H + (1 - q_e) L$ denote the expected fraction of naïve consumers conditional on the agent’s effort $e \in \{0, 1\}$. Notice that by Assumption 1 $\hat{\sigma}_0 < \hat{\sigma}_1$. We assume that the fraction of

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naïve consumers is always neither too high or too low – independent of the effort choice – compared to the willingness to pay for the add-on:

**Assumption 2.** $\frac{1}{1+f^2} < \hat{\sigma}_0 < \hat{\sigma}_1 < \bar{f}^2$.

The agent also has to incur a cost $\phi > 0$ in order to “walk out” those consumers who do not wish to buy the add-on.\(^2\) For simplicity we assume that this cost is fixed and does not depend on the number of customers that are walked out empty-handed. Moreover, we assume that it is relatively more costly for the agent to talk consumers into buying the add-on than to “walk out” those consumers who do not wish to buy it:

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

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

\[ w = \{w_{L,N}, w_{L,S}, w_{H,N}, w_{H,S}\}, \]

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

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

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

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

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

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\(^1\)Here, the chain chooses the prices at stage 2 (see timeline below) whereas in the baseline model of the main text the agent chooses the prices at stage 2 on behalf of the chain. Thus, the chain now cannot use the contract to commit to certain prices. The chain has no incentives to attract also sophisticated consumers (when being committed to sell only the bundle) if $\sigma \geq 1/(1 + f^2)$. To see this note that the chain can induce sophisticated consumers to buy the bundle by charging $p_D + f_D < \tilde{P}_r = 1/2$. The optimal deviation is $f_D = \bar{f}$ and (slightly less than) $p_D = 1/2 - \bar{f}$. The corresponding profit is $\pi^{D}_D = 1/4 + (\sigma \bar{f})/2$, which is less than $\tilde{\pi}_D$ if $\sigma \geq 1/(1 + \bar{f}^2)$.

\(^2\)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 agent is intrinsically sympathetic towards the consumers, as the psychological cost of having to lie to the consumers and letting them go empty-handed.
2. Pricing stage: the chain and the local retailer $T$ simultaneously set prices.

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

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

1.1 Serving both consumer groups

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

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

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

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

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

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

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

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

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

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

Thus, if the chain wants to induce low effort, $e = 0$, it is straightforward to show that it is optimal to pay a zero wage in all states, $w_{\sigma,j} = 0$ for all $\sigma, j$. The corresponding profit of the chain
is
\[ \hat{\Pi}_0 = \hat{\sigma}_0 \bar{f}. \]

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

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

The chain’s expected profit amounts to
\[ \hat{\Pi}_1 = \hat{\sigma}_1 \bar{f} - \frac{q_1}{q_1 - q_0} \psi. \]

Thus, if the chain wants to serve both types of consumers, it induces its agent to exert high effort if and only if
\[ \psi \leq \frac{(H - L)(q_1 - q_0)^2 \bar{f}}{q_1} := \hat{\psi}. \]

### 1.2 The chain serves only naïve consumers

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

\[
\max_{e, w_{e,j}} \frac{\hat{\sigma}_e (1 + \bar{f})^2}{4} - q_e w_{H,N} - (1 - q_e) w_{L,N}
\]

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

\[
q_e w_{H,N} + (1 - q_e) w_{L,N} - e \psi - \phi \geq 0 \quad (PC_{e}^N)
\]
\[
q_e w_{H,N} + (1 - q_e) w_{L,N} - e \psi - \phi \geq q_e w_{H,N} + (1 - q_e) w_{L,N} - \hat{e} \psi - \phi \quad (IC_{e}^N)
\]
\[
q_e w_{H,N} + (1 - q_e) w_{L,N} - e \psi - \phi \geq q_e w_{H,S} + (1 - q_e) w_{L,S} - e \psi \quad (IC_{e,S}^N)
\]
\[
q_e w_{H,N} + (1 - q_e) w_{L,N} - e \psi - \phi \geq q_e w_{H,S} + (1 - q_e) w_{L,S} - \hat{e} \psi \quad (IC_{e,N}^N)
\]
\[ w_{\sigma,j} \geq 0 \text{ for all } \sigma \in \{L, H\}, \ j \in \{N, S\} \quad (LL) \]

The difference with respect to the previous program is that the chain now has to ensure that the agent does not serve sophisticated consumers who are only interested in purchasing the base good. As the agent experiences a disutility if he has to walk out customers empty-handed, the problem now is more intricate.
Suppose the chain wants to induce low effort, $e = 0$, and thus does not need to specify an incentive payment which motivates the agent to work hard. Importantly, the chain can perfectly monitor the fraction of add-on sales over total sales and thus observes whether or not sophisticated consumers are served. This implies that there is no moral hazard problem between the chain and the agent regarding the served types of consumers. The chain simply has to compensate the agent for the disutility associated with walking out sophisticated consumers. The optimal wages are $w_{H,S} = w_{L,S} = 0$ and $w_{H,N} = w_{L,N} = \phi$. The chain’s corresponding profit is

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

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

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

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

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

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

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

### 1.3 Comparison

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

\[ \tilde{\psi} > \hat{\psi}. \] (1)

Hence, the chain is more likely to implement high effort if it is able to commit not to serve sophisticated consumers. 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 sophisticated consumers 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 sophisticated consumers.

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

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

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

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

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

According to part (i) of Proposition 1, if the cost of effort is relatively low, the chain will always induce the agent to walk out sophisticated consumers, irrespective of his disutility for doing so. Intuitively, when the add-on good has a high profit margin, the gain from market segmentation becomes so large that the chain never considers serving sophisticated consumers. Moreover, part (ii) of Proposition 1 shows that, for intermediate levels of the effort cost, the decision as to whether sophisticated consumers should be walked out is independent of the agent’s disutility for doing so. This is a by-product of Assumption 3 which says that it is more expensive for the chain to motivate the agent to work hard than not to serve sophisticated consumers. Finally, in part (iii) of Proposition 1 if the cost of walking out consumers empty-handed is not too high, the chain will design a compensation scheme that induces its agent not to serve sophisticated consumers. Notice that whenever it engages in “bait-and-ditch”, the chain is rewarding its agent based on the revenue generated via add-on sales. Hence, even when the fraction of naïve consumers who can
be exploited by retailer $D$ directly depends on the effort exerted by its agent, who also incurs a disutility from walking out consumers empty-handed, it is often profitable for the chain company to offer an incentive scheme to its agent so that he engages in bait-and-ditch. Interestingly, the chain’s decision of whether to engage in bait-and-ditch may be independent of the agent’s disutility associated with walking out customers empty-handed. Indeed, the rent that the agent demands in order to exert effort may already compensate him also for the disutility arising from not serving sophisticated consumers. In this case, incentivizing the agent to serve only naïve consumers comes without additional costs for the deceptive retailer.

1.4 Proofs

In the proof of Proposition 1 we use the two following results:

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

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

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

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

Hence, the stated result follows. ■

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

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

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

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

The chain’s corresponding profit is

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

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

\[ w_{H,S} = w_{L,S} = 0. \]

Moreover, if (PC\(_1^N\)) holds, (IC\(_1^N\)) and (IC\(_N^N\)) are automatically satisfied. The remaining constraints are:

\[
\begin{align*}
 w_{L,N} + q_1(w_{H,N} - w_{L,N}) & \geq \phi + \psi & (PC\(_1^N\)) \\
 (q_1 - q_0)(w_{H,N} - w_{L,N}) & \geq \psi & (IC\(_1^N\)) \\
 w_{H,N} & \geq 0 & (LL) \\
 w_{L,N} & \geq 0
\end{align*}
\]

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

\[
\begin{align*}
 w_{L,N} &= \phi - \psi \frac{q_0}{q_1 - q_0} \\
 w_{H,N} &= \phi + \psi \frac{1 - q_0}{q_1 - q_0}
\end{align*}
\]

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,

\[
\begin{align*}
 w_{L,N} &= w_{H,S} = w_{L,S} = 0, \quad w_{H,N} = \frac{\psi}{q_1 - q_0}.
\end{align*}
\]

The chain’s profit in this case is

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

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

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

This concludes the proof of the lemma.  \( \blacksquare \)

We are now in the position to prove Proposition 1.

**Proof of Proposition 1:** From the above two lemmas it follows that we can distinguish three cases depending on the size of \( \psi \) - cases (i) - (iii) from the proposition.
Part (i) of the proposition: The claim is true if and only if $\Pi_1 < \tilde{\Pi}_1$, which is equivalent to

$$\tilde{\sigma}_1 \tilde{f} - \frac{q_1}{q_1 - q_0} \psi > \frac{\tilde{\sigma}_1 (1 + \tilde{f})^2}{4} - \frac{q_1}{q_1 - q_0} \psi$$

$$\iff 0 < \frac{\tilde{\sigma}_1 (1 - \tilde{f})^2}{4}.$$ 

Next, we prove part (ii) of the proposition. Note that $\Pi_0 \leq \tilde{\Pi}_1$ is equivalent to

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

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

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

Finally, in case (iii), not serving sophisticated consumers is optimal if and only if $\Pi_0 < \tilde{\Pi}_0$. This is equivalent to

$$\tilde{\sigma}_0 \tilde{f} < \frac{\tilde{\sigma}_0 (1 + \tilde{f})^2}{4} - \phi$$

$$\iff \phi < \frac{\tilde{\sigma}_0 (1 - \tilde{f})^2}{4}.$$ 

which completes the proof. ■