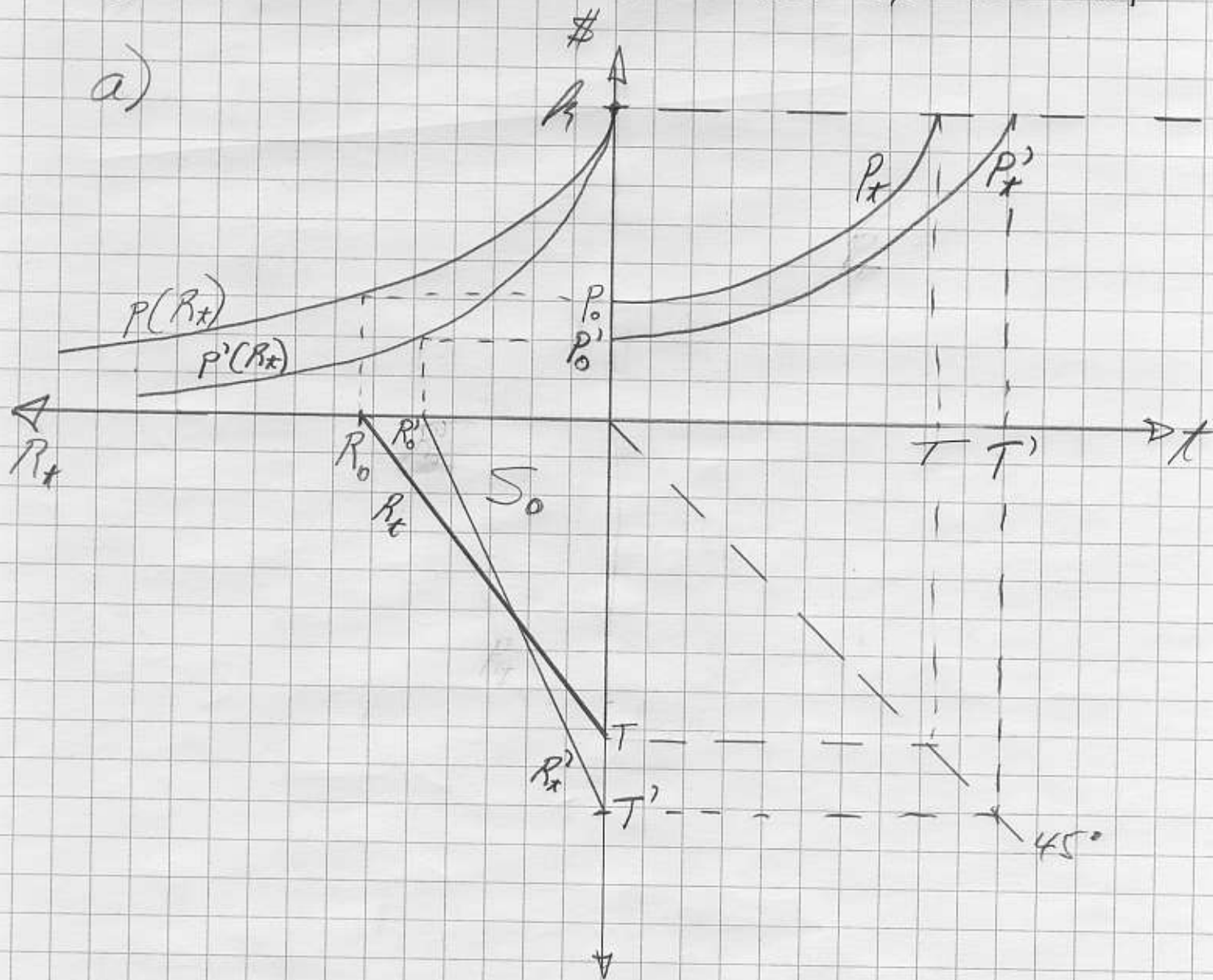


RESOURCE ECON.
2nd MID-TERM
MARCH 2007

①

1) Non-renewable Resource Extraction

a)



The net price increases at rate ρ in order to respect the arbitrage condition.

The initial price P_0 is chosen such that the total stock S_0 is "exactly" extracted when the choke price is reached.

The area under curve R_t is equal to S_0 , i.e.

$$\int_0^T R_t dt = S_0.$$

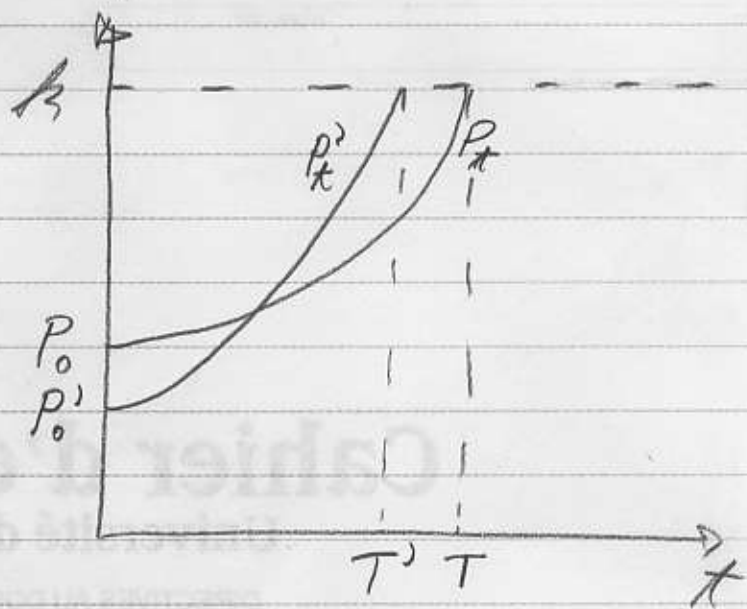
b) If the demand curve becomes $P'(R_t)$, then keeping the same initial price path P_t implies that some resources are left in the ground at $t=T$ since the extraction rates are lower. In order to extract more, the price must be reduced, say at P_0' initially. The new price path is "parallel" to the old one since they both increase at the same rate P .

c) The problem of the expected profit max. firm is:

$$\max_{\{R_t\}} E[V_0] = \int_0^T P(R_t) R_t e^{-Pt} e^{-\lambda t} dt$$

③

Hence, the only difference is that the "effective" discount rate is now $\rho + \lambda > \rho$. The price must therefore increase faster.



If we keep the same initial price, then $P_t' > P_t$ for $t > 0$, which implies incomplete depletion.

Hence $P_0' < P_0$.

If $P_t' < P_t$, $\forall t$, then the stock is depleted before $P_t' = B$.

Hence $T' < T$. The two paths must cross and the resource is depleted earlier.