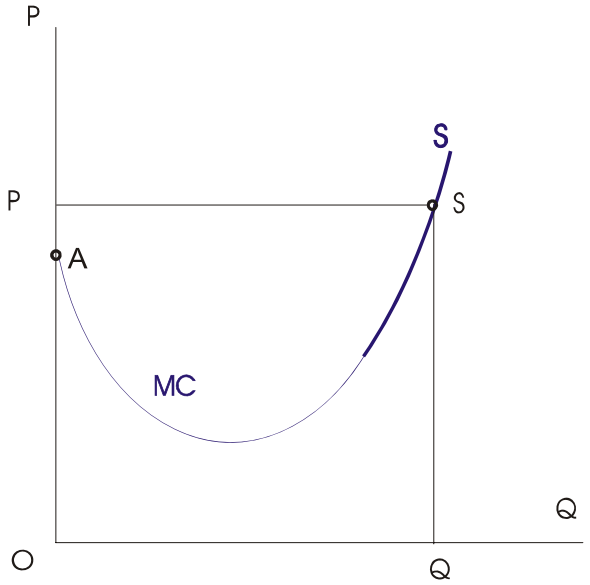
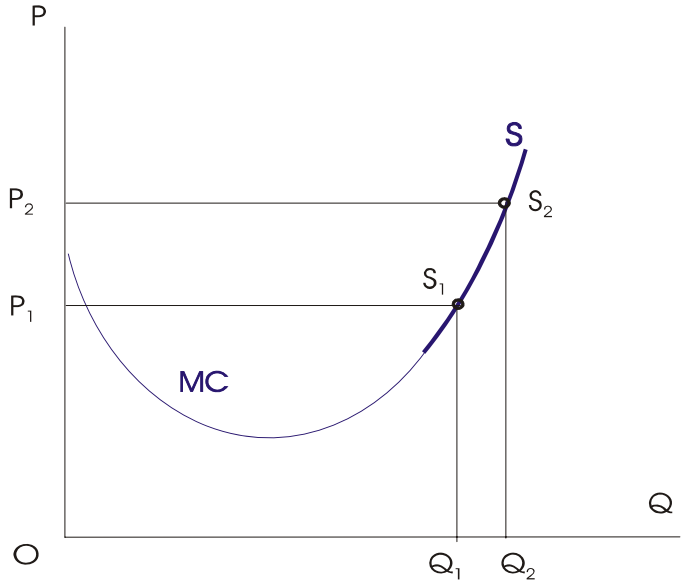
POSITIVE AND NORMATIVE ANALYSIS OF COMPETITIVE MARKETS

PRODUCER SURPLUS (P-R pp. 279-80, 286-7)

Defined as Revenue - Total variable cost
= Revenue rectangle OPSQ
– Area under MC curve, OASQ
PS = Profit + Fixed cost
= economic rent on something scarce available to this firm but not others
Can be insider status, good land, ...

Suppose price changes from P_1 to P_2
Revenue change: $OP_2S_2Q_2$ - $OP_1S_1Q_1$
Variable cost change: area $Q_1S_1S_2Q_2$
Producer surplus change: area $P_1S_1S_2P_2$
= area to the left of firm's supply curve
Can add up change in PS over all firms
Area to left of industry supply curve





OPTIMAL OUTPUT AND DEAD-WEIGHT LOSSES

Consumer and producer surpluses are dollar measures of the benefit the two parties obtain from engaging in the production and consumption of the good/service in question

There may be other benefits / costs, for example government revenues / disbursements

Schematic exposition:

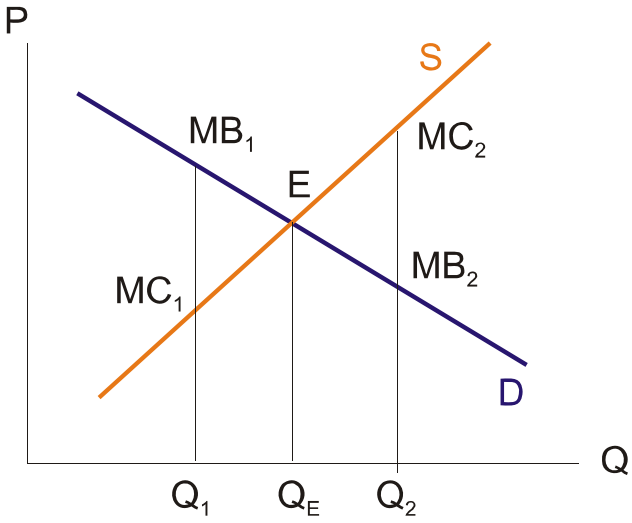
Write net benefit from producing quantity Q as B(Q) – C(Q)

First-order condition for maximization: B'(Q) - C'(Q) = 0
or marginal benefit = marginal cost

But marginal benefit
= consumers' maximum willingness to pay for marginal unit of the good
= height of demand curve at Q

and marginal cost
= height of supply curve at Q

Therefore optimum is where the demand and supply curves intersect



In figure, this is at E, quantity Q_E

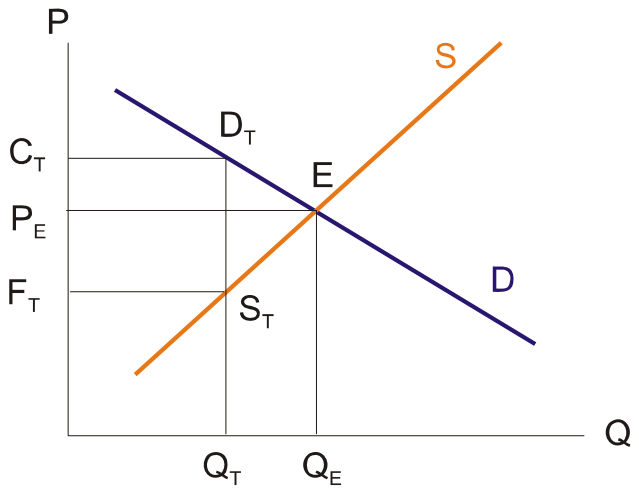
When $Q_1 < Q_E$, $MB_1 > MC_1$
forgone net benefit = deadweight triangle E MB_1 MC_1 , output should be expanded

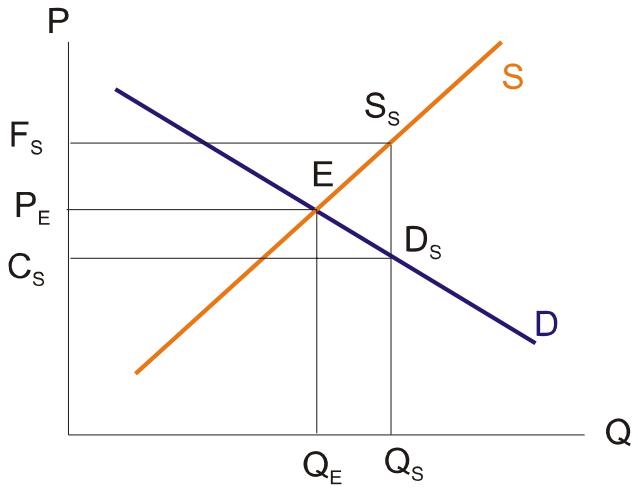
When $Q_2 > Q_E$, $MB_2 < MC_2$
forgone net benefit = deadweight triangle E MB_2 MC_2 , output should be contracted

Effect of a tax or a subsidy (P-R pp. 326-332)

Tax: Quantity reduced from Q_E to Q_T
Consumers pay C_T - P_E more per unit;
Consumer surplus down by $C_T D_T E P_E$
Firms receive P_E - F_T less per unit;
Producer surplus down by $F_T S_T E P_E$
C_T - F_T = amount of tax per unit of good
Government revenue rectangle $C_T D_T S_T F_T$
Dead-weight loss: triangle $E D_T S_T$

Subsidy: Quantity increased from Q_E to Q_S
Consumers pay P_E - C_S less per unit;
Consumer surplus up by $C_S D_S E P_E$
Firms receive F_S - P_E more per unit;
Producer surplus up by $F_S S_S E P_E$
F_S - C_S = amount of subsidy per unit of good
Government pays out rectangle $C_S D_S S_S F_S$
Dead-weight loss: triangle $E D_S S_S$

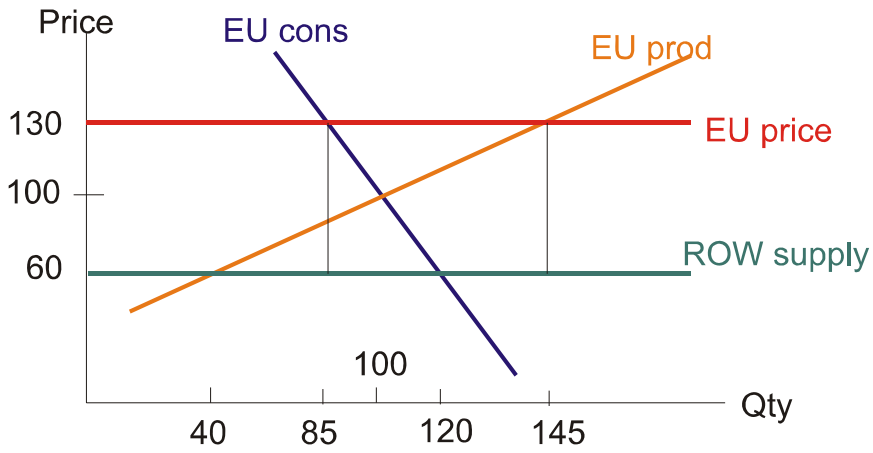




Tax and subsidy both create dead-weight losses - (competitive) equilibrium E is most efficient
Other reasons may explain or justify tax / subsidy policies - [1] financing public good provision,
[2] redistribution, [3] increase / decrease quantity of goods with + / – externalities,
[4] political considerations: benefits to organized pivotal special interests, contributors etc.

APPLICATION – EU'S COMMON AGRICULTURAL POLICY (related to P-R pp. 314-6)

Note - numbers are schematic;
actual depend on commodity, year,
special rates used for exchange ...
Under free trade: P = 60
EU cons. = 120, prod. = 40
With price support at 130
EU cons. = 85, prod. = 145
Surplus 145 - 85 = 60 is sold on
world market (or given away)
(with reimports prohibited)

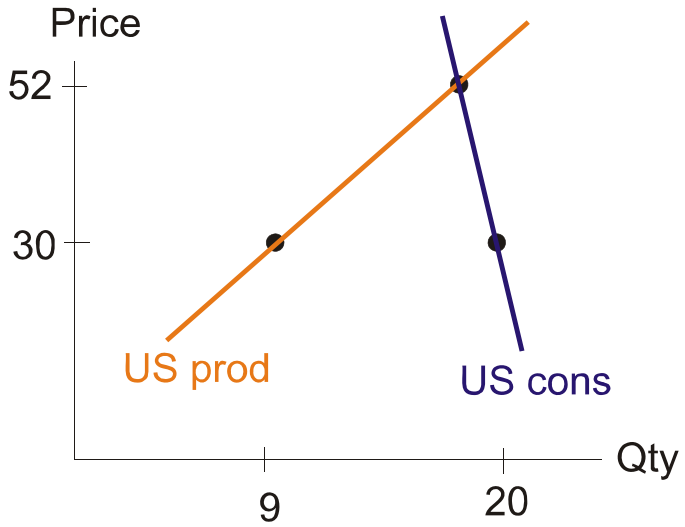


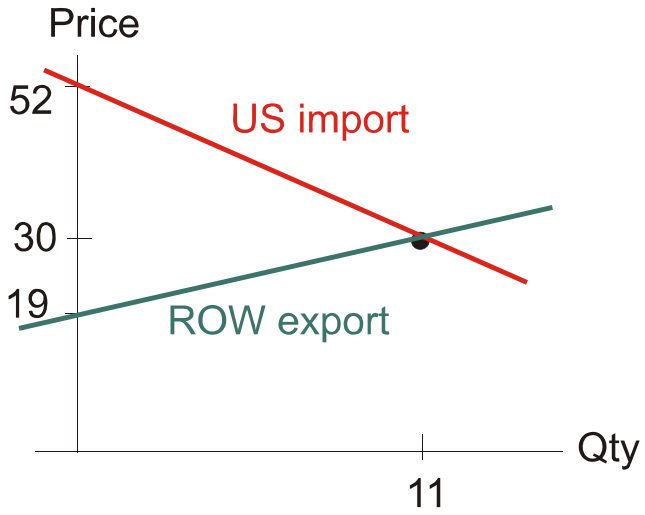
EU consumer surplus loss = ½ (85+120) * (130-60) = 7175
EU producer surplus gain = ½ (145+40) * (130-60) = 6475
Note conflicting interests, typical in most international trade policy issues
EU government revenue loss = (145-85) * (130-60) = 4200
Total EU loss = 7175 - 6475 + 4200 = 4900
This can be seen as the sum of two dead-weight loss triangles:
½ (120-85)(130-60) + ½ (145-40)(130-60) = ½ 35 * 70 + ½ 105 * 70 = ½ 140 * 70
In politics, concentrated and organized special interests can win, even if aggregate loss

In reality, ROW supply curve is not perfectly elastic. The EU's dumping of its surplus on the world market lowers the world price and inflicts further loss of ROW surplus, usually harming producers in less-developed countries.

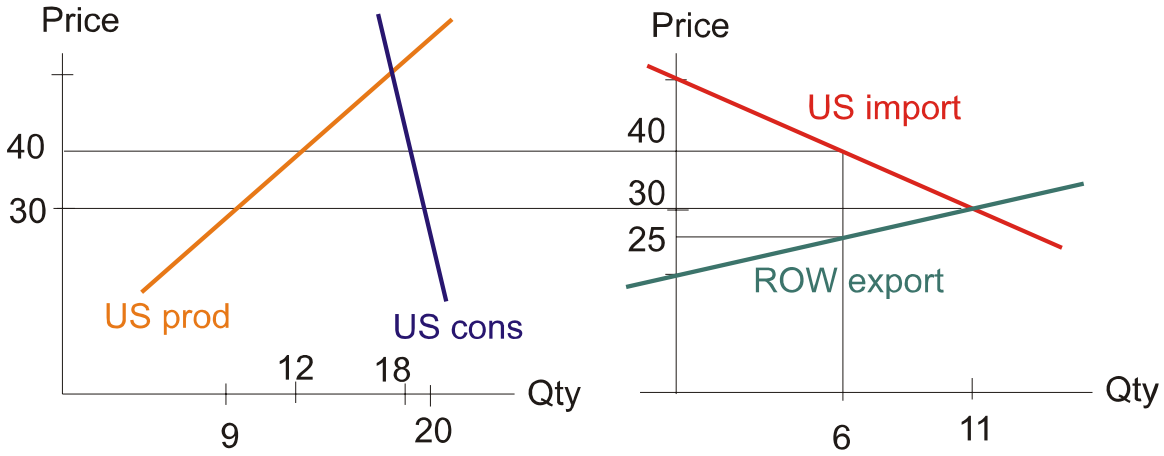
APPLICATION – US PETROLEUM SELF-SUFFICIENCY? (Related to P-R pp. 321-6)

Quantities in millions of barrels per day, prices in dollars per barrel
Approximate data for 2003: Price = 30, World production = consumption = 80,
US consumption = 20, US production = 9, US import = Rest-of-world (ROW) export = 11
Assumptions: All supply and demand curves straight lines, with point elasticities at the data point
US demand elasticity = 0.3 (rough estimate for medium-run adjustment)
US supply elasticity = 1 (probably too high)
Elasticity of ROW export supply to the US ≈ 3 (exactly 30/11) (probably far too low)
These imply equations for: US demand $Q = 26 - 0.2\,P$. US inverse demand $P = 130 - 5\,Q$
US supply $Q = 0.3\,P$, its inverse $P = 3.33\,Q$
US import demand $Q = 26 - 0.5\,P$, its inverse $P = 52 - 2\,Q$
ROW's supply to the US $Q = P - 19$, its inverse $P = Q + 19$
In isolation ("autarky"), US price would be 52, quantity 15.6
In free trade, P = 30, US consumption = 20, US production = 9, imports = 11





Now suppose the US imposes an import tariff (tax) of $15 per barrel
Equilibrium: US imports = ROW exports = Q must be such that
Price in the US = Price in ROW + 15, or 52 - 2 Q = Q + 19 + 15
3 Q = 18, or Q = 6 : US "dependence on foreign oil" has been cut nearly by half
Price in US = 40, price in ROW = 25. US consumption = 18, US production = 12



US consumer surplus loss = ½ (18+20) * (40-30) = 190 (million dollars / day)
US producer surplus gain = ½ (12+9) * (40-30) = 105
(So guess which interest group advocates and supports "energy independence" !)
US government's revenue from tariff = (40-25) * 6 = 90. So US net gain = 105 + 90 - 190 = 5
ROW loss = ½ (11+6) * (30 - 25) = 42.5
World-wide net loss = 42.5 - 5 = 37.5, equals dead-weight loss triangle ½ (40-25) * (11-6)
Reason for gain : reduction in our purchase lowers the price at which ROW receives
(Our consumers pay more, but our own government gets the difference)
So the tariff is helping the US exercise "monopsony power" in world trade.
To see this, redo the problem when ROW supply curve is flat at P = 30; then US loses