Customer Perception and Competitive Quality Strategy

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Sketch

• **Objective**: given the customers’ perceptions of quality and the reference standard in a competitive market, to determine the optimum level of quality a firm should choose in a product/service

• **Model**: game-theoretic

• **Solve**: 1) how does the average customer’s perception affect a firm’s quality choice?

   2) will quality chosen under imperfect information always be lower than quality under perfect information?

   3) what is the relationship between an industry standard of quality and each firm’s quality choice?
Figure 1. Features of the proposed model structure.
Key Assumptions

- **Market structure:** one is N firms, each with a single product; the other is a monopolist with N products
- **Manufactured quality:** each firm develops a product of varying quality and makes a once-and-for-all quality choice
- **Reference standard of quality:** the market’s reference standard if a function of the perceived qualities of all N firms in the market
- **Perceived quality:** it is a function of the magnitude and direction of the gap between reference standard and objective quality

\[ Q_{i,m} = G_{i,m}(q_i, Q) = (q_i - Q)m + Q; Q_i = \int G_{i,m}(\cdot)dF_m(\cdot) = (q_i - Q)\eta + Q \]
Model analysis

• Many firms--single products
  1) two effects: indirect and direct
  2) equilibrium condition

\[ \theta \alpha \varepsilon [\Sigma U_k]^{\theta-2} \left[ (1-\eta) \frac{\partial Q}{\partial q_i} \left\{ \frac{U_i}{Q_i} \Sigma U_k + (\theta - 1) U_i \Sigma \frac{U_k}{Q_k} \right\} \right. \\
\left. + \frac{\eta U_i}{Q_i} (\Sigma U_k + (\theta - 1) U_i) \right] = \frac{dC_i}{dq_i}, i = 1, \ldots, N \quad (9) \]
Model analysis

• Single firm--many products
  it is equivalent to that the firms are all subsidiaries of a parent company

\[
\theta^2 \alpha \varepsilon [\Sigma U_k]^{\theta-1} \left[ (1-\eta) \frac{\partial Q}{\partial q_i} \left\{ \Sigma \frac{U_k}{Q_k} \right\} + \eta \frac{U_i}{Q_i} \right]
\]

\[
\frac{dC_i}{dq_i}, i=1, \ldots, N \quad (10)
\]
Customer’s perception

• Exogenous reference quality

\[ \frac{\partial Q}{\partial q_i} = 0, \quad i = 1, \ldots, N \]

Then Eqn (9) reduces to:

\[ \theta \alpha \varepsilon \left[ \Sigma U_k \right]^{\theta-2} \left[ \frac{\eta U_i}{Q_i} \left\{ \Sigma U_k + (\theta - 1) U_i \right\} \right] = \frac{dC_i}{dq_i}, \]

\[ i = 1, \ldots, N \quad (11) \]
Exogenous reference quality

- Perceptions determine the degree of the moral hazard problem and give firms incentives to provide varying degrees of quality.

- The market degenerates for pure credence goods when the reference standard is exogenously fixed.
Endogenous reference quality

• Accurate perception: the reference standard has no impact on the firm’s quality choice

\[ \theta \alpha \varepsilon [\Sigma U_k]^{\theta - 2} \left[ \frac{U_i}{q_i} \{ \Sigma U_k + (\theta - 1) U_i \} \right] = \frac{dC_i}{dq_i}, \]

\[ i = 1, \ldots, N \] (13)

since \[ Q_k = q_k, \ k = 1, \ldots, N \]

• Imprecise perception: the quality of product is poorer

\[ \theta \alpha \varepsilon [\Sigma U_k]^{\theta - 2} \left\{ \frac{y_i}{\Sigma y_i} \right\} \left[ \frac{U_i}{Q} \Sigma U_k + (\theta - 1) U_i \Sigma \frac{U_k}{Q} \right] \]

\[ = \frac{dC_i}{dq_i}, \ i = 1, \ldots, N \] (14)

since \[ Q_k = Q, \ k = 1, \ldots, N \]
Comparison of single and multiple firms

- Exogenous reference standard
- Endogenous reference standard
  1) accurate perceptions
  2) imprecise perceptions

(a) Oligopoly

\[ \varepsilon \theta^2 \alpha \left[ \sum U_k \right]^{\theta - 1} \frac{y_i}{\sum y_i} \cdot \frac{U_i}{Q} = \frac{dC_i}{dq_i} \]

(b) Monopoly

\[ \varepsilon \theta^2 \alpha \left[ \sum U_k \right]^{\theta - 1} \frac{y_i}{\sum y_i} \sum \frac{U_k}{Q} = \frac{dC_i}{dq_i} \]