Shrouded Attributes and the Curse of Education

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February, 2004

1 Shrouded attributes

- Consider a bank that sells two kinds of services.

- For price p a consumer can open an account.

- If consumer violates minimum she pays fee $\widehat{p}$.

- WLOG assume that the true cost to the bank is zero.

- Consumer benefits V from violating the minimum.

- Consumer alternatively may reduce expenditure to generate liquidity V.

Cut back early spending	$V - e$
Violate minimum balance	$V - \widehat{p}$
Do neither	0

1.1 Sophisticated consumer

- Sophisticates anticipate the fee $\widehat{p}$.

- They choose to spend less, with payoff $V - e$

- ...or to violate the minimum, with payoff $V - \widehat{p}$

1.2 Naive consumer

- Naive consumers do not fully anticipate the fee $\widehat{p}$.

- Naive consumers may completely overlook the aftermarket or they may mistakenly believe that $\widehat{p} < e$.

- Naive consumers will not spend at a reduced rate.

- Naive consumer must choose between foregoing payoff V or paying fee $\widehat{p}$.

Summary of the model:

- Sophisticates will buy the add-on iff $V - \widehat{p} \geq V - e$, or $e \leq \widehat{p}$.

- Naives will buy the add-on iff $V - \widehat{p} \geq 0$.

- $D_i$is the probability that a consumer opens an account at bank i

$$D_1 = P\left(\sigma\varepsilon_1 - p_1 + q > \max_{i=2,\dots,n} \sigma\varepsilon_i - p_i + q\right)$$

- Assume that quality q is constant across banks and look for symmetric equilibrium with $p_1 = ... = p_n = p^*$.

- Then, the demand

$$D_1 = P\left(\sigma\varepsilon_1 - p_1 > \max_{i=2,\ldots,n} \sigma\varepsilon_i - p^*\right) = D\left(-p_1 + p^*\right)$$

where $D(x) = P\left(\sigma\varepsilon_1 + x > \max_{i=2,\ldots,n} \sigma\varepsilon_i\right)$.

- If ε is Gumbel then

$$D(x) = \frac{e^{-x/\sigma}}{e^{-x/\sigma} + \sum_{i=2,\ldots,n} e^{-0/\sigma}} = \frac{e^{-x/\sigma}}{e^{-x/\sigma} + n - 1}$$

1.3 Suppose there are only naives in the market.

- Assume $c = \widehat{c} = 0$.

- In equilibrium other firms offer p^* and $\widehat{p}^*$.

- We need $\widehat{p} \leq V$, otherwise no demand for add-on.

- Payoff of firm 1

$$\pi_1 = (p + \widehat{p})\, D\left(-p + p^*\right)$$

- Optimal p.
  - At optimum
$$0 = \frac{\partial \pi}{\partial p} = D\left(-p + p^{*}\right) - \left(p + \widehat{p}\right) D'\left(-p + p^{*}\right)$$
  - At symmetrical equilibrium $p = p^{*}$ and $\widehat{p} = \widehat{p}^{*}$ and
$$0 = D\left(0\right) - \left(p^{*} + \widehat{p}^{*}\right) D'\left(0\right)$$
  - Hence, the profit per consumer is
$$\mu \equiv p^{*} + \widehat{p}^{*} = \frac{D\left(0\right)}{D'\left(0\right)} > 0$$
  - Moreover, optimum $\widehat{p}^{*} = V$.
  - Thus $p^{*} = \mu - \widehat{p}^{*}$.

- Firms set high mark-ups in the add-on market.and the add-on mark-ups are inefficiently high: $\widehat{p} = V > e$.

- High mark-ups for the add-on are offset by low or negative mark-ups on the base good.

- To see this, assume market is competitive, so $\mu \simeq 0$.
  - Loss leader base good: $p^* \approx -V < 0$.

- In general with unit cost c we have $p - c = \mu - V$ and $\mu = \frac{D(0)}{D'(0)} = B_n \sigma$ where B_n was defined last week.

- Total profits $p + \widehat{p} = \mu$ are small for high competition ($\mu \sim 0$), and firms incur loss on the main item and high profits on add-ons.

- Examples: printers, hotels, banks, credit card teaser, mortgage teaser, cell phone, etc...

- The shrouded market becomes the profit-center because at least some consumers don't anticipate the shrouded add-on market and won't respond to a price cut in the shrouded market.

1.4 Suppose there are only sophisticated consumers

- Sophisticates will buy the add-on iff $\widehat{p} \leq e$.

- Thus profit

$$\pi_1 = (p + \widehat{p})\, D_1 \text{ if } \widehat{p} \leq e$$

and

$$\pi_1 = pD_1 \text{ if } \widehat{p} > e$$

- Perceived utility from good 1 is

$$U_1 = q - p + \max\left(V - \widehat{p}, V - e\right) + \sigma\varepsilon_1 = q + V - p - \min\left(\widehat{p}, e\right) + \sigma\varepsilon_1$$

- Perceived utility from good i is

$$U_i = q + V - p - \min\left(\widehat{p}, e\right) + \sigma\varepsilon_i$$

- Demand for good 1 is

$$\begin{aligned} D_1 &= P\left(U_1 > \max_{i=2,\ldots,n} U_i\right) \\ &= P\left(q + V - p - \min\left(\widehat{p_1}, e\right) + \sigma\varepsilon_1 > q + V - p^* - \min\left(\widehat{p}^*, e\right) + \sigma \max \varepsilon\right. \\ &= P\left(-p - \min\left(\widehat{p_1}, e\right) + p^* + \min\left(\widehat{p}^*, e\right) + \sigma\varepsilon_1 > \sigma \max \varepsilon_i\right) \\ &= D\left(-p - \min\left(\widehat{p_1}, e\right) + p^* + \min\left(\widehat{p}^*, e\right)\right) \end{aligned}$$

- Conclusion. If there are only sophisticated consumers

$$\begin{aligned}\pi_1 &= \left(p + \widehat{p}\mathbf{1}_{\widehat{p}\le e}\right) D_1 \\ &= \left(p + \widehat{p}\mathbf{1}_{\widehat{p}\le e}\right) D\left(-p - \min\left(\widehat{p_1}, e\right) + p^* + \min\left(\widehat{p}^*, e\right)\right)\end{aligned}$$

where $\mathbf{1}_{\widehat{p}\le e}$ is indicator function equal 1 if $\widehat{p} \le e$ and equal 0 otherwise.