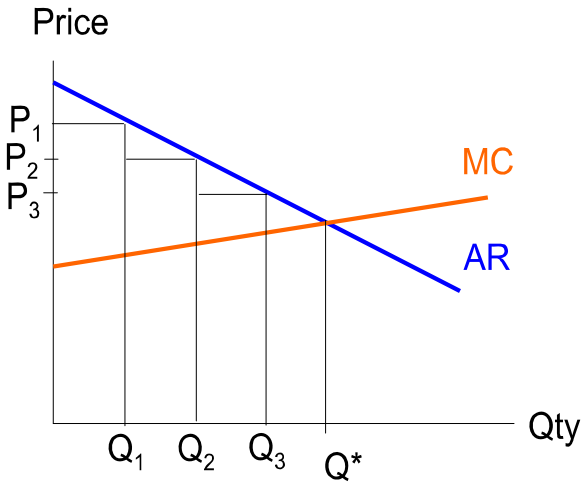
MONOPOLY – PART 2

SECOND-DEGREE PRICE DISCRIMINATION (P-R pp. 386-7)

This is an imperfect attempt to extract some consumer surplus
using quantity discounts, usually in blocks of quantities
The same discount schedule is available to all customers, they can pick quantity

This is less than perfect price discrimination in two ways:
[1] Each consumer's surplus is only partially extracted
[2] If different consumers have different demands,
the threshold quantities and prices must be chosen
to be best on the average, and not finely tailored
to extract the most surplus from each consumer
For example, the entry fee in a two-part tariff must be
optimal on average, and then the constrained
optimal price need not equal marginal cost



Quantity discounts and block pricing produce
an outcome that is somewhere between the
uniform-pricing monopoly output Q^m and the socially efficient Q*
Therefore such a system may be acceptable to regulators etc.

Constraint on price discrimination using quantity discounts or block pricing
Must be able to prevent re-sales among consumers

THIRD-DEGREE PRICE DISCRIMINATION

– "GROUPING" AT SELLER'S DISCRETION (P-R pp. 388-90)

Identify different groups with different demands (importantly, different elasticities) and charge separate different prices to each

Two groups, inverse demand functions $P_1 = D_1(Q_1)$ and $P_2 = D_2(Q_2)$. Write $Q = Q_1 + Q_2$

Monopolist wants to maximize profit $\pi = P_1 Q_1 + P_2 Q_2 - C(Q)$

Condition for optimal Q_1 (similar condition for Q_2)

$$P_1 + Q_1 \frac{dP_1}{dQ_1} - \frac{dC}{dQ}\frac{\partial Q}{\partial Q_1} = 0, \quad or \quad MR_1 = MC, \quad or \quad P_1\left(1 - \frac{1}{e_1}\right) = MC$$

Then $$P_1 = \frac{e_1}{e_1 - 1} MC, \quad P_2 = \frac{e_2}{e_2 - 1} MC$$

Numerical example: If $e_1 = 5$ and $e_2 = 10$, then $P_1 = 1.25$ MC and $P_2 = 1.11$ MC

Group with less elastic demand pays higher price

Examples – [1] Students' demand for textbooks is very price inelastic

When campus stores hold sales, they usually exclude textbooks

[2] New customers are more price-sensitive than returning ones

So introductory discounts are more common than renewal discounts

THIRD-DEGREE PRICE DISCRIMINATION – "VERSIONING" & BUYERS' SELF-SELECTION

Here the firm does not know the group membership of any individual customer and so cannot present him with just the price intended for that group (or is not legally allowed to do so)
Instead, the firm designs two (or more) different purchase contracts in such a way that each group's members will self-select the one that was intended for them
Examples – restricted vs. unrestricted air fares, hardback vs. paperback books, ...
(Quantity discount or block pricing schedules can also have this purpose)

Numerical example – Pie-In-The-Sky (PITS) airline's route between Podunk and Wobegon
100 potential customers each day; 70 tourist, 30 business
Each buys at most one ticket. Max willingness to pay for it is called "reservation price"

Type of ticket	PITS's cost	Reservation price		PITS's potential profit	
		Tourist	Business	Tourist	Business
Restricted	100	140	225	40	125
Unrestricted	150	175	300	25	150

Perfect price discrimination: Sell R to each T at 140, sell U to each B at 300
Profit = (140–100) * 70 + (300–150) * 30 = 40 * 70 + 150 * 30 = 2800 + 4500 = 7300

Various strategies compatible with PITS's available information :
[1] R only - Either price at 140, profit 40 * 100 = 4000, or price at 225, profit = 125 * 30 = 3750
[2] U only - Either price at 175, profit 25 * 100 = 2500, or price at 300, profit = 150 * 30 = 4500

[3] Both, priced R at X, U at Y, to be determined

Each type of customer will buy the ticket that yields larger consumer surplus

Assume that each type B or T, when surpluses equal, will choose U

Want T to choose R : $140 - X > 175 - Y$, or $Y - X > 35$

Want B to choose U : $225 - X \leq 300 - Y$, or $Y - X \leq 75$

These give each type of consumer the right incentive to choose the type of ticket the airline wants him to choose – Therefore they are called the "incentive-compatibility" or "self-selection" constraints Figure shows them in green

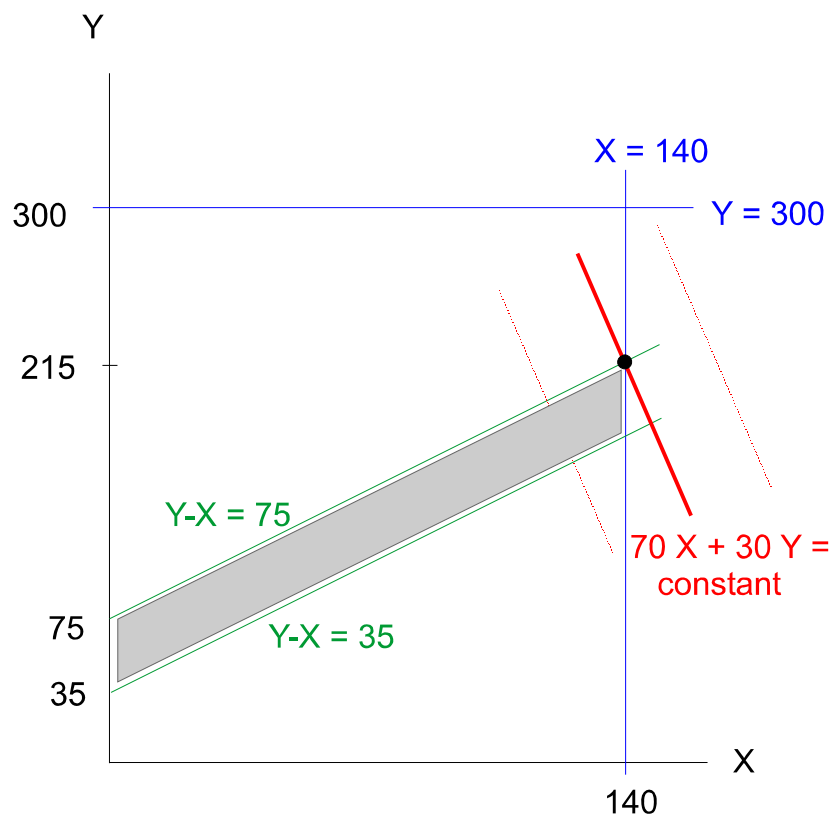
The airline must also set

$X \leq 140$, else T doesn't buy R,

$Y \leq 300$, else B doesn't buy U

These are called "individual rationality" or "participation" constraints Figure shows them in blue

So overall feasible region for choice of X, Y is the shaded area



PITS' profit is 70 (X - 100) + 30 (Y - 150) = 70 X + 30 Y - 11,500
Therefore PITS' iso-profit lines have equations 70 X + 30 Y = constant; they are shown in red

PITS' optimal choice is X = 140, Y = 215, shown by bullet

Resulting profit = (140–100) * 70 + (215–150) * 30 = 2800 + 1950 = 4750
Better than that of any of the single type of service strategies in [1] and [2]
But less than the 7300 PITS could make if it could identify individuals' types
and use this information to implement perfect price discrimination

So the "versioning" strategy lets PITS increase its profit above single-type strategies
by extracting some but not all consumer surplus
Each T-type still gets almost no surplus. But each B-type gets 300 – 215 = 85;
PITS can't charge them more than 215; they would buy R tickets, even worse for PITS.
This is PITS's cost of its information disadvantage (not knowing individuals' group identity)

In the language of the economics of asymmetric information (more later in course)
this is an example of "screening by self-selection"

P-R's analysis of bundling in restaurant menus (pp. 404-414) is another example