

Problem Set 1
Due: Wednesday, February 16.

Question 1. (5 points each) True, false or uncertain? Give a brief but careful explanation.

- Economic models can be used both for forecasting and for choosing optimal policy instruments.
- There is a consensus today that high current US stock prices reflect bright future fundamentals (e.g., productivity growth)
- The relationship between output per capita and growth varies a lot among different regions of the world.
- An endogenous variable in a macro model is dependent on the value of other variables in the model.
- The high unemployment rate has been causing trouble for Europe since as early as the 1960s.

Question 2. (35 points) A model of wage and price inflation.

a) (10 points) Assume that wage inflation (i.e., the relative change of wages from year to year) is given by

$$\frac{W_t - W_{t-1}}{W_{t-1}} = \frac{P_{t-1} - P_{t-2}}{P_{t-2}} + A_0 - A_1(U_t - U_{voluntary}),$$

where W_t is the level of wages at time t , P_t is the price level, U_t is the actual level of unemployment, $U_{voluntary}$ is the level of voluntary unemployment.

Interpret the three terms on the right hand side. Can you relate this equation to a labor supply relation?

b) (10 points) Prices are set by

$$P_t = K_t W_t,$$

where K_t is called a *markup*. Give at least two factors that might be captured by this term and explain how. Derive the rate of change form

$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}} = \frac{K_t - K_{t-1}}{K_{t-1}} + \frac{W_t - W_{t-1}}{W_{t-1}}$$

from the above specification (*Hint: use the approximation $(1+a)(1+b) = 1+a+b$ if ab is small*).

Assume that

$$\frac{K_t - K_{t-1}}{K_{t-1}} = B_0 - B_1(U_t - U_{voluntary}).$$

Interpret this relationship with the determinants of the markup you listed earlier.

c) (5 points) Solve for $\pi_t - \pi_{t-1}$ as a function of $U_t - U_{voluntary}$ (and the A, B coefficients). Interpret the tradeoff described by your results.

d) (10 points) How can you reconcile the relationship you established in part c with actual US data (using figures 8-2, 8-3 and 8-5 of the textbook)?

Question 3. (40 points) A model of output determination.

a) (5 points) Consumption is determined by

$$C = c_0 + c_1(Y - T) - c_2i.$$

Here Y is output, T is the level of taxes and i is the interest rate. Interpret this equation: what determines the sign of the effect of Y, T and i on C ?

b) (5 points) Investment is given by

$$I = b_1 + b_2Y - b_3i.$$

Interpret the equation (in the same manner as in part a).

c) (10 points) Assuming that there are no exports or imports ($M = X = 0$), the equilibrium condition becomes

$$Y = C + I + G,$$

with G denoting government spending. What does this condition mean? Assume that $b_2 + c_1 < 1$. Solve for Y, C , and I as a function of G, T, i (and the coefficients).

d) (10 points) Suppose that G increases by ΔG . Calculate the effect on output, consumption and investment. Is the effect on output smaller or larger than ΔG ? Explain why.

e) (10 points) Suppose that i increases by Δi . What happens to output and its components (C and I)? Explain the channels through which Y, C and I are affected.