ECO 203: Environmental and Resource Economics

Group-B: Resource Economics

Unit-2: Exhaustible Resources

Lecture-V

THE EFFECTS OF CHANGING PARAMETERS

We are now in a position to indicate how changes in the various parameters affect the optimal price and quantity paths produced by the simple Hotelling rule. The relevant parameters are:

1. The discount rate, s

2. The price of the backstop technology, P_B

3. The stock of resource

4. The cost of extraction, C

5. Demand.

We will discuss here only changing s.

CHANGING "s"

Since the royalty must grow at the discount rate, an increase in s will change the price path. In terms of figure-4, if P_0 remains the same then P_t will be everywhere above the path shown and limit, P_B will be reached with some of the resource left unexploited. Thus, if the discount rate increases, P_0 cannot be the starting point. That point must lie below P_0. The effect is shown in figure-4: initial price is lowered, later prices are raised, and T is reduced to T'. This shows that higher discount rates tend to mean more rapid exhaustion of the exhaustible resource. The lower prices in the early periods encourage demand and the higher prices in later periods discourage demand. Higher discount rates mean that the resource owner wishes to secure the benefits of extraction now rather than later. We have now formalised one of the concerns of the conservationist: positive discounting of the future encourages more rapid exploitation of natural resources.
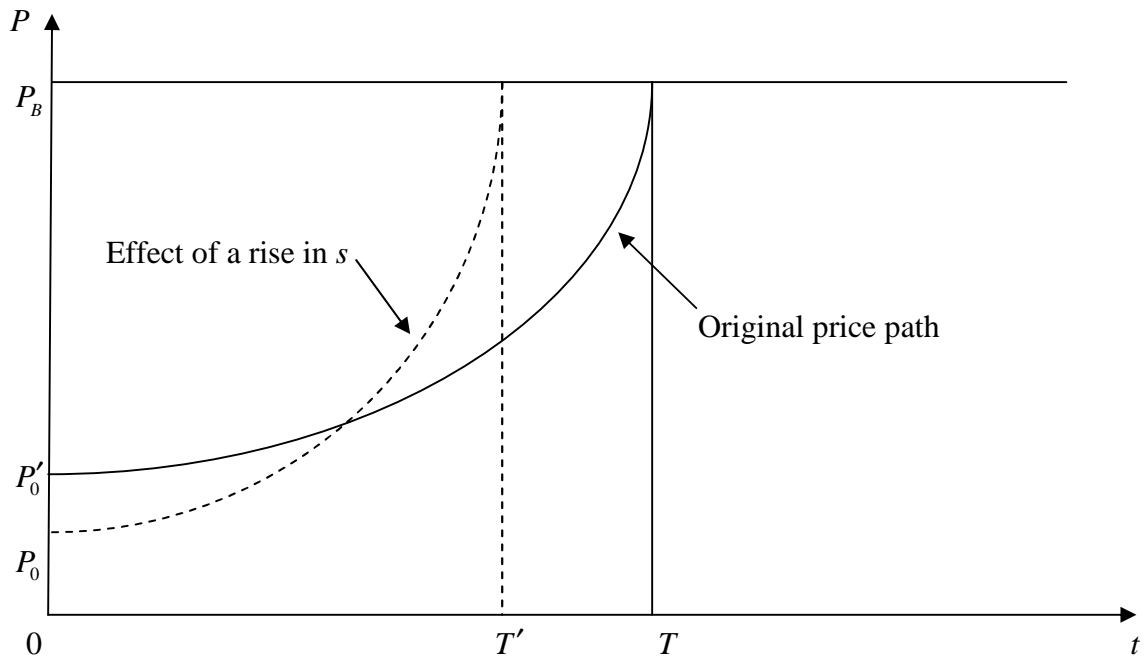
Figure-4: The effects of increasing the discount rate

But this result is not so certain. Higher discount rates will tend to discourage capital investment generally. On the materials- balance principle, therefore, less materials and energy will be required, and hence there is less demand for natural resources. The overall effect of high discount rates on the natural resource stock is therefore ambiguous.