

SIMON FRASER UNIVERSITY
Department of Economics

Econ 305
Intermediate Macroeconomic Theory

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PROBLEM SET 2
(Due March 6)

1. (20 points). Once again, the USA is currently worried about the supposedly disastrous effects of a looming ‘fiscal cliff’. This so-called cliff involves automatic decreases in government spending. Use the dynamic intertemporal model developed in Chapter 11 to analyze the effects of this decrease in government spending. In particular, how would output, consumption, investment, and employment be affected? Illustrate your answers with graphs. How do the results depend on whether the cuts are permanent or transitory? Are people’s concerns about the fiscal cliff justified? (Hint: Are the effects on output and employment the same as the effects on economic welfare?)
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

$$U(C_1, C_2, \ell_1, \ell_2) = C_1 + \gamma\sqrt{\ell_1} + \beta\{C_2 + \gamma\sqrt{\ell_2}\} \quad (1)$$

where C_1 and C_2 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:

$$Y_i = z_i K_i^{1/2} N_i^{1/2} \quad i = 1, 2 \quad (2)$$

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? Here are some 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’. (See chapter 5 in the textbook). 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 Accounting identity), 2 time constraints, and a capital accumulation equation.

- ii Use the constraints to sub out $(C_1, C_2, \ell_1, \ell_2)$ 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 $C_2 = Y_2$.
- iv To get the equilibrium wage rate and interest rate, substitute the equilibrium quantities into the appropriate optimality conditions.