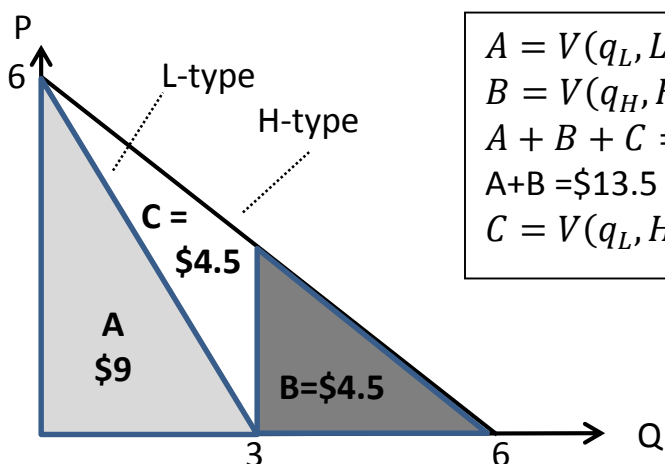


**Tennis Club Pricing Example**

- Costs:  $MC = 0$ ;  $FC = \$5,000$ ;  $Q$  = hours of court time.
- 1,000 H's:  $q_H = 6 - p \rightarrow V_q(q_H, H) = 6 - q_H \rightarrow V(q_H, H) = 6q_H - \frac{1}{2}q_H^2$
- 1,000 L's:  $q_L = 3 - \frac{1}{2}p \rightarrow V_q(q_L, L) = 6 - 2q_L \rightarrow V(q_L, L) = 6q_L - q_L^2$

**Nonlinear Pricing:** Bronze  $\{q_L = 3, P_L = ?\}$  & Gold  $\{q_H = 3, P_H = ?\}$  memberships

- Players can choose membership (2<sup>nd</sup> Degree P.D. / Self-selection)



$$\begin{aligned}
 A &= V(q_L, L) = 6 \cdot 3 / 2 = \$9 \\
 B &= V(q_H, H) - V(q_L, H) = 3 \cdot 3 / 2 = \$4.5 \\
 A + B + C &= V(q_H, H) = 6 \cdot 6 / 2 = \$18 \\
 A + B &= \$13.5 \\
 C &= V(q_L, H) - V(q_L, L) = 18 - 13.5 = \$4.5
 \end{aligned}$$

$$P_L = A = V(q_L, L)$$

$$P_H = A + B = P_L + V(q_H, H) - V(q_L, H) = P_L + \text{Value(Upgrade)}$$

$$P_H = 18 - C = V(q_H, H) - (V(q_L, H) - P_L) = V(q_H, H) - CS(\text{bronze}, H)$$

(1) Serious Value Gold at  $A+B+C = \$18$ ; Casual Value Bronze at  $A = \$9$ .

- Ask: What if Charge  $P_B = \$9$  and  $P_g = \$18$ ?** (3<sup>rd</sup> degree P.D. prices)
- Both buy Bronze. Why?** (Profit  $2 \cdot 9k - 5k = \$13k$ )
- $CS(\text{bronze}, H) = V(q_L, H) - P_L = C = \$4.5$ ;  $CS(\text{gold}, H) = 0$

(2) What if want to price Gold to sell?

- Ask:  $P_L$ ?**  $P_L = A = \$9$ . Why? Can't be higher. If lower, problem H-types buying wrong package gets **worse**.
- Ask:  $P_H$ ?**  $P_H = A+B = \$13.5$ , so  $CS = C$ . Need to give at least same value over price as on bronze package.
- Profit** =  $\$9,000 + \$13,500 - 5,000 = \$17,500$

(3) **Intuition: Base package** 3 hrs for  $A = \$9$ . **Upgrade** additional 3 hrs for  $B = \$4.5$

(4) Alternative: Sell only gold packages at  $A+B+C = \$18$ .  $\pi = \$18,000 - 5,000 = \$13,000$ . Better iff  $N_s(A+B+C) > N_c(A) + N_s(A+B) \leftrightarrow N_s(C) > N_c(A)$

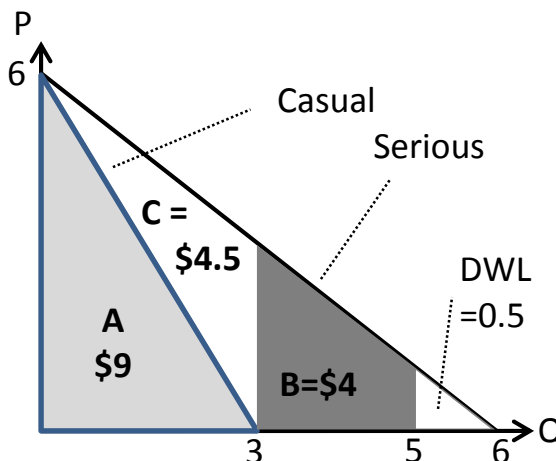
### Package Design [Discussion]

- Choose number of hours in Bronze & Gold as well as price.
- **ASK:**  $Q_H$  or  $Q_L$ : Raise, Lower, or Keep the same?

#### Debrief: $Q_H$

- Lower  $Q_H$ ? No, DWL underproduction lowers profits – no offsetting gain.
- Raise  $Q_H$ ? No, DWL overproduction lowers profits – no offsetting gain.

→ Set  $Q_H = Q_H^{FB} = 6$ . **Largest Package should be efficient size.**



#### Debrief $Q_L$

Trade-off:  $\Delta P_L = -D$  Lose D on  $N_L$  L-types  
 $\Delta P_H = +E$  Gain E on  $N_H$  H-types

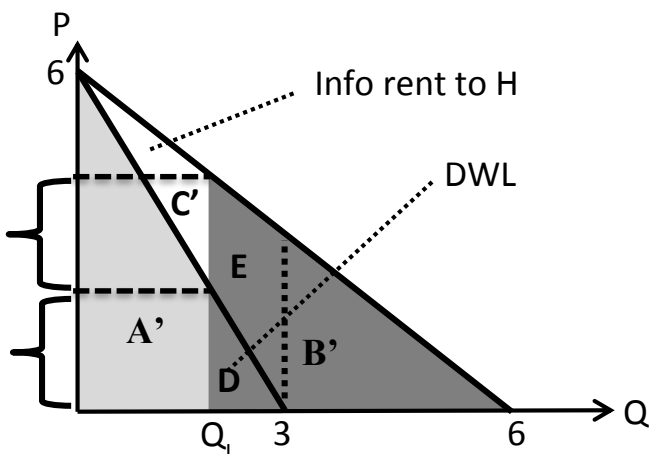
For small reduction in  $Q_L$ ,

D is very small.

So  $Q_L^* < 3$ .

$V_q(q_L, H) - V_q(q_L, L)$   
 Marginal information rent,  
 weight  $(1 - F(\theta_H))$

$V_q(q_L, L) - MC$   
 Marginal DWL, weight  $f(\theta_L)$



$$\text{FOC: } N_L(V_q(q_L, L) - MC) = N_H(V_q(q_L, H) - V_q(q_L, L))$$

#### Take-aways:

- Create DWL / lose  $\pi$  on Bronze BUT Extract more surplus from Gold;
- Trade-off between base package revenue and upgrade revenues.
- Large package is efficient size and delivers  $CS > 0$ .
- Small package should be smaller than efficient and delivers  $CS = 0$ .
- **“Answer”**  $Q_L = 2$ ;  $P_L = \$8$ ,  $Q_H = 6$ ;  $P_H = \$16$ .  $\pi = \$19k$ ;  $CS_{\text{casual}} = 0$ ;  $CS_{\text{serious}} = \$2$
- **Volume Discounting:**
  - Bronze:  $P_L/Q_L = 8/2 = \$4.00/\text{hr}$
  - Gold:  $P_H/Q_H = 16/6 = \$2.67/\text{hr}$

**Applications:** Quantity or Quality? The same! Iphone GB memory: just the same!