

Economics 614: Macroeconomics  
Spring, 2010  
Cornell University  
Problem Set #3  
Due: Friday, February 19, 2010

1. Precisely state the Phelps-Koopmans Theorem on dynamic inefficiency. Carefully prove the theorem.

2. Burdens of the debt:

$$\begin{aligned} Y &= 100K^{0.7}L^{0.3} \\ Y &= C + Z \\ y &= 100k^{0.7} = c + z \end{aligned}$$

Perceived income per worker is  $\hat{y} = y + \delta$ , where  $\delta$  is lump-sum transfers per head = deficit per head. Depreciation  $\mu = 0.2$ . Population growth  $n = 0.01$ .

a. Plot steady-state capital intensity  $k$  against steady-state debt per head  $\Delta$ . Show that  $k(\Delta)$  is not necessarily unique.

b. Plot  $c$  against steady-state  $\Delta$ .

c. Calculate the  $\Delta$  consistent with golden-rule  $k$ . Show that at the GR wealth per head ( $k + \Delta$ ) is maximized and hence  $\Delta$  equally crowds out  $k$  at margin.

d. Calculate the maximum sustainable debt per head and the corresponding  $k$ .

e. Show that if  $\delta$  is constant then the steady state is stable if and only if  $dk/d\Delta < 0$ .