

SIMON FRASER UNIVERSITY  
Department of Economics

Econ 305  
Intermediate Macroeconomic Theory

Prof. Kasa  
Fall 2013

PROBLEM SET 1  
(Due September 27)

Answer the first three questions True, False, or Uncertain. Briefly explain your answers. No credit without explanation. (5 points each).

1. It is not possible for real GDP to grow more rapidly than nominal GDP.
2. It is not possible for a country to have a trade surplus and a current account deficit at the same time.
3. If employment rises then the unemployment rate must fall.
4. (35 points). In class we discussed one reason why Americans might work more than Europeans. This question explores one reason why Americans might work *less* than Chinese people. Suppose the preferences of Americans and Chinese are the *same*, and are given by:

$$U(C, \ell) = \alpha C - \frac{1}{2}C^2 + \ell$$

where  $C$  stands for consumption of market goods,  $\ell$  stands for leisure, and  $\alpha$  is a fixed parameter, which is the same in both the USA and China. Assume both countries are competitive, and output is produced by firms using the linear production function,

$$Y = C = zN$$

where  $N$  denotes labor input and  $z$  denotes productivity. (Note, for simplicity, we've ignored the government and international trade). Like Prescott, let's suppose the time unit is a week, and suppose the total time available is  $h = 100$  hours. Therefore, the time constraint in both countries is  $\ell + N^s = 100$ , where  $N^s$  denotes labor supply.

- (a) Assuming the market (real) wage is  $w$ , show that the labor supply curve in both countries is given by

$$N^s = \frac{1}{w} \left( \alpha - \frac{1}{w} \right)$$

Why does labor supply increase with  $\alpha$ ? Why does it not depend on the total time endowment? Sketch the above labor supply curve with  $w$  on the vertical axis. What does it imply about the relative strength of income and substitution effects as  $N$  varies?

- (b) Derive an expression of the firm's labor demand, and illustrate it with a graph.
- (c) Using your answers to parts (a) and (b), derive an expression for equilibrium employment, as a function of  $z$  and  $\alpha$ . Illustrate it with a graph. Suppose  $\alpha = 15$  in both countries, but that  $z_{us} = 1/3$  in the US and  $z_c = 1/5$  in China. Compute and compare their equilibrium hours worked. Finally, suppose  $z$  is growing at 8% in China, but only at 2% in the USA. How long will it be before the average work week in China converges to that in the USA? Explain intuitively what is going on (hint: think income and substitution effects).