

### Nonrenewable resource price: determinants

Adopt the following notation and assumptions. Demand is given by  $q(t) = e^{\gamma t} p(t)^\eta$ , where  $\eta < 0$  is the price elasticity and  $\gamma$  is the exogenous growth rate. The interest rate is denoted by  $\rho$ , unit cost is zero and the initial reserve of the resource is  $R_0$ . To guarantee that a competitive equilibrium with positive extraction exists, assume  $\gamma + \eta\rho < 0$ .

- Express the initial ( $t=0$ ) price as a function of the initial reserve and other parameters of the problem. Why is it necessary to assume  $\gamma + \eta\rho < 0$ ?
- Solve for the initial price using the following parameter values

$R_0$	1000
$\gamma$	0.08
$\rho$	0.06
$\eta$	-1.5

Using a range of values, examine the responsiveness of the initial price to the growth rate in demand.