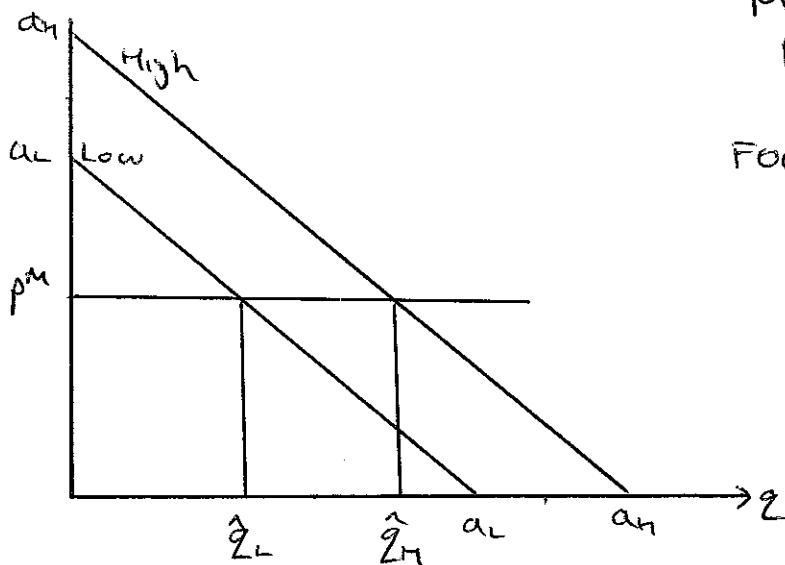


Second Degree Price Discrimination

- This note (a) explains why SDPD beats normal monopoly pricing
- (b) examines the optimal SDPD scheme with 2 types of consumers
- Model - suppose there are equal nos. of 2 types of consumers
 - high demand have demand $p = a_h - q$
 - low demand have demand $p = a_L - q$
 - assume $a_h > a_L > \frac{a_h}{2}$. Assume $MC = 0$.
(for simplicity)
- Standard Monopoly price :



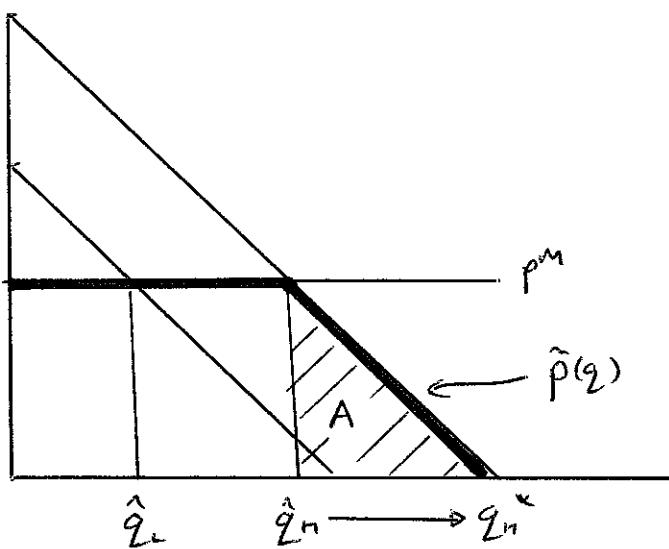
$$\underset{p}{\text{Max}} \quad p(a_h - p) + p(a_L - p)$$

$$\text{FOC}(p) : a_h - 2p + a_L - 2p = 0$$

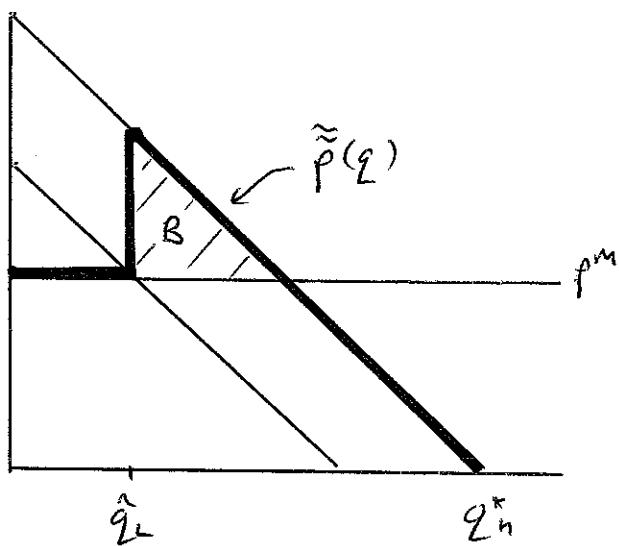
$$p^M = \frac{a_h + a_L}{4}$$

Price Discrimination (Nonlinear pricing) Improved Profits

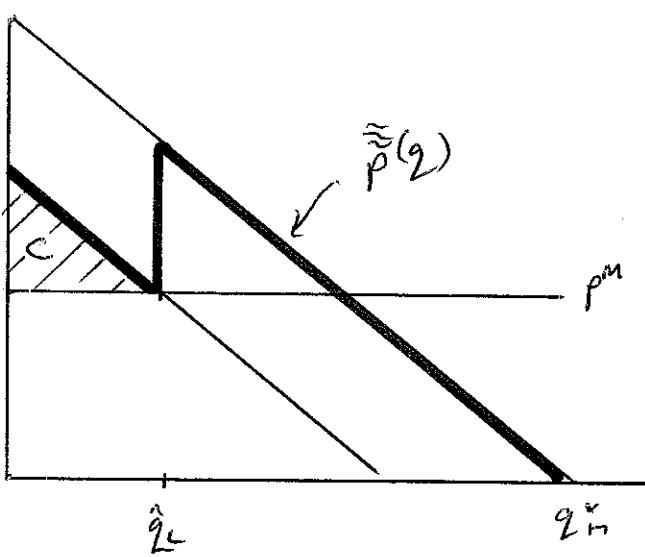
(2)



- Nonlinear price $\tilde{p}(q)$ improves on p^M .
- Firm makes extra profits A.
- High type's demand rises $\hat{q}_n \rightarrow q_n^*$.



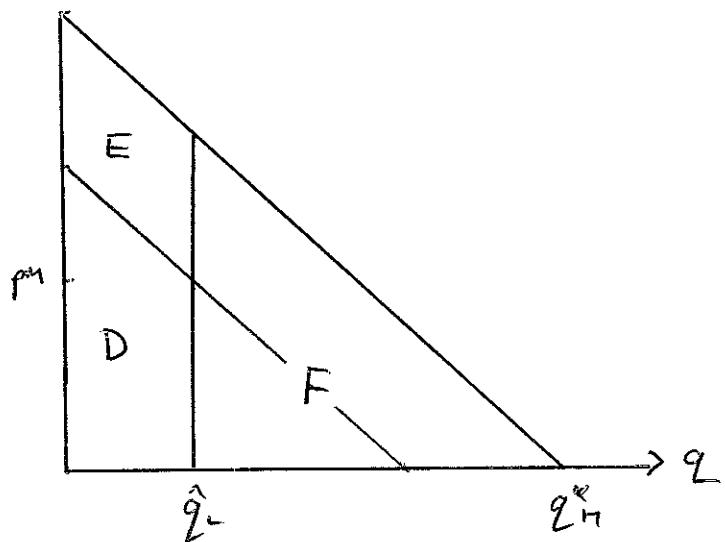
- Nonlinear price $\tilde{p}(q)$ improves on $\tilde{\tilde{p}}(q)$.
- Firm makes extra profit B.



- Nonlinear price $\tilde{\tilde{p}}(q)$ improves on $\tilde{p}(q)$.
- Firm makes extra profits C.
- In fact, given firm sells \hat{q}_L , this is the best the firm can do.

Second Degree Price Discrimination + Selling Bundles.

- The last pricing scheme, $\tilde{p}(q)$, looks quite complicated.
- Is there another way the firm can implement this?



Suppose firm sells 2 bundles:

(1) Buy \hat{q}_L units at price given by area D.

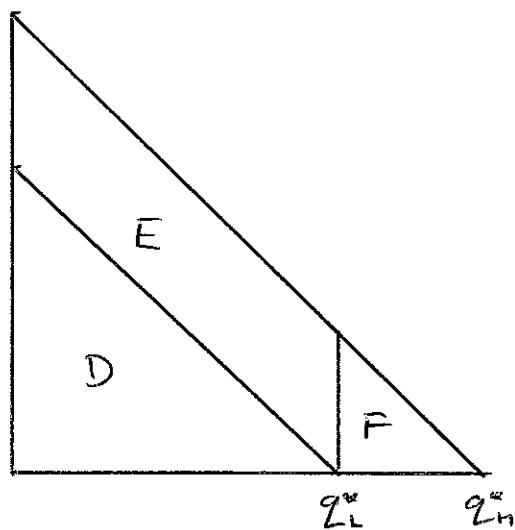
(2) Buy \hat{q}_H^* units at price given by area $D + F$.

- Low agents will buy bundle (1), while high types buy (2).
- We can use this picture to show this pricing scheme is the best the firm can do, conditional on selling \hat{q}_L to low types.
 - Suppose firm sells \hat{q}_L to low demand agents.
 - most firm can extract is D.
 - if high types copy low types, they can always guarantee themselves corner surplus E.
 - Hence most firm can charge for \hat{q}_H^* units is $D + F$.

What is optimal choice of q_L ?

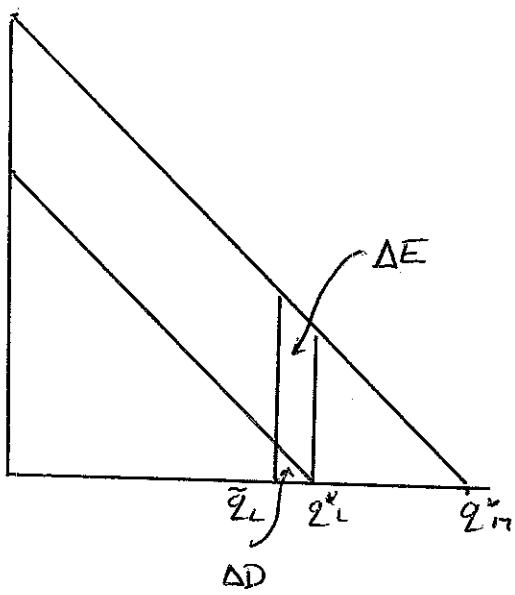
(4)

- What quantity should firm sell to low types?
- First suppose $q_L = q_L^*$, the socially optimum quantity



- Again firm sells two bundles:
 - (1) q_L^* units at $p = D$
 - (2) q_L^* units at $p = D + F$
- Total profits $2D + F$.

- Now suppose firm to q_L^* by a little.

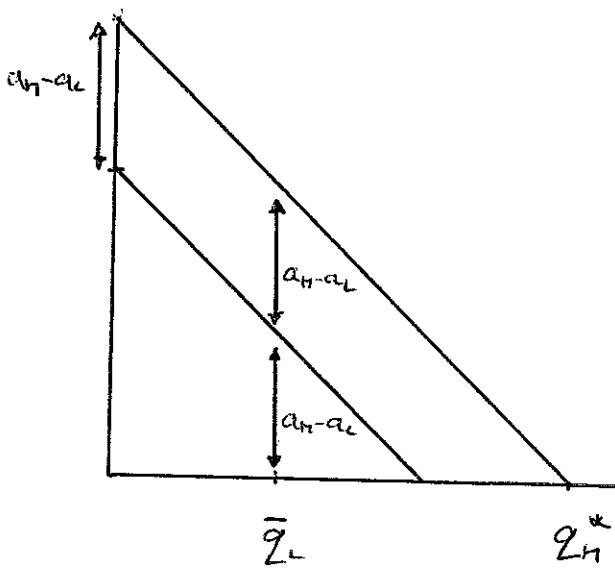


- Suppose firm sells \tilde{q}_L to low agents.
- Change in profit:
 - lost ΔD on low types since sell less of good
 - made ΔE on high types since consumer buys more.
 - Observe $\Delta E > \Delta D$. Hence reduction in q_L increases profits.

What is optimal q_L ? [continued]

(5)

- We know the firm wants to underapply the low agent. That is, they apply the agent with less than the efficient amount, q_L^* . Intuitively, the lost profit on low agents is less than the extra profit made from high types [recall the dupont quote].
- How far should the firm reduce q_L ?
- The answer is easy: they should equate marginal benefits and marginal costs, i.e. $\Delta D = \Delta E$.



- ΔE is proportional to the difference between the demand curves, $\alpha_H - \alpha_L$.
- ΔD is proportional to the height of the low demand curve.
- Hence $\Delta E = \Delta D$ when the low demand curve has height $\alpha_H - \alpha_L$. That is, $\bar{q}_L = 2\alpha_L - \alpha_H$.
- Intuitively, if $q_L > \bar{q}_L$ then $\Delta E > \Delta D$ and the firm should $\downarrow q_L$. If $q_L < \bar{q}_L$ then $\Delta E < \Delta D$ and the firm should $\uparrow q_L$.