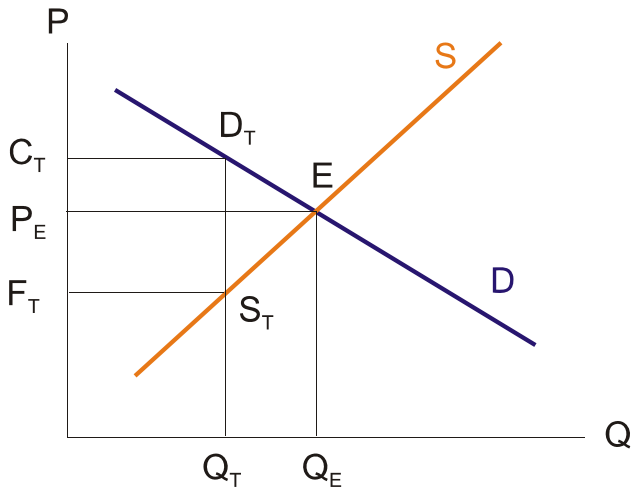
ECO 352 – Spring 2010
Precept Week 8 - March 29

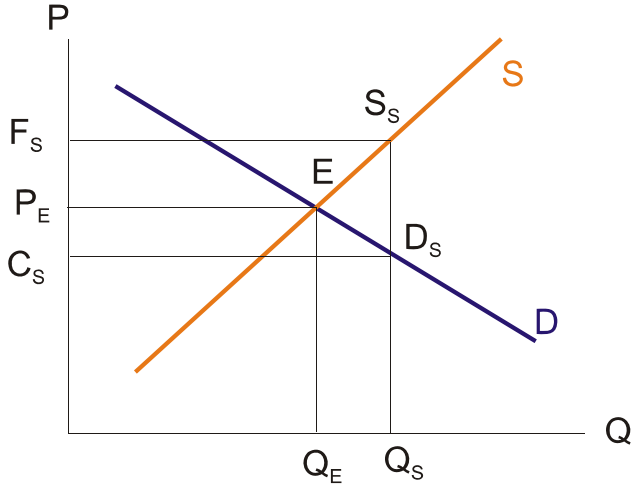
TAX INCIDENCE AND DEAD-WEIGHT LOSSES

Effect of a tax or a subsidy

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 $E D_T S_T$

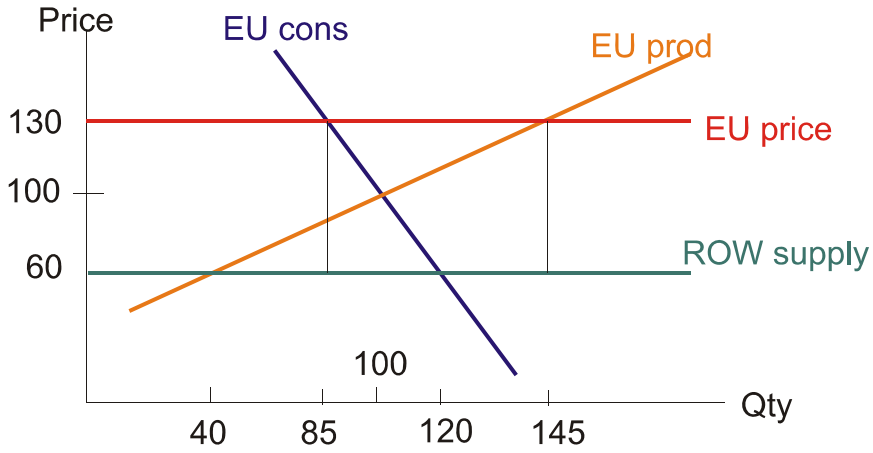


Subsidy: Quantity increased from Q_E to Q_S
Consumers pay $P_E - C_S$ less per unit;
Consumer surplus up by $C_S D_S E P_E$
Firms receive $F_S - P_E$ more per unit;
Producer surplus up by $F_S S_S E P_E$
$F_S - C_S$ = amount of subsidy per unit of good
Government pays out rectangle $C_S D_S S_S F_S$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



APPLICATION – EU'S COMMON AGRICULTURAL POLICY

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)

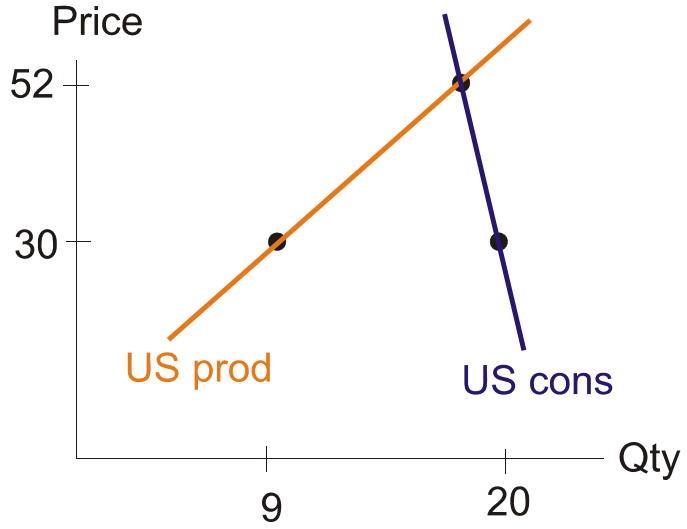


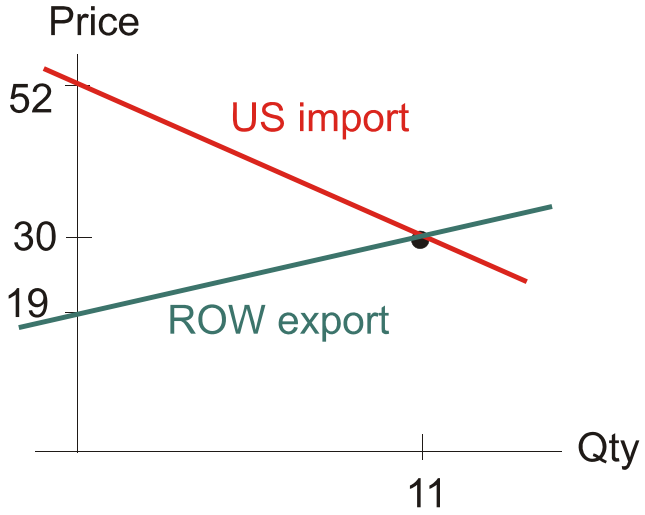
EU consumer surplus loss = ½ (85+120) * (130-60) = 7175
EU producer surplus gain = ½ (145+40) * (130-60) = 6475
Note conflicting interests, typical in most international trade policy issues
EU government revenue loss = (145-85) * (130-60) = 4200
Total EU loss = 7175 - 6475 + 4200 = 4900
This can be seen 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.

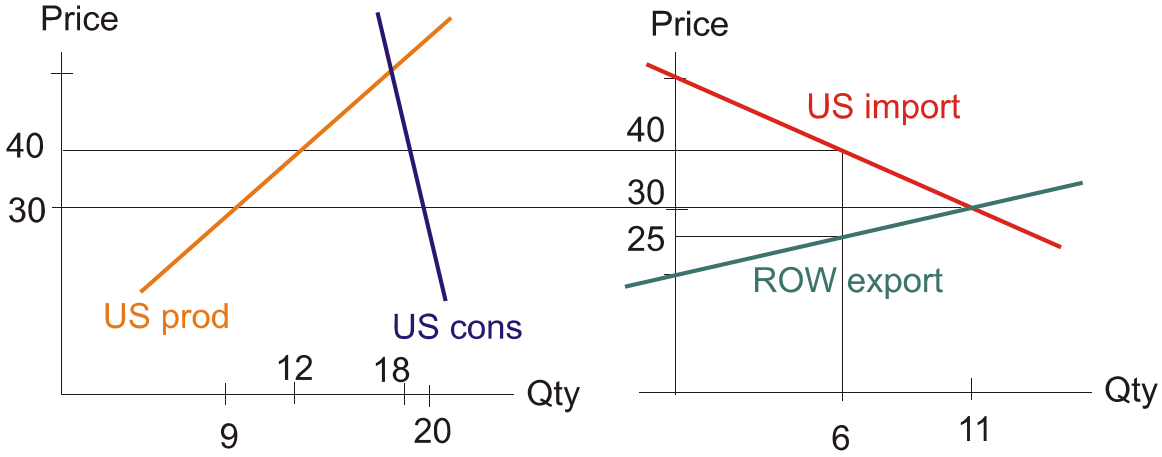
APPLICATION – U.S. PETROLEUM SELF-SUFFICIENCY?

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