2.6 Subsidies

The policy objective of a subsidy is to help producers, or encourage the use of a good. The seller’s price is higher than the buyer’s price by the amount of the subsidy \( s \).

\[
P_s = P_b + s
\]

The subsidy is the vertical distance between the seller’s price and the buyer’s price, as shown in Figure 2.15.

Figure 2.15 Corn Subsidy
2.6.1 Welfare Analysis of a Subsidy

The welfare analysis of the subsidy compares the initial market equilibrium with the post-subsidy equilibrium.

\[ \Delta CS = + C + D + E, \]
\[ \Delta PS = + A + B, \]
\[ \Delta G = - A - B - C - D - E - F, \]
\[ \Delta SW = - F, \]
\[ \text{and} \]
\[ \text{DWL} = F. \]

Both consumers and producers gain from the subsidy, but at a large cost to tax payers (the government).

2.6.2 Quantitative Welfare Analysis of a Subsidy

Suppose that the inverse demand and supply of corn are given by:

\[ P_b = 12 - 2Q^d, \]
\[ P_s = 2 + 2Q^s, \]

Where \( P \) is the price of corn in USD/bu, and \( Q \) is the quantity of corn in billion bushels. Market equilibrium is found where supply equals demand: \( Q^e = 2.5 \) billion bu of corn and \( P^e = P_b = P_s = 7 \) USD/bu of corn (Figure 2.16).
Figure 2.16 Corn Subsidy

With the subsidy, the price relationship is given by:

\[ P_s = P_b + s. \]

Assume that the government sets the corn subsidy equal to 2 USD/bu. Substitution of the inverse supply and demand equations into the price equation yields:

\[ 2 + 2Q^s = 12 - 2Q^d + 2 \]

Since \( Q^d = Q^s = Q' \) after the tax:

\[ 4Q' = 12 \]

\[ Q' = 3 \text{ billion bushels of corn.} \]

The quantity can be substituted into the inverse supply and demand equations to find the buyer’s and seller’s prices.
$P_b = 6 \text{ USD/bu}$, and

$P_s = 8 \text{ USD/bu}$.

These prices are shown in Figure 2.14. The welfare analysis is:

\[ \Delta CS = + C + D + E = + 2.75 \text{ USD billion} \]
\[ \Delta PS = + A + B = + 2.75 \text{ USD billion} \]
\[ \Delta G = - A - B - C - D - E - F = - 6 \text{ USD billion} \]
\[ \Delta SW = - F = - 0.5 \text{ USD billion} \]
\[ DWL = F = + 0.5 \text{ USD billion} \]

Note again that the change in social welfare equals the sum of the welfare changes due to the tax: $\Delta SW = \Delta CS + \Delta PS + \Delta G$. Although the deadweight loss is not large, the government cost is large, making subsidies effective in helping producers and encouraging consumption of the good, but expensive for society.