Q: Explain the Optimal depletion of non-renewable or exhaustible resources.

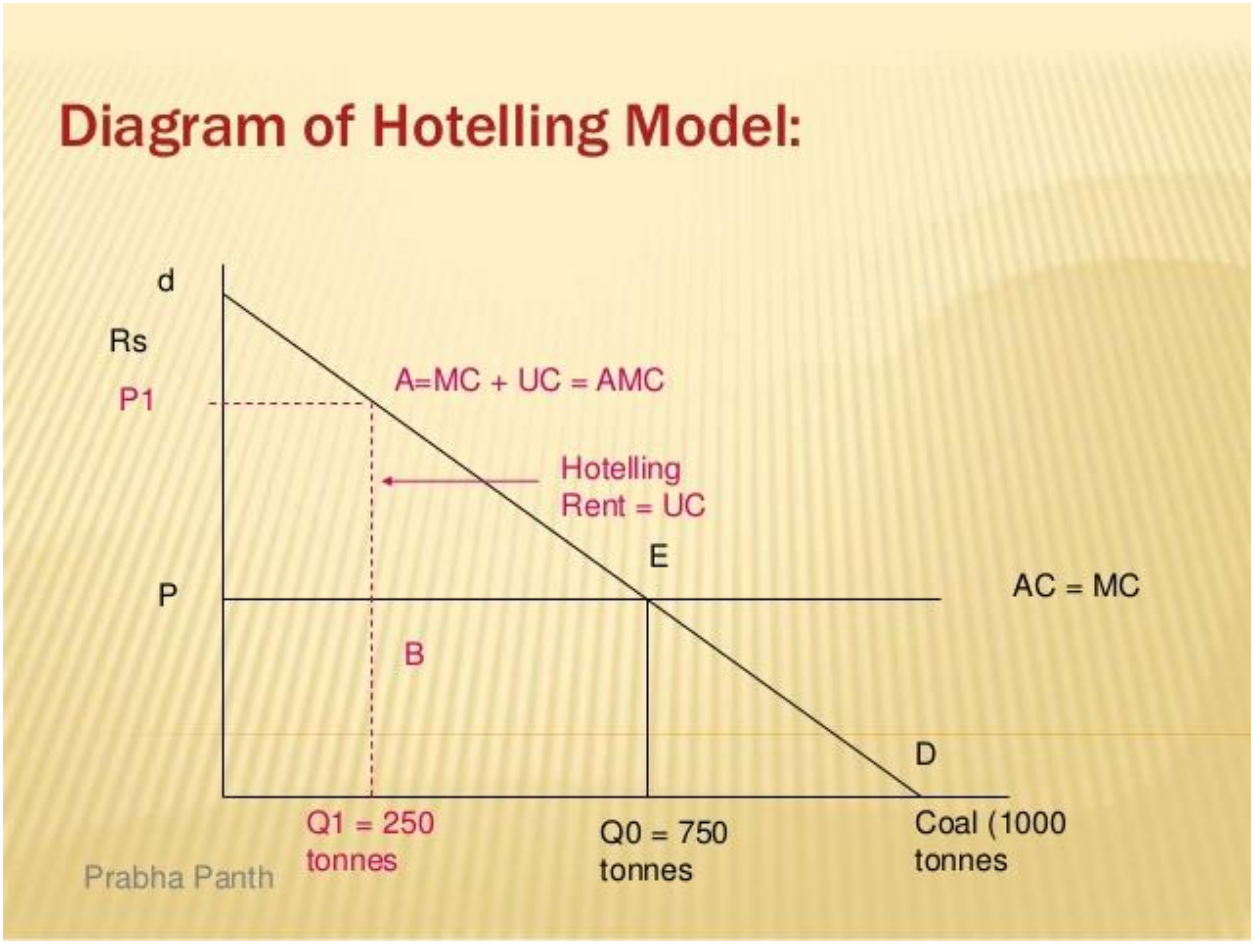
Ans: First let's know the conditions of optimal depletion of non-renewable resources-

A.) In percentage, equilibrium exists when the price is equal to marginal cost.

B.) The case of NRR (Net Production Rate) the price equals Augmented user cost and equals to marginal cost plus User cost.

C.) Postponing extraction of the resource for the future involves preference of time.

D.) The future price should exceed present price of extraction to provide compensation for the loss of present earnings resulting from conservation.



When to postpone Extraction

Resources usually get exhausted when they are extracted, if MC = P is followed in the perfect competition. The mine owners expects resource price to rise as it may get scarcer in future. However the expected increase in price will be

$$P1 – P0 = UC \text{ (User Cost) Or } \quad P1 = P0 + UC$$

Here postponement of extraction means postponement in earning profits. So the mine owners will compare the present earnings at a given price with the discounted earnings overtime to decide whether they will extract now or in the future. For this an example is discussed below:

Suppose there are two time periods T0 and T1. Total amount of non-renewable resources reserved is 100 tonnes. Present Price (P0) of the resource is Rs. 20. Since perfect competition is discussed here so P = MC = AC. Rate of discount is 10%. So P1 will increase by-

As we know that

The expected future price will be equal to AMC (Augmented Marginal Cost),

$$P1 = AMC = MC + UC$$

P1 should exceed the price P0 by the rate of discount:

$$P1 = P0 (1+r)$$

If P0 (1+ r) < P1, then the mine owner will prefer to extract now.

If P0 (1+ r) > P1, then the mine owner will prefer to postpone extraction.

In our example, P1 = P0 (1+R) = Rs.20 (1+ 10%)

= Rs.20 (1+ 10/100)

= Rs.20 (1 + 0.1)

= Rs.22

So the future prices had to increase by Rs. 2/-. The mine owner now equates the present earnings with the discounted future earnings:

P0Q0 = P1Q1/ 1+ r

Earnings in T0 = Rs.20 x 30tn = Rs.600

Earnings in T1 = Rs.22 x 30tn = Rs.660

Discounting by the rate of interest 10% = Rs.660/1.1 = Rs.600

Therefore, P0Q0 = P1Q1/ 1+ r

So it can be concluded that if the initial prices of the resource extraction are too high then the resources will be conserved for the future. And if the initial prices are low then resources will be depleted without the future concern.

Note Prepared by

Pummy Sinha

Assistant Professor

Department Of Economics

M.C. College, Barpeta