

Price Discrimination

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Outline

- Elasticity and market power.
- Price discrimination: Motivation.
- Extracting consumer surplus.
 - Feasibility.
 - Efficiency.
 - Fairness.
- First degree price discrimination.
- Third degree price discrimination.
- Second degree price discrimination.

Price Elasticity

- Price elasticity is a measure of the responsiveness of demand to changes in prices.

It is the percent change of the quantity demanded due to a percent change of the price.

- It is independent of the units of measurements of price and quantity.
- It is independent of the direction of the price change.
- It is related both to the position and the slope of demand.
- It is critically related to market power, *i.e.*, the ability of firms to charge positive markups over the marginal cost.

Elasticity and Marginal Revenue

- The marginal revenue function can be written as a function of elasticity:

$$R = P(Q) * Q$$

$$MR = (\partial P / \partial Q) * Q + P$$

$$MR = [(\partial P / \partial Q) * (Q / P) + 1] * P$$

$$MR = P * [1 - 1/\epsilon]$$

- Therefore:

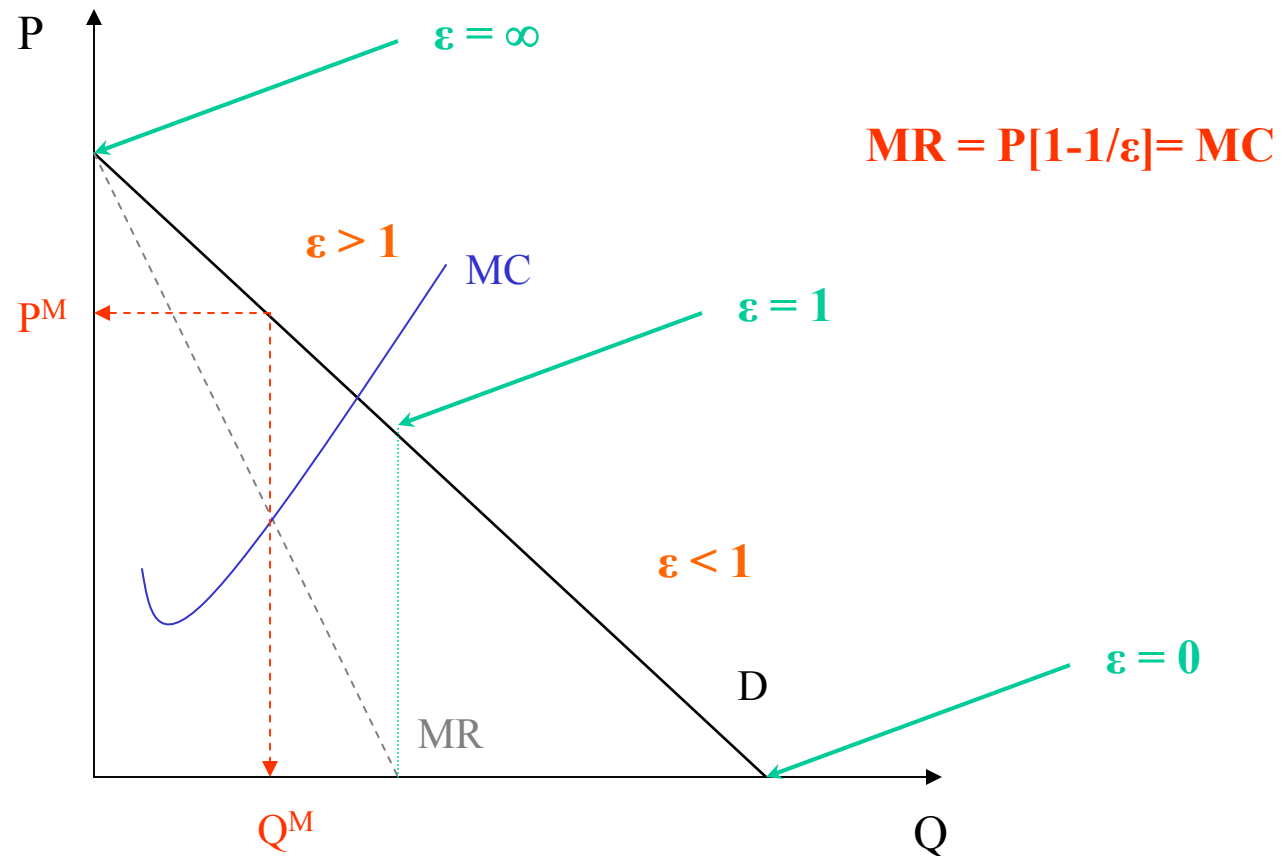
$$\epsilon = 1 \text{ implies } MR = 0$$

$$\epsilon > 1 \text{ implies } MR > 0$$

$$\epsilon < 1 \text{ implies } MR < 0$$

Elasticity and Monopoly Equilibrium

- The monopoly equilibrium is always on the elastic part of the demand!



Elasticity and Markup

- There is a close relation between elasticity and markup.
- The equilibrium price can be understood as a markup over MC.
- Maximizing profits is equivalent to finding the optimal markup.

$$MC = MR = P * [1 - 1/\epsilon]$$

$$P = MC * [1 - 1/\epsilon]^{-1}$$

$$P = MC * (1 + k)$$

$$k = 1/(\epsilon - 1)$$

Own-Price Elasticities

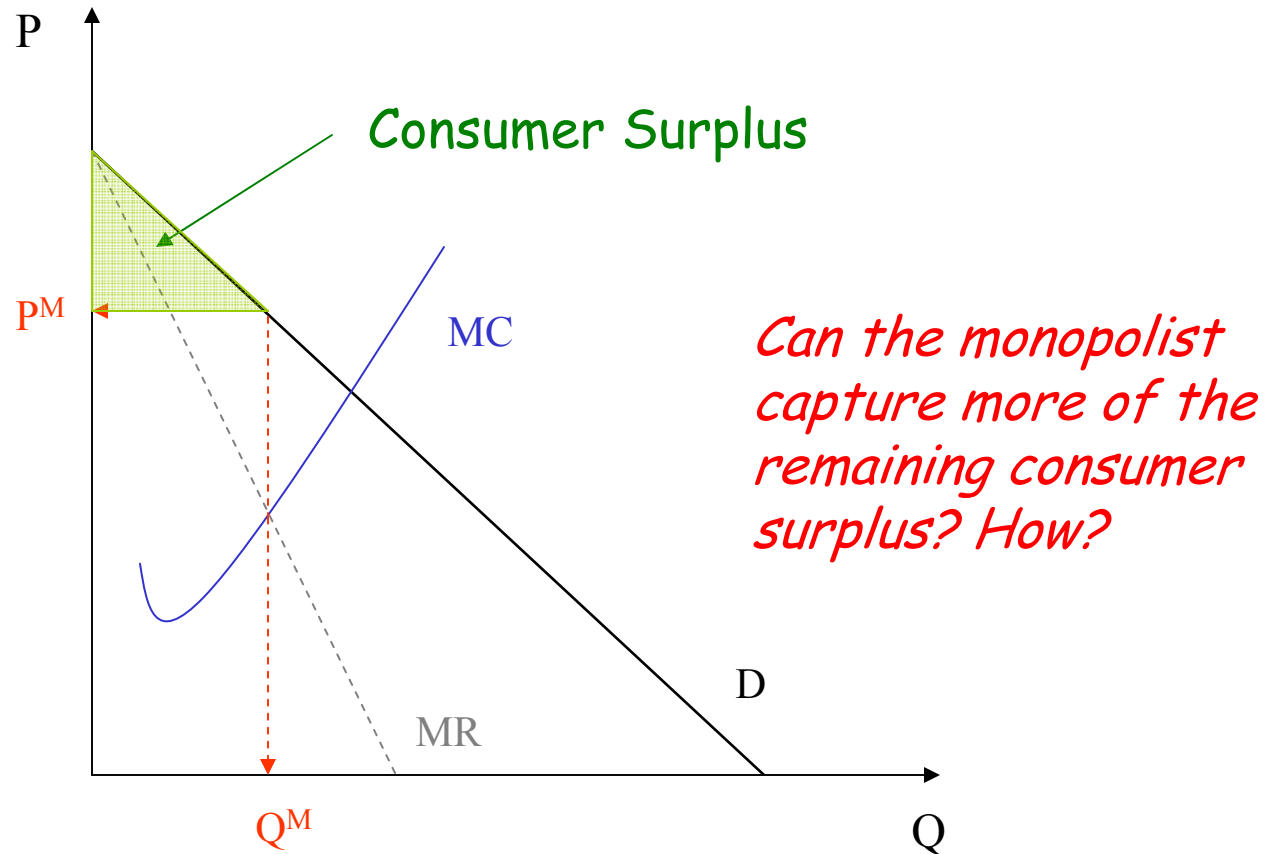
GOOD	Short Run	Long Run
Household Electricity	0.13	1.89
Household Natural Gas	1.40	2.10
Gasoline	0.30	0.51
Bus Transportation (local)	0.20	1.20
Railway Commuting	1.42	3.19
Tires	0.86	1.19
Jet Fuel	0.21	0.21
Medical Insurance	0.31	0.92
Clothing	0.90	2.90
China and Glassware	1.54	2.55
Stationery	0.47	0.56
Toys	0.88	2.39
Jewelry and Watches	0.41	0.67
Radio and TV Repairs	0.47	3.84
Tobacco	0.46	1.89
Opium	0.70	1.00
Marijuana	1.00	1.50
Beer	1.13	1.20
Foreign Travel	0.13	1.77
Theatre and Opera	0.18	0.31
Motion Pictures	0.87	3.67
Restaurant Meals	2.27	Unknown

Price Discrimination: Motivation

- Annual subscriptions generally cost less in total than one-off purchases.
- Buying in bulk usually offers a price discount.
 - these are price discrimination reflecting quantity discounts.
 - prices are *nonlinear*, with the unit price dependent upon the quantity bought.
 - allows pricing nearer to willingness to pay.
 - so should be more profitable than uniform pricing.
- How to design such pricing schemes?
 - depends upon the information available to the seller about buyers.
 - distinguish *first-degree* (personalized), *second-degree* (menu) pricing, and third degree price discrimination (market segmentation).

Consumer Surplus under Monopoly Pricing

- How do we measure how happy are consumers?



First Degree Price Discrimination

- Monopolist can observe how much every single consumer is willing to pay for the good or service.
- Personalized pricing extracts *all* consumer surplus
- First-degree price discrimination is highly profitable but requires:
 - detailed information.
 - ability to avoid arbitrage.
- Leads to the efficient choice of output: since price equals marginal revenue and $MR = MC$ for the last unit sold.
 - no value-creating exchanges are missed.

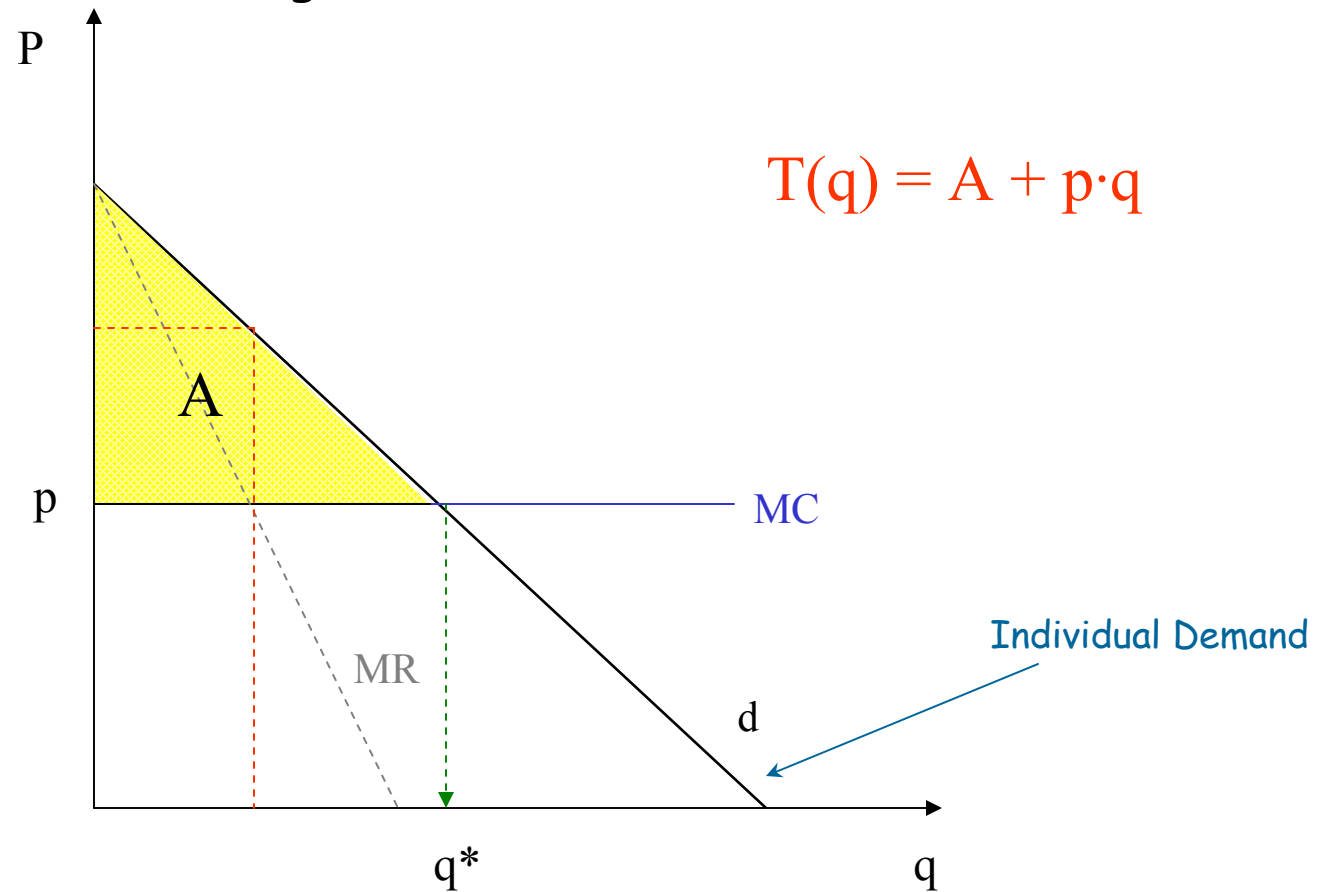
FDPD: Discussion

- **Is it feasible?** Yes, in some individual services.
- **Is it efficient?** Yes.
- **Is it fair?** Consumer surplus is zero.

- **Is FDPD of any practical interest?**
 - Personalized pricing.
 - Internet auctions.
 - Cover charges.
 - Implementation: Two-part tariffs for homogeneous consumers.

Two-Part Tariffs

- Example with homogeneous consumers and CRS.



Third Degree Price Discrimination (I)

- What if consumers are heterogeneous?
 - Assume that consumers' valuations are correlated with some observable characteristic of a group customers and/or their location.
 - Then the monopolist should pursue market segmentation.
 - Arbitrage. Markets should be independent (perhaps geographically) or consumers should have an observable characteristic that will be used to charge different prices for the same good or service.

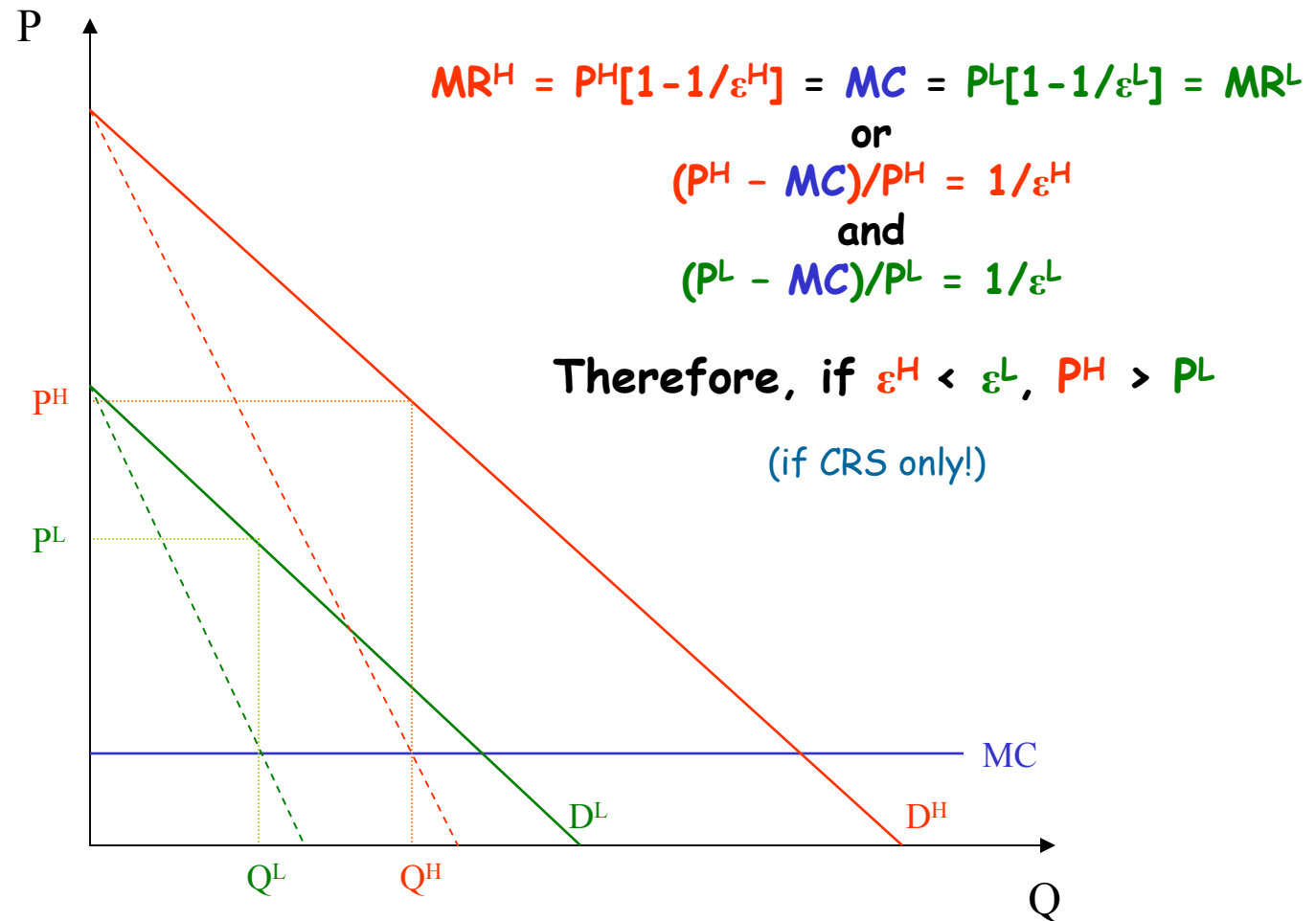
Third Degree Price Discrimination (II)

- **Is it feasible?** Yes, particularly for services.
- **Is it efficient?** More than monopoly pricing but less than FDPD.
- **Is it fair?** High demand consumers are worse off but low demand are better off. Society is better off if total production increases relative to standard pricing.

Table 2: Markups of Selected Cars (%)

MODEL	Belgium	France	Germany	Italy	U. Kingdom
Fiat Uno	7.6	8.7	9.8	21.7	8.7
Ford Fiesta	8.0	8.9	10.5	9.5	11.7
Nissan Micra	8.1	23.1	8.9	36.1	12.5
Renault 5	8.0	10.4	8.4	8.8	8.4
Fiat Tipo	8.4	9.2	9.0	20.8	9.1
Ford Escort	8.5	9.5	8.9	8.9	11.5
Renault 19	8.9	13.0	9.2	9.5	9.0
Toyota Corolla	9.7	19.6	13.0	24.2	13.6
VW Golf	9.3	10.3	12.2	11.0	10.0
Lancia Dedra	9.1	9.9	9.2	21.8	9.8
Mazda 626	9.8	19.3	13.0	21.7	13.3
Opel Vectra	9.3	9.5	10.7	9.2	11.8
Peugeot 405	9.9	13.4	10.2	9.9	11.6
Audi 80	10.8	11.3	14.3	12.6	10.9
Opel Omega	10.2	10.0	11.6	10.2	12.2
Citroen XM	11.1	14.1	12.4	12.0	11.3
Fiat Croma	9.0	9.6	9.7	21.2	9.8
Mercedes 190	14.3	14.4	17.2	15.6	12.3
BMW 5-series	12.5	12.4	12.3	12.7	13.0
Mercedes 200	15.1	15.2	17.9	16.8	NA
Honda Prelude	15.1	19.6	17.9	20.6	17.1
BMW 7-series	15.7	15.7	14.7	19.0	21.5

3DPD: Two consumer types



Second Degree Price Discrimination (I)

- **Second degree price discrimination.** The monopolist knows that there are different types of consumers but he *does not know who is who*. **Market segmentation is achieved through the design of the tariff itself.**
 - **Is it feasible?** Yes if offering different tariffs is not very costly and resale can be easily avoided.
 - **Is it efficient?** It is more efficient than uniform pricing.
 - **Is it fair?** Again, not an economist's question.

Second Degree Price Discrimination (II)

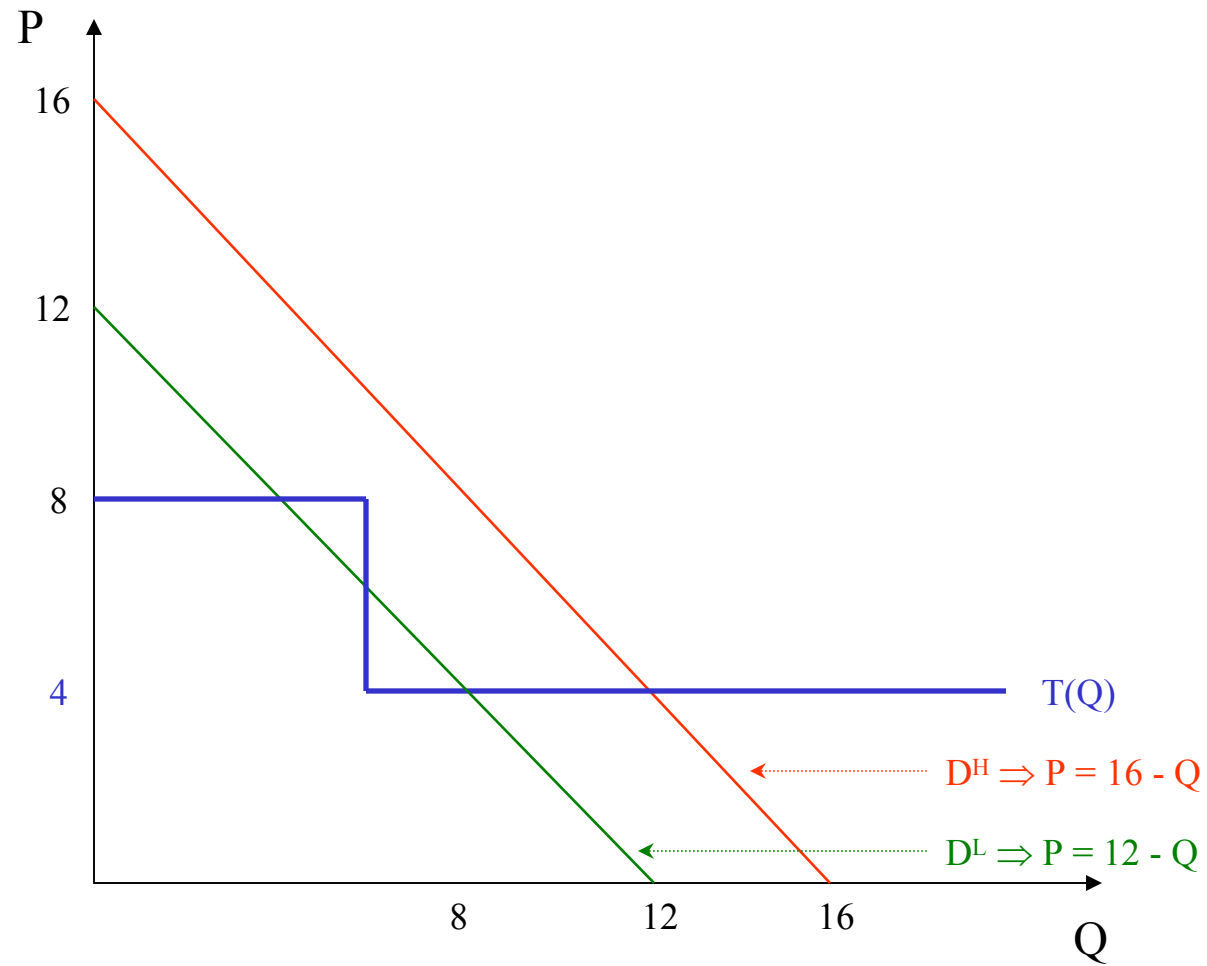
- **Definition of segments.**
 - The monopolist has to define the number of consumer groups that he wants to differentiate.
 - We will take this number as given, but in reality, a repeated analysis under different scenarios will determine what is the optimal number of segments.
- **Basic Features:**
 - Quantity Discounts.
 - Incentive Compatibility.
 - Depending on the distribution of consumer types optimal price discrimination may imply exclusion of low valuation customers.
 - Profits always increase relative to uniform pricing but net welfare effects depend on the share of consumer excluded and the overall output relative to the uniform pricing case.

How do incentives work?

“It is not because of the few thousands francs which would have to be spent to put a roof over the third-class carriages or to upholster the third-class seats that some company or other has open carriages with wooden benches... What the company is trying to do is prevent the passengers who can pay the second class-fare from traveling third-class: it hits the poor, not because it wants to hurt them, but to frighten the rich... And it is again for the same reason that the companies, having proved almost cruel to third-class passengers and mean to second-class ones, become lavish in dealing with first class passengers. Having refused the poor what is necessary, they give the rich what is superfluous.”

J. Dupuit, *Annales des Ponts et Chaussées*, 1849.

Quantity Discounts - Block Declining Tariffs



M.Q. 4: Tokyo's Taxi Fare

This page has been left blank on purpose. Read the motivating question above and address it before coming to class. We will discuss them and I will post the solutions after the lecture.