[Academic Script]
**[Cost and Benefit Analysis of Tariff
and Rate of Effective Protection]**

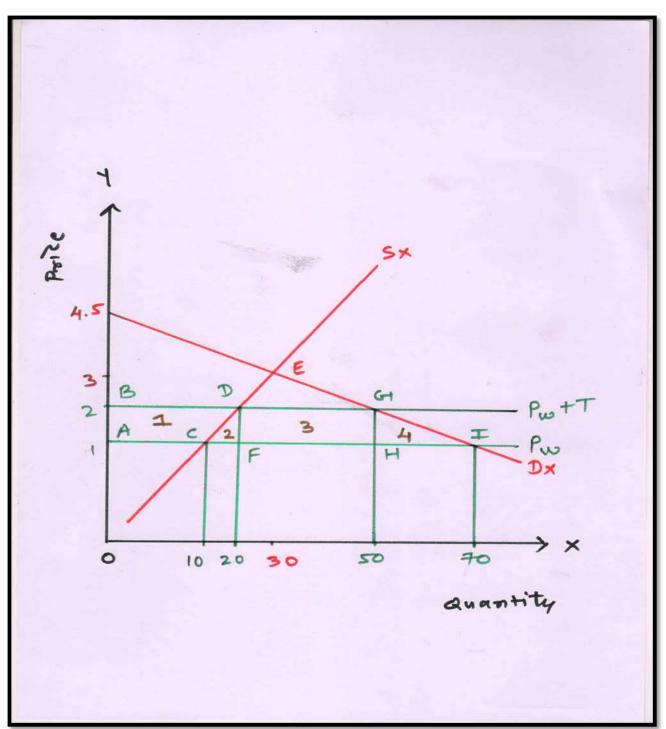|	
Subject:	Business Economics
Course:	B.A., 5ᵗʰ Semester, Undergraduate
Paper No. & Title:	Paper – 541 International Economics
Unit No. & Title:	Unit - 3 International Trade Policy
Lecture No. & Title:	2: Cost and Benefit Analysis of Tariff and Rate of Effective Protection

Cost and Benefit Analysis of Tariff and Rate of Effective Protection

Introduction:

Tariff affects both the domestic consumption and domestic production. An imposition of import tariff by a small nation reduces the imports of the nation. Consumer surplus would reduce and producer surplus would increase after the imposition of a tariff. The concepts of consumer surplus and producer surplus are useful in the cost benefit analysis of tariff.

Cost and Benefit Analysis of Tariff:

We assume that nation A is a small nation. Nation A imposes an import tariff on commodity X. An imposition of tariff will not affect the international price but increases the domestic price of the commodity in the nation. Consider Figure-1:

We measure quantity of commodity X on X-axis and price of commodity X on Y-axis. P_W is the international price line which is parallel to X-axis. It means that an imposition of a tariff by a small nation cannot affect the international price of the commodity. It increases domestic price only.

(1) D_X is a demand curve for commodity X and S_X is a supply curve of commodity X.

Autarky Situation:

Domestic Price ($)	Domestic Consumption of commodity X (units)	Domestic Production of commodity X (units)	Imports of commodity X (units)
1	70	10	60

(2) When domestic price is $ 1, nation A produces 10X. The domestic demand for commodity X is 70X. The remaining of 60X is imported.

Effect of an Import Tariff:

Domestic Price ($)	Domestic Consumption of commodity X (units)	Domestic Production of commodity X (units)	Imports of commodity X (units)
2	50	20	30

(3) An imposition of import tariff increases the domestic price of commodity X in nation A from $ 1 to $ 2.

(4) An import tariff reduces the domestic consumption of commodity X from 70X to 50X due to price rise.

(5) Am imposition of tariff increases the domestic production of import-competing industry from 10X to 20X.

(6) Due to fall in domestic consumption and rise in domestic production total imports of nation A falls from 60X to 30X.

(7) It means that due to an import tariff, domestic consumption falls, domestic production rises and imports of the nation declines.

(8) An imposition of a tariff increases the domestic price of the commodity and hence consumer surplus falls by ABGI= 1+2+3+4 = $ 15+ $ 5 +$ 30 + $ 10 = $ 60.

(9) Similarly, an imposition of a tariff increases producer surplus by ABDC = area 1 = $15

(10) Due to imposition of a tariff nation A collects DGHF = $ 1 x 30X = $ 30.

Costs and Benefit Analysis:

(11) Figure-1 exhibits that, the reduction of the consumer surplus is ABGI = 1+2+3+4 = $ 60, DGHF = $ 30 is collected by the government as import duty and an increase in producer surplus is ABDC = $ 15. It means that $ 15 is redistributed from consumers to producers in the form of increased producer surplus. The remaining $ 15 i.e. 2+4 depicts the protection cost or deadweight loss to the economy due to an import tariff.

(12) Area 2 = $ 5 arises due to tariff imposition. An imposition of tariff transferred some domestic resources from more efficient production of exportable commodity to the less efficient production of importable commodity X in nation A.   This is the production component of deadweight loss. (Deadweight loss refers to any reduction in consumer and/or producer surplus)

(13) Area 4 = $ 10 is the consumption component of deadweight loss. A tariff increases the price of importable commodity in relation to exportable commodity. It twists the consumption pattern in nation A.

(14) This analysis shows that, an imposition of a tariff redistributes income from consumers to producers in the form of increased producer surplus. It also redistributes income from nation's abundant factorswhich produces export commodity to nation's scarce factor which produces import commodity. This leads to inefficiencies in the economy. This is referred to as protection cost or deadweight loss to the economy due to an import tariff by a small nation.

Effective Rate of Protection:

A nation can impose a tariff on imports of the inputs and imports of the final commodity. To protect domestic industries from foreign industries, a nation often imposes a lower tariff on the imports of inputs than on the imports of the final commodity.

Protection depends on two things:

(1) Tariff imposed on the final product.

(2) Taxes and subsidies placed on inputs.

E.g. A nation may import steel without import duty but imposes a tariff on the imports of the automobiles.

Nominal tariff rate cannot measure degree of protection because protection depends on nominal tariff rates imposed on final commodity and tariff imposed on inputs as well.

To understand the concept of effective rate of protection we need to understand the meaning of value added.

Value added:

Value added is the difference between the selling price and the production cost of intermediate goods.

Therefore, value added $V = P_X - C_X$

Where, P_X = price of commodity X

C_X = Cost of inputs to produce commodity X

Definition:

Effective Rate of Protection (ERP) is defined as the ratio of difference between the value added at domestic prices and the value added at world prices to value added at world prices.

$$\therefore ERP = (V' - V) / V$$

Where, V' = value added at domestic prices i.e. inclusive of tariffs on the final commodity and intermediate inputs.

V = domestic value added under free trade.

Assume that we are dealing with a small nation and therefore an imposition of a tariff cannot affect the international price of the commodity. Suppose that the fixed international free trade price of a commodity is p. The number of imported inputs also fixed in price in the international market. the sum of the costs of these imported inputs going into the domestic production of commodity X under free trade is

$$a_1 p + a_2 p + a_3 p + \ldots + a_n p = \sum a_i p \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Here $a_i p$ is the cost of imported input i going into the domestic production of commodity X.

Now,

$$ERP = (V' - V) / V \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Therefore,

V = the domestic value added in the production of commodity X under free trade = the difference between international fixed price of the commodity X under free trade and the cost of all imported inputs under free trade.

$$\therefore V = p - \sum a_i p = p \left[1 - \sum a_i\right] \quad \text{................................... (3)}$$

V' = With a tariff on commodity X and on imported inputs going into the domestic production of commodity X, the value added at domestic prices is

$$\therefore V' = \left[p(1 + t) - p\sum a_i(1 + t_i)\right] \quad \text{.................................. (4)}$$

Where, t = nominal ad valorem duty on commodity X

t_i = nominal ad valorem tariff rate on imported inputs going into the production of commodity X.

Substituting equations (3) and (4) into equation (2), we get

$$ERP = (V' - V) / V$$

$$\therefore ERP = \left\{\left[p(1 + t) - p\sum a_i(1 + t_i)\right] - \left[p(1 - \sum a_i)\right]\right\} / \left[p(1 - \sum a_i)\right]$$

$$\therefore ERP = p\left\{1 + t - \sum a_i - \sum a_i t_i - 1 + \sum a_i\right\} / \left[p(1 - \sum a_i)\right]$$

$$\therefore ERP = 1 + t - \sum a_i - \sum a_i t_i - 1 + \sum a_i / 1 - \sum a_i$$

$$\therefore ERP = t - \sum a_i t_i / 1 - \sum a_i$$

The relationship between the rate of effective protection and nominal tariff rate is as follows:

(1) If a_i =0, ERP=t.

(2) For given values of a_i and t_i, ERP is larger the greater is the value of t.

(3) For given values of t and t_i, ERP is larger the greater is the value of a_i.

(4) When $a_i t_i$ exceeds t, the ERP is negative.

Example-1:

Suppose that price of commodity X in international market is $40. To produce this commodity nation A must import $30 worth raw material from abroad. Nation A's industry of commodity X creates $40-$30 = $10 worth of value added.

Assume that nation A imposes a 25% nominal tariff on imported commodity X. This will increase the price of commodity X to $50, that is, $ 40 + (25% of $40). In this case, nation A's industry of commodity X creates $50-$30 = $20 worth of value added. Thus, the value added increases by 100%, and this is the ERP that nation A provides to its industry of commodity X.

Example-2:

Assume now that in addition to the 25% nominal tariff on imported commodity X, nation A imposes a 10% tariff on imports of raw material which is required to produce commodity X.

An imposition of tariff on raw material raises the cost of raw material from $30 to $33, that is, $30 + (10% of $30). Therefore, the value added is $50 - $33 = $17. Thus, value added has increased by 70%, that is, [($17-$10)/$10] x 100. This ERP of 70% is lower than the rate of 100% that existed before the imported commodity X was taxed.

Conclusions:

An imposition of a tariff redistributes income from consumers to producers in the form of increased producer surplus. It also redistributes income from nation's abundant factors, which produces export commodity to nation's scarce factor, which produces import commodity. This leads to inefficiencies in the economy.

This is referred to as protection cost or deadweight loss to the economy due to an import tariff by a small nation. Effective Rate of Protection (ERP) is defined as the ratio of difference between the value added at domestic prices and the value added at world prices to value added at world prices.