Shrouded Attributes and the Curse of Education

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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 $\hat{p}$.

- 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 $V$.

\[
\begin{align*}
\text{Cut back early spending} & \quad V - e \\
\text{Violate minimum balance} & \quad V - \hat{p} \\
\text{Do neither} & \quad 0
\end{align*}
\]
1.1 Sophisticated consumer

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

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

- ...or to violate the minimum, with payoff $V - \hat{p}$
1.2 Naive consumer

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

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

- Naive consumers will not spend at a reduced rate.

- Naive consumer must choose between foregoing payoff $V$ or paying fee $\hat{p}$.
Summary of the model:

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

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

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

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

- Assume that quality $q$ is constant across banks and look for symmetric equilibrium with $p_1 = \ldots = p_n = p^*$. 
• Then, the demand

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

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

• If \( \varepsilon \) 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 $c = \hat{c} = 0$.

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

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

- Payoff of firm 1

$$\pi_1 = (p + \hat{p}) D (-p + p^*)$$
• Optimal \( p \).

  - At optimum

\[
0 = \frac{\partial \pi}{\partial p} = D (-p + p^*) - (p + \hat{p}) D' (-p + p^*)
\]

  - At symmetrical equilibrium \( p = p^* \) and \( \hat{p} = \hat{p}^* \) and

\[
0 = D (0) - (p^* + \hat{p}^*) D' (0)
\]

  - Hence, the profit per consumer is

\[
\mu \equiv p^* + \hat{p}^* = \frac{D (0)}{D' (0)} > 0
\]

  - Moreover, optimum \( \hat{p}^* = V \).

  - Thus \( p^* = \mu - \hat{p}^* \).
• Firms set high mark-ups in the add-on market and the add-on mark-ups are inefficiently high: \( \hat{p} = V > e \).

• 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 \( \mu \approx 0 \).
  
  – 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 \( p + \hat{p} = \mu \) 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 $\hat{p} \leq e$.

- Thus profit

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

and

$$\pi_1 = pD_1 \text{ if } \hat{p} > e$$
- Perceived utility from good 1 is
  \[ U_1 = q - p + \max (V - \hat{p}, V - e) + \sigma \varepsilon_1 = q + V - p - \min (\hat{p}, e) + \sigma \varepsilon_1 \]

- Perceived utility from good \( i \) is
  \[ U_i = q + V - p - \min (\hat{p}, e) + \sigma \varepsilon_i \]

- Demand for good 1 is
  \[
  D_1 = P \left( U_1 > \max_{i=2,\ldots,n} U_i \right)
  = P \left( q + V - p - \min (\hat{p}_1, e) + \sigma \varepsilon_1 > q + V - p^* - \min (\hat{p}^*, e) + \sigma \max \varepsilon \right)
  = P \left( -p - \min (\hat{p}_1, e) + p^* + \min (\hat{p}^*, e) + \sigma \varepsilon_1 > \sigma \max \varepsilon_i \right)
  = D \left( -p - \min (\hat{p}_1, e) + p^* + \min (\hat{p}^*, e) \right)
  \]
• Conclusion. If there are only sophisticated consumers

\[ \pi_1 = \left(p + \hat{p}1_{\hat{p} \leq e}\right) D_1 \]

\[ = \left(p + \hat{p}1_{\hat{p} \leq e}\right) D (-p - \min (\hat{p}_1, e) + p^* + \min (\hat{p}^*, e)) \]

where \(1_{\hat{p} \leq e}\) is indicator function equal 1 if \(\hat{p} \leq e\) and equal 0 otherwise.