

ECON 222

Winter 2005 – Assignment 2

Due: February 10 at 4pm

For each of the following questions, please round all calculations to *two* decimal places.

1. Technical Change and Wage Inequality

Suppose that there are two sectors of the economy given by

$$y_1 = A_1 N_1^{0.5}$$

$$y_2 = A_2 N_2^{0.5}$$

where $A_1 = A_2 = 200$. Suppose that there are 200 people in the economy who will work at any wage.

- (a) If $N_1 = N_2 = 100$, what is the equilibrium wage in each sector?
- (b) If $N_1 = N_2 = 100$ and productivity in sector 1 doubles so that $A_1 = 400$, what will be the new equilibrium wage in sector 1?
- (c) If $A_1 = 400$ and workers are free to move between the two sectors, what will be the equilibrium wage and number of workers in each of the two sectors? (Hint: workers will always have an incentive to switch sectors if they can get a higher wage by switching.)
- (d) Suppose now that working in sector 1 (the higher productivity sector) requires higher skills. If only 50 workers have these necessary skills, what will be the equilibrium wage and number of workers employed in each of the two sectors?

2. Employment in Japan

In November 2004 there were 2.9 million unemployed workers in Japan, while the adult population was 110.03 million and the participation rate was 60.08%.

- (a) What was the unemployment rate in November 2004?
- (b) What was the employment ratio in November 2004?
- (c) From November 2003 to November 2004 the size of the Japanese labour force dropped by 0.43 million. If the participation rate was 60.58% in November 2003, by how much did the adult population change over the year?

(d) Calculate the difference in the number of people classified as ‘not in the labour force’ between November 2003 and November 2004.

3. Consumption, Saving and Government Expenditure

Consider a two-period economy where individuals face an intertemporal budget constraint given by

$$C_1 + \frac{C_2}{1+r} = Y_1 - T_1 + \frac{Y_2 - T_2}{1+r}$$

and where the government faces the budget constraint

$$G = T_1 + \frac{T_2}{1+r}$$

Suppose that $Y_1 = Y_2 = 2000$, $r = 0.1$ and individuals desire perfect consumption smoothing over the two periods. Government services are expected to cost a total of 400.

(a) If the government announces a tax in the first period of $T_1 = 200$, determine consumption in each period (C_1 and C_2) and after tax savings in period 1.

(b) If the government changes its announcement in the first period to $T_1 = 100$, determine consumption in each period and after tax savings in period 1. Assume that Ricardian equivalence holds.

(c) Suppose that the government discovers that its total expenditures will only be 300 rather than 400. If the government announces that $G = 300$ and $T_1 = 100$ at the beginning of the first period, determine consumption in each period.

(d) Now suppose that after discovering that its expenditures will be only 300, the government waits until *after* the first period to announce that $G = 300$. If the government announces $T_1 = 100$ at the beginning of the first period, determine consumption in each period.

(e) Are individuals better off in (c) or in (d)? Why?

4. Capital Investment and Taxation

Suppose that the production function of the economy is given by

$$Y = AK^{0.5}$$

where $A = 2$. The real interest rate is 4%, the depreciation rate on capital is 6% and the price of capital is 1.

- (a) If the effective tax rate is 20%, what is the optimal level of capital in the economy?
- (b) Now suppose that in order to increase capital investment, the government eliminates the effective tax rate. What will be the new optimal level of capital?
- (c) How much gross investment is required to reach this new optimal level of capital in only one period?
- (d) Repeat parts (a) and (b) for the case where $A = 2.4$. Does the elimination of the capital tax have a larger or smaller effect when productivity is higher?