

### **Growth with capital-biased technological change**

The stand-in household owns the capital stock and sells capital and labor services to the stand-in firm. The stand-in firm sells the consumption and the investment good to the household. The aggregate technology is specified by the set of period production functions

$$c_t + x_t / (1.04)^t \leq k_t^{0.3} l_t^{0.7}.$$

Non-reversibility requires that capital services satisfy  $k_t \geq 0$  and labor services satisfy  $l_t \geq 0$ .

The stand-in household's preferences are ordered by

$$\sum_{t=0}^{\infty} \beta^t [\log c_t + 1.5 \log(1 - l_t)],$$

where  $l_t \in [0,1]$  and  $c_t \geq 0$ . Capital services supplied,  $k_t$ , is constrained by the household's capital stock,  $K_t$ . Thus,  $k_t \leq K_t$  for all  $t$ . The law of motion for the capital stock is

$$K_{t+1} \leq .95 K_t + x_t \text{ for all } t.$$

- a* Specify the commodity space. Be sure that the norm is such that the aggregate production set,  $Y$ , has an interior point. Verify that  $Y$  does indeed have an interior point.
- b* Define a competitive equilibrium constant growth path.
- c* Find this constant growth path.
- d* Let  $\{p_t\}$  be the nominal price sequence of the consumption good. What is the nominal price sequence of the investment good? What is the nominal value of the beginning of period capital stock?
- e* What is nominal and "real" GNP?