

Econ Problem Set 1

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Problem 1. • (i). The state variables are the future sequence of prices and the number of barrels that are available to the owner.

• (ii). The control variable is the number of barrels sold.

• (iii). The transition equation is

$$b_{t+1} = b_t - k_t$$

where b_t = the number of barrels available at the start of period t and k_t = the number of barrels sold in period t . Define also that p_t = the price in period t .

• (iv). The sequence problem is:

$$\max_{\{k_t\}_{t=1}^{\infty}} \left\{ \sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} p_t k_t \right\}$$

*constraint while the bellman equation is:

$$V(B) = \max_{0 \leq k_t \leq B} \left\{ p k + \frac{1}{1+r} V(B') \right\}$$

where $B' = B - k$

• (v). I have a few constraints. First of all, the lifetime budget constraint is that

$$b_0 = \sum_{t=1}^{\infty} k_t$$

The = is actually a \geq , but it is always optimal to sell more, assuming positive price. We also have the constraint that for all t ,

$$k_t \geq 0$$