1 Agricultural Price Support

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Lecture 17
Supply Restrictions, Tax, and Subsidy

Outline

1. Chap 9: Agricultural Price Support
2. Chap 9: Supply Restrictions
3. Chap 9: Tax and Subsidy

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 $P_2$, thus

$$\Delta PS = -(C + D).$$

![Figure 1: Agricultural Price Support.](image-url)
2 Supply Restrictions

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 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

$$\Delta PS = A - C.$$
2.1 Zero Quota

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

$$DWL = B + C.$$
2.3 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

\begin{align*}
\Delta CS &= -(A + B + C + D); \\
\Delta PS_D &= A.
\end{align*}

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 $C$

\[\Delta PSA_F = C.\]

The total deadweight loss is

\[\text{DWL} = B + D.\]

The domestic loss is

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

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 $C$

\[\Delta PSA_F = C.\]

The total deadweight loss is

\[\text{DWL} = B + D.\]

The domestic loss is

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

Figure 5: Import Tariff.

$$\Delta CS = -(A + B + C + D)$$

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.
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

$$DWL = B + D.$$