SIMON FRASER UNIVERSITY
Department of Economics

Econ 305 — Prof. Kasa
Intermediate Macroeconomic Theory — Fall 2013

PROBLEM SET 2
(Due October 30)

1. (20 points). Consider the 2-period Fisherian model discussed in class. Suppose Yin and Yang have the same preferences. Also suppose Yin earns \$100 in period-1 and \$100 in period-2, while Yang earns nothing in period-1, but earns \$210 in period-2. Finally, suppose we observe that Yin and Yang both consume \$100 in each period. Given this information, what is the interest rate? Suppose interest rates increase. What happens to Yin's consumption? What happens to Yang's consumption? Are Yin and Yang better of worse off after the interest rate increase? Illustrate your answers with a graph.

2. (30 points). This question asks you to work through the complete (2-period) dynamic intertemporal model, for a particular specification of preferences and technology. Suppose the representative household's preferences are given by

$$U(C_1, C_2, \ell_1, \ell_2) = C_1 + \gamma \ell_1^{1/3} + \beta\{C_2 + \gamma \ell_2^{1/3}\} \tag{1}$$

where C_1 and C_1 denote consumption in the first and second time period, ℓ_1 and ℓ_2 denote leisure in the first and second time period, γ is a fixed parameter summarizing the relative preference for leisure, and $\beta < 1$ is a fixed parameter summarizing the household's time preference. Output in each period is produced with the following Cobb-Douglas production function:

$$Y_i = z_i K_i^{2/3} N_i^{1/3} \qquad i = 1, 2 \tag{2}$$

where z_i denotes total factor productivity in period-i. The economy begins with a fixed amount of capital, K_1, in period 1. This capital can be increased by investing in the first period, so that $K_2 = K_1 + I_1$. Notice for simplicity we've assumed that capital does not depreciate (i.e., $\delta = 0$). As usual, the household confronts the following time constraint each period, $\ell_i + N_i = h$, where h is the total time available in each period. Finally, for simplicity, suppose there is no government in this economy, and that all markets are perfectly competitive.

Calculate the competitive equilibrium values of consumption, employment and investment in each period. Also, derive expressions for the market clearing wage rates and interest rates. How do these variables depend on current and future productivity? [Hints: (i) Rather than look for market-clearing wage rates and interest rates, use the 'second welfare theorem', and compute the competitive equilibrium quantities by solving a 'social planner's problem'. That is, maximize the household's utility subject to the economy's technology and resource constraints. There are 5 constraints: $C_i + I_i = Y_i$, $\ell_i + N_i = h$ and $K_2 = K_1 + I_1$, where Y_i is given by equation (2). That is, there are 2 aggregate resource constraints (i.e., the National Income Accouting identity), 2 time constraints, and a capital accumulation equation. (ii) Use the constraints to sub out (C_1, C_2, ℓ_1, ℓ_2) and then solve an unconstrained maximization problem over (N_1, N_2, I_1). (iii) Notice that since the economy ends in period 2, it makes no sense to invest in period 2. That is, we know $I_2 = 0$, so that $C_2 = Y_2$.]