ECO 203: Environmental and Resource Economics

Group-B: Resource Economics

Unit-2: Exhaustible Resources

Lecture-III

RESOURCE PRICES AND BACKSTOP TECHNOLOGY

From the earlier discussion we find that:

$$R_t = R_0 e^{st} \tag{9}$$

It follows that:

$$R_0 = \frac{R_T}{(1+s)^T} \tag{10}$$

Where, T is the time period at which either the backstop technology comes into play, or wher demand falls to zero. But R_T is the royalty (rental, user cost) in period T and equation (8) shows us that this must be equal to price in period T less cost. Keeping our assumption that costs of extraction are constant, this means

$$R_T = P_{B,T} - C \tag{11}$$

$\Rightarrow$ The royalty equals the price in period T, which is equal to the cost of the backstop technology, less cost. Substituting (11) in (10) gives:

$$R_0 = \frac{P_{B,T} - C}{(1+s)^T} \tag{12}$$

That is, the royalty, or marginal user cost, in the initial period is equal to the price of the backstop technology minus the cost of extracting the resource, all discounted back to present. We have thus established a link between the backstop technology prices and thus established a link between the backstop technology price and royalty in the initial period. More generally, the royalty in any period t will be equal to:

$$R_0 = \frac{P_{B,T} - C}{(1+s)^{T-t}} \tag{13}$$

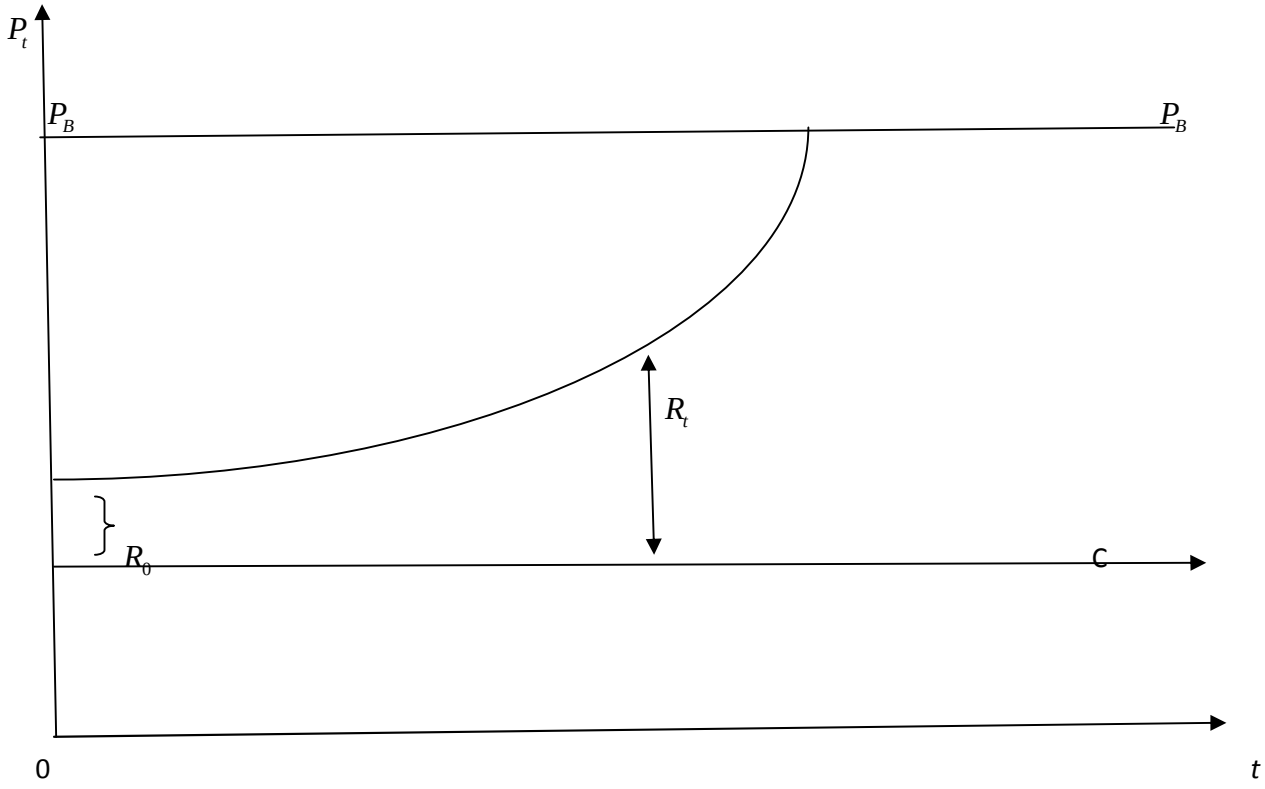

Figure-2: The path of resource price over time

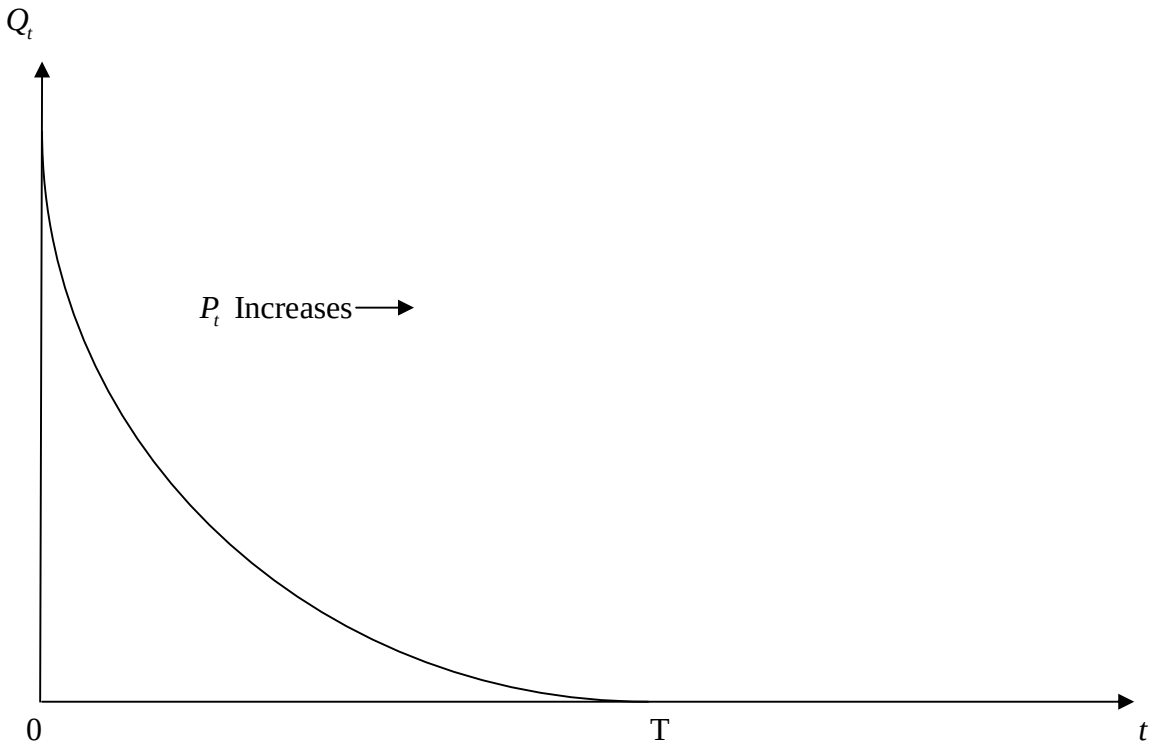

Figure-3: The path of quantity over time