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Hidden Characteristics II: Versioning

SI 680, ICD: Signaling and Contracting
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April 2, 2008

1   Motivation

Willingness-to-pay is classic //hidden characteristic//: buyer knows how much a good is worth to her, seller doesn't know.

- If seller faces lots of competition, may not matter: competition forces P = MC, independent of WTP

- But what if $\Pi = P \times Q -$ Total Cost $= MC \times Q -$ Total Cost < 0? For example, if $MC = 0$?

- Then $P > MC$: now WTP does matter for P (can't set $P > WTP$)

If WTP heterogeneous, might want to (might //need// to if competition forces it) charge different users different amounts: get more from those with high WTP

- Differential pricing

- How to sort buyers into different WTP classes?
    - Perhaps WTP correlated with observable characteristic (seniors, students, business v. vacation travel, etc.) ("Partially observable" characteristics)
    - What about the unobservable part? Get buyers to reveal through self-selection (choose from a menu of contracts
    - Self-selection on what dimensions?
        * quantity
        * bundle of features
        * quality
    - These last two are instances of *versioning*

2 Graphical analysis of versioning

- Single item

- Two types of buyers, low and high WTP for quality. (Draw two WTP for quality curves (how much WTP for each incremental unit of quality)

- If full information, firm would charge A to low types for quality x_1^0, and charge A+B+C to high types for x_2^0

- But, if not full information, self-selection not incentive compatible!

  - Seller gets all surplus, buyers get 0

  - If high type pretends to be low type, takes x_1^0 for price A, gets to keep surplus $B > 0$. See Figure (1).
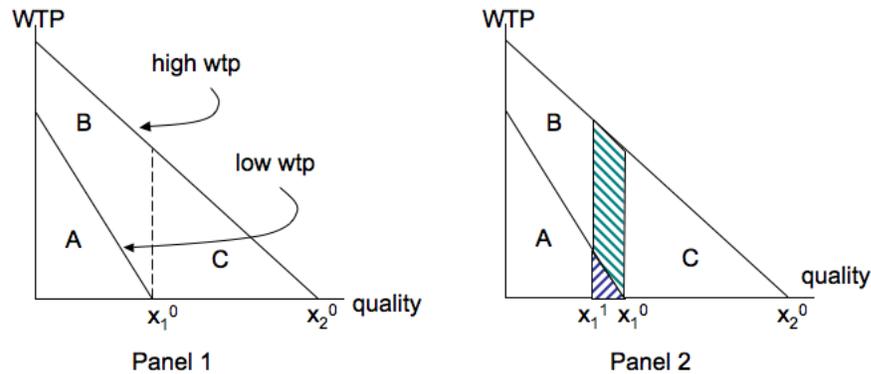
The graphs show the willingness-to-pay for various qualities by two different consumer types: those with high WTP and those with low WTP

Figure 1:

  - Suppose seller offers high quality for A+C
    * high types get to keep surplus B, no incentive to lie
    * seller gets increase of C in revenues
  - Seller can do better: degrade product for low type

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* reduce quality to low type to x_1^1
* lose blue shaded from low type, gain green from high type
* at starting point, marginal loss on low types is zero, gain on high types positive, so unambiguous increase by lowering low-type quality at least some

– How far to lower low-type quality?

* if $\{N_L, N_H\}$ of each type, go until $N_L \Delta \text{blue} = N_H \Delta \text{green}$
* Special case: if $N_L = N_H$, then go until the dividing line is bisected

QUESTION: What is the incentive compatibiltiy constraint above?

$$u(q_2) - t_2 > B$$