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Real Life Application of Consumer and Producer Surplus

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Abstract

In this assignment, we addressed the usage of consumer and producer surplus in various sectors as business sector, medical sector, engineering sector, non profit sector and educational sector. Businesses employ consumer excess to draw in new clients, boost client satisfaction, expand their product offerings, and maintain their position as leaders in their sector. The idea is to determine what advantages consumers can have from purchasing a product and then reduce the price of that product to provide those advantages to them in excess.

Keywords: Consumer Surplus and Producer Surplus

Introduction

The concept of consumer's surplus was first introduced by A.J. Dupuit in 1844. It was further developed by Alfred Marshall in his famous book 'Principle of Economics' in 1890. According to Marshall, every increase in the consumer's surplus is an indicator of the increase in social welfare.

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According to Marshall. "Excess of the price which a consumer would be willing to pay rather than go without a thing over that which he actually does pay is the economic measure of this surplus satisfaction. It may be called consumer's surplus."

The consumer surplus is the gap between the price that customers pay and the amount that they are willing to pay. When consumers pay less than they are willing to pay for a commodity or service, there is a consumer surplus. The area above and below the demand curve's equilibrium price is used to compute it. For instance, a man is willing to spend Rs. 1,000 on a commodity, even though it costs Rs. 800 on the market. He gains Rs. 200 as a result. We refer to this benefit as consumer surplus (CS).

Consumer surplus = Value to buyers – Amount paid by buyers like

This law is based on the following assumptions:

1. The consumer is rational.
2. Utility can be measured in cardinal numbers.
3. Marginal utility of money remains constant.
4. All the units of consumption are homogeneous.
5. No change in income, taste and preference of the consumer.

Consumer surplus under pure competition: In pure competition, the supply and demand functions are equated to determine the equilibrium demand, or Q. After obtaining Qo, the value of Qo is substituted into either the supply or demand function to obtain the matching Po.

Consumer surplus under monopoly: To maximize profit in a monopoly, marginal income and marginal cost are equalized to determine the quantity Qo. By replacing the value of Qo in the demand function, the equivalent Po may be found.

However. Consumer surplus theory is criticized on several basis as :

1. Measurement of utility
2. Marginal utility of money is not constant
3. Imaginary concept
4. Not applicable to necessaries
5. Neglects the compliment and substitute goods.

Despite these criticisms consumer surplus theory has many importance as:

1. To compare economic conditions
2. Formulation of fiscal policy
3. For cost- benefit analysis
4. International trade
5. Distinguish between value in use and value in exchange.

The concept of producer's surplus was first explained by Alfred Marshall in his book Principles of Economics in 1890. Producer's surplus measures the welfare of the producer. A producer always tries to increase his surplus by trying to sell more goods at higher prices.

The gap between the price producers are truly paid and the price they are willing and able to supply a good for is known as the producer's surplus. The area above the supply curve and below the equilibrium price is used to compute it. For instance, a manufacturer is prepared to charge Rs. 80 for a product, while the market price for the identical product is Rs. 90. He thus gains Rs. 10 as a result. The excess of the producer is this gain. It is therefore the price differential between the amount a producer receives and the amount he anticipated.

Producer surplus = Amount received by sellers- cost to sellers

This law is based on the following assumptions:

1. The producer is rational.
2. Price of the commodity remains constant.
3. The market is perfectly competitive.
4. Units of the good are homogeneous.

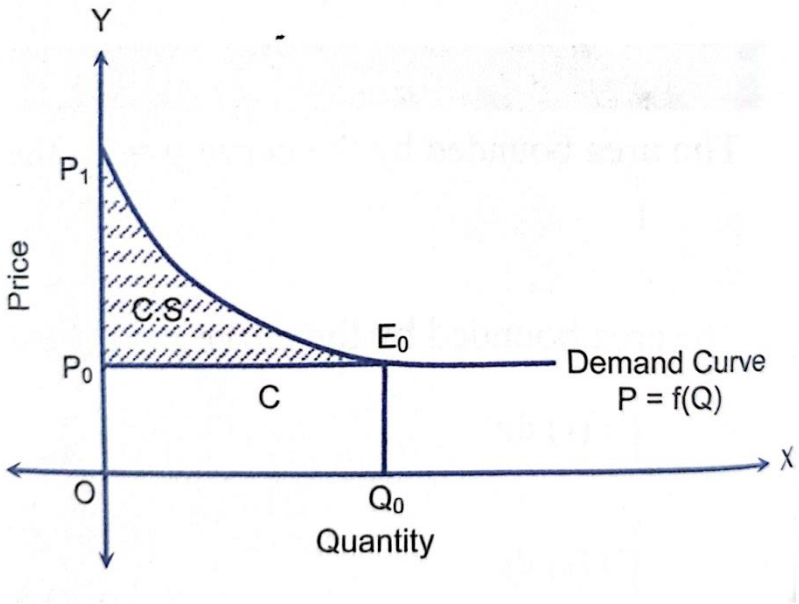
Definition

Consumer Surplus: Consumer surplus is defined as the gap between the price consumers pay and the price they are willing to pay.

Producer Surplus: Producer surplus is the amount that the seller obtains beyond his cost of manufacturing the good.

Discussion

Let the market be at equilibrium. Let price per unit of the product be P_0. There are consumers who would be willing to pay more than P_0. These consumers will be benefited by paying the lower equilibrium price. The total benefit obtained by them is consumer surplus (CS). It is given by the area between the line P = P_0 and the demand curve P = f(Q) from Q = 0 to Q = Q_0 where Q_0 is the market demand.



In above figure,

The amount that the consumer actually pays = Area of $OP_0E_0\ Q_0$

$= P_0Q_0$

The amount that the consumer is willing to pay = Area of $OP_1E_0Q_0$

$= \int_0^{Q_o} f(Q)\, dQ$

Thus, consumer surplus (CS) = Area of $P_0P_1E_0$

= Area of $OP_1E_0Q_0 -$ Area $of\ OP_0E_0Q_0$

$$= \int_0^{Q_0} f(Q)dQ - P_oQ_o$$

Alternatively, one can also obtain the consumer surplus using the following formula:

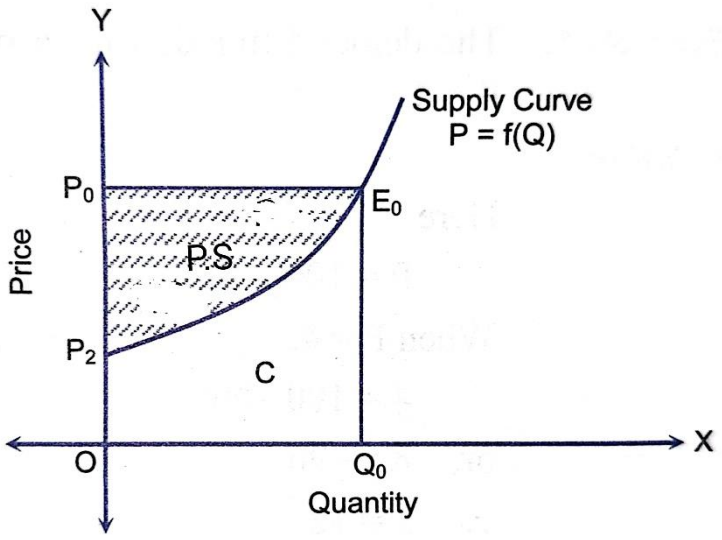
Where P_1 is the price at which quantity is zero.

CS = $\int_{P_0}^{P_1}$(demand function as a function P)dP

where P_1 is the price at which quantity is zero . Thus, P_1 is obtained by substituting

$$Q = 0 \quad \text{in the demand function.}$$

Let P = f (Q) be the supply curve. Let Qo be the quantity supplied at the market price of Po per unit. The producer surplus is the area between the line P = Po and the supply curve P = f (Q) from Q = 0 to Q = Q_o



From figure,

The amount that the producer actually receives = Area of $OP_0E_0\ Q_0$

$$= P_oQ_o$$

The amount that the producer is willing to receive = Area of $OP_2E_0Q_0$

$$=\int_o^{Q_o} f(Q)dQ.$$

By definition,

Producer surplus (PS)=Area of $P_2P_oE_o$

$$= \text{Area of } OP_oE_oQ_o - \text{Area of } OP_2E_oQ_o$$

$$= P_oQ_o - \int_0^{Q_o} f(Q)dQ$$

There is an alternative way to find the producer surplus and is given by

$$PS = \int_{P_2}^{p_o} (\text{ supply function as a function P})dP$$

Where P_2 is the price obtained by setting $Q = 0$ in the supply function.

In engineering sector

Problem 1 :

SCAEF is an engineering association in Nepal that is actively seeking new members. Engineers have a demand function of P = 50000-5000Q at a wage rate of P = RS 40000/month; however, because of Nepal's high unemployment rate, SCAEF can acquire engineers at a reduced cost. Find the surplus of SCAEF?

Solution 1:

Here,

P = 50000-5000Q

When P = 40000,

40000 = 50000 – 5000Q

or, 5000Q=50000-40000

or, 5000 Q=10000

Q = 2.

Thus, (P_0, Q_0) = (40000, 2)

We Know That,

$$CS = \int_0^{Q_0} (\ demand\ function\ )dQ - P_0Q_0$$

$= \int_0^2 (100000 - 30000Q)\, dQ - 40000 * 2$

$= 50000 \int_0^2 dQ - 5000 \int_0^2 Q\, dQ - 80000$

$= 50000\, [Q]_0^2 - 5000 \left[\frac{Q^2}{2}\right]_0^2 - 80000$

$= 50000[2 - 0] - 2500\, [2^2 - 0^2] - 80000$

$=50000 * 2 - 2500 * 4 - 80000$

$=100000 - 10000 - 80000$

$= 10000$

Therefore, SCAEF gets the surplus of Rs. 10000.

In medical sector

Problem 2:

The Nepalese Teaching Hospital needs to buy ventilator machines at the time of COVID-19. P = RS 300000 is its payment function, while its demand function is P = 30500-250Q. It purchases ventilator machines in large quantities as a result of the epidemic, therefore it has considerable excess. Find out the actual consumer surplus.

Solution 2:

Here,

P= 305000-250Q

When P=300000

300000=305000-250Q

or, 250Q=30500-300000

or, 250Q=5000

Q= 20

This, $(P_o, Q_o) = (300000,20)$

We know that,

C.S.=$\int_0^{Q_o} f(Q) - P_oQ_o$

$= \int_0^{Q_o}(305000 - 250Q) - (300000 * 20)$

$$= [305000 \int_0^{Q_o} 1\, dQ - 250 \int_0^{Q_o} Q\, dQ] - 6000000$$

$=[305000[Q] - 250\left[\frac{Q^2}{2}\right]_0^2] - 6000000$

=[305000[20 -0] – 125[20^2-0^2]] – 6000000

=[(305000*20)-(125*400)]- 6000000

= 6100000-50000-6000000

=50000

Therefore, teaching hospital of Nepal gets the surplus of RS 50000.

In non profit sector

Problem :3

An organization called MAITI NEPAL, which promotes women's empowerment, hires indigenous women from underdeveloped regions of Nepal. As a finished good, it makes mixed pickles and sells them on the market. Their real quantity sold is 500 kg, and its supply function is P= 249950+0.1Q. Calculate the actual producer surplus.

Solution 3:

Here,

P=249950+0.1Q

When Q=500

P=249950+0.1×500

P=249950+50

P=250000

$$\text{Thus, } (P_o, Q_o) = (250000,500)$$

We know that,

P.S.= $P_oQ_o - \int_0^{Q_o} f(\mathrm{Q})\, dQ$

=249950*500-[$\int_0^{500} 249950 + 0.1Q)$]

= 125000000-[249950$\left(\int_0^{500} 1\, dQ\right) + 0.1\ \int_0^{500} Q\, dQ$]

=125000000-(249950$[Q]_0^{500} + 0.1\left[\frac{Q^2}{2}\right]_0^{500}$]

=125000000-[(249950*500)+0.1*[$\frac{500^2}{2}$]]

=125000000-(124975000+12500)

=125000000-(124987500)

=12500

Therefore, it will get Rs12500 as a producer surplus.

In educational sector

Problem 4:

The MIT campus plans to purchase smart whiteboards for more productive classrooms. At P = Rs 2250000, the demand function for digital boards is P = 2400000 – 1000Q. The MIT Campus has excess due to the reduction in the VAT rate. Find the surplus?

Solution 4:

Here,

P = 2310000 – 4000Q

When P = 2250000 in demand function,

2250000 = 2310000 - 4000Q

4000Q = 2310000 – 2250000

4000Q = 60000

Q = 15

Therefore, $(P_0, Q_0) = (\ 2250000, 15)$

We know that,

$$CS = \int_0^{Q_0} (\ demand\ function\ ) dQ - P_0 Q_0$$

$$= \int_0^{15} (2310000 - 4000Q)\, dQ - 2250000 * 15$$

$$= 2310000 \int_0^{15} dQ - 4000 \int_0^2 Q\, dQ - 33750000$$

$$= 2310000\, [Q]_0^{15} - 4000 \left[\frac{Q^2}{2}\right]_0^2 - 33750000$$

$$= 2310000\, [15 - 0] - 2000\, [15^2 - 0^2] - 33750000$$

$$= 2310000*15 - 2000*15^2 - 33750000$$

$$=34650000 - 450000 - 33750000$$

$$= 450000$$

Thus, MIT Campus gets the surplus of Rs 450000.

In business sector

Problem 5 :

Ramesh purchased a large quantity of bananas directly from the farmers for a discounted price, which he kept in storage for a month. After a month, demand rises as a result of the chhath. Therefore he sold bananas to the market to get some more cash. The supply function of banana is P = 24900+ 2Q and at Q = 50. Find out producer surplus ?

Solution 5 :

Here,

P=24900+2Q

When Q=50

P=24900+2*50

P=24900+100

P=25000

Therefore,(P_o, Q_o) =(25000,50)

We know that,

P.S.=$P_oQ_o - \int_0^{Q_o} f(Q)dQ$

=25000*50 – $\int_0^{50}(24900 + 2Q)\,dQ$

=1250000-$(24900\int_0^{50} 1dQ + 2\,[\int_0^{50} Q\,dQ$

=1250000-$(24900[Q]_0^{50} + 2\left[\frac{Q^2}{2}\right]_0^{50})$

=1250000-(24900[50-0] +(50^2-0^2)

=1250000-(24900*50 +2500)

=1250000-(1245000+2500)

=1250000-1247500

=2500

Hence, Ramesh gets RS.2500 as a Surplus.

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