Agricultural Price Support

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1 Agricultural Price Support

In this case, government sets prices higher than the free market level, and buys excess supply (see Figure 1). The buyer’s price is shown on the y-axis in the following graphs. The original consumer surplus equals the area between the demand curve and the line of price \( P_1 \); after the price support, it equals the area between the demand curve and the line of price \( P_2 \), thus

\[
\Delta CS = -(A + B).
\]

The original producer surplus equals the area between the supply curve and the line of price \( P_1 \); after the price support, it equals the area between the supply curve and the line of price \( P_2 \).
curve and the line of price $P_2$, thus

$$\Delta PS = A + B + D.$$  

Government buys quantity $Q_3 - Q_2$ at price $P_2$; the cost equals the area of the rectangular

$$\Delta G = -(B + D + E).$$  

The deadweight loss to the society is

$$DWL = -(B + E).$$

## 2 Supply Restrictions

Government restricts quantity supplied to be less than $Q_1$ (see Figure 2). The

![Supply Restriction](image)

Figure 2: Supply Restriction.

The original consumer surplus equals the area between the demand curve and the line of price $P_0$; after the supply restriction, it equals the area between the demand curve and the line of price $P_1$, thus

$$\Delta CS = -(A + B).$$

The original producer surplus equals the area between the supply curve and the line of price $P_0$; after the supply restriction, it equals the area of the trapezoid, with the supply curve, the line of price $P_1$, the line of quantity $Q_1$, and the price axis as its sides, thus

$$\Delta PS = A - C.$$
Thus, the deadweight loss is

\[ DWL = -(B + C). \]

Example government measures include import quota and tariff, which benefit domestic producers but hurt consumers.

### 2.1 Zero Quota

$S_D$ is the domestic supply, and $D_D$ is the domestic demand. If no import is allowed, the domestic price is $P_0$. Without restriction on import, the domestic price would be the same as the world price $P_W$, which is lower than $P_D$ (see Figure 3). Without import quota restriction, consumer surplus equals the area between the domestic demand curve and the line of price $P_W$; if the quota is zero, it equals the area between the domestic demand curve and the line of price $P_0$, thus

\[ \Delta CS = -(A + B + C). \]

Without quota restriction, producer surplus equals the area between the domestic supply curve and the line of price $P_W$; if the quota is zero, it equals the area between the domestic supply curve and the line of price $P_0$, thus

\[ \Delta PS = A. \]

The deadweight loss is

\[ DWL = B + C. \]

### 2.2 Non-Zero Quota

Given the same $S_D$, $D_D$, and $P_W$, now suppose the government sets non-zero quota $k$. The domestic price $P_1$ is where the difference between domestic demand
2.3 Import Tariff

Figure 4: Non-Zero Quota.

\( (Q_{D1}) \) and domestic supply \( (Q_{S1}) \) is \( k \) (see Figure 4). Likewise, the change of consumer surplus

\[
\Delta CS = -(A + B + C + D);
\]

and the change of domestic producer surplus

\[
\Delta PS_D = A.
\]

The net domestic loss equals

\[
-(\Delta CS + \Delta PS) = B + C + D.
\]

The foreign producer surplus increases by excess profits, which equal the area of rectangular \( C \)

\[
\Delta PS_F = C.
\]

The total deadweight loss is

\[
DWL = B + D.
\]

The domestic loss is

\[
\text{Domestic Loss} = B + C + D.
\]

2.3 Import Tariff

Government imposes a tariff \( P_1 - P_W \) on each unit imported (see Figure 5). The change of consumer surplus and domestic producer surplus are
\[ \Delta CS = -(A + B + C + D) \]

and

\[ \Delta PS_D = A, \]

respectively. Foreign producers gain nothing, that is to say

\[ \Delta PS_F = 0, \]

because \( C \) becomes the revenue of government

\[ \Delta G = C. \]

The deadweight loss is

\[ DWL = B + D, \]

which equals to the domestic loss.

3 Tax and Subsidy

Assume that government imposes a $1 tax on each cigarette unit. Given the market price \( P \), if the tax is paid by

- producers, then buyers pay \( P \) and producers get \( P - 1 \);
- consumers, then buyers pay \( P + 1 \) and producers get \( P \).
Therefore, the price paid by buyers and the price received by producers always have a difference of 1 (see Figure 6). Let \( P_B \) be the buyer’s price and \( P_S \) be the seller’s price.

\[
P_D - P_S = 1.
\]

In figure 6, we put buyer’s price on the y axis. Therefore, with the tax, the supply curve moves from \( S \) to \( S' \). The equilibrium buyer’s price is \( P_D \), and the equilibrium seller’s price is \( P_S \). Thus, the consumer surplus and producer surplus both decrease:

\[
\Delta CS = -(A + B),
\]

\[
\Delta PS = -(C + D).
\]

Government revenue

\[
\Delta G = A + C.
\]

So, the deadweight loss is

\[
DWL = B + D.
\]