

PROBLEM SET #4

2 % of grade; 13 points possible; max you can earn=10 points

DUE: via gradescope, 10:00.00 a.m. on Wednesday March 20

NOTE: THE DUE DATE IS WEDNESDAY (not Friday)

Problem sets must be uploaded and submitted by 10 am. No problem sets accepted after gradescope window closes. Your submitted work must be your own: Problem sets that are identical (in whole or in part) to another student's problem set will receive a zero.

Follow these guidelines. Write your GSI's name and your name on the first answer sheet. You can hand write or type your answers or some combination of typing & hand-written; just be sure answers are neat and legible. No answer sheet is provided; use your own paper if you are writing by hand. When you are done, you will scan your problem set answers (see gradescope hints on course website) and convert to a pdf file. No need to scan this sheet of questions. You are responsible for submitting the right pdf file. We will grade what you submit, not circle back to you to tell you that you gave us the wrong file. You must tell gradescope on which page we will find your answers. If you don't tell gradescope which page your answer is on, we won't grade what you submit. Gradescope is accessible via our bcourses site.

1. (2 points total; ½ point each)

(From Spring 2017 MT2, and Fall 2010 MT2) We have two models

- Chapter 7, a long-run model in which we assume prices and wages are fully flexible
- Chapter 9-12, a short-run model in which we assume prices and wages are sticky

- Of these two models, which is the appropriate model to use to answer this question: "When the central bank changes interest rates, how does this affect unemployment?" Why?
- Of these two models, which is the appropriate model to use to answer this question: "When the federal government increases its spending, what is the effect on interest rates?" Why?
- When we assume wages and prices are fully flexible, what are the determinants of real GDP? When we assume wages and prices are sticky, what are the determinants of real GDP?
- Describe what it means to assume wages and prices are fully flexible. When we assume wages and prices are sticky, is that the same as assuming prices and wages are constant? Explain.

2. (1 point total, ½ point each)

Okun's Law states that the unemployment rate, u , is related to the natural rate of unemployment, u^* , and the output gap (in percentage terms, the gap between potential output Y^* and actual output Y). Check page 330, Box 12.1, of the textbook if need be.

$$u = u^* - 0.4 \left(\frac{Y - Y^*}{Y^*} \right) = u^* + 0.4 \left(\frac{Y^* - Y}{Y^*} \right)$$

- For each of the following three scenarios, use Okun's Law to calculate the unemployment rate. (Round to 1 digit after the decimal point) Put a box around each answer. (three answers; three boxes)
 - $u^* = 4$ percent, $Y^* = \$20,000$ billion per year, and $Y = \$19,000$ billion per year.
 - Starting from the conditions in (i), real GDP increases by 2 % but potential output doesn't change
 - Starting from (i), real GDP increases by 2 % and potential output increases by 5 %
- Use your answers to a to answer this question: how is it possible for the unemployment rate to go up even when real GDP is increasing?

3. (1 point)

(From Spring 2017, MT #2) The Okun's Law coefficient in #2 above is 0.4. Suppose more generally that the Okun's Law coefficient (OLC) is unknown. Thus we would express Okun's Law as

$$u = u^* + OLC \left(\frac{Y^* - Y}{Y^*} \right)$$

Consider two economies.

- In Economy A, when output falls, very few workers are laid off and instead shareholder profits decline. When output rises, very few workers are hired, and instead shareholder profits rise.
- In Economy B, when output falls, workers are laid off and shareholder profits remain the same or rise slightly. When output rises, workers are hired and shareholder profits rise.

In which economy – A or B – will the Okun's Law coefficient be larger? Why?

4. (4 points total, ½ point each)

Suppose the following equations describe a flexible-price economy. All flows are billions of dollars per year.

$$\begin{aligned} C &= 2,800 + 0.7Y^D \\ T &= -1,000 + 0.15Y \\ I &= 3,000 - 1,200r \\ G &= 2,000 \\ GX &= 520 + 0.1Y^f + 400\varepsilon \\ Y^f &= 2,000 \\ \varepsilon &= 1.1 - 9.5(r - r^f) \\ IM &= 700 + 0.195Y \\ Y^* &= 15,000 \end{aligned}$$

- Using the $Y=AD$ approach, solve for the equilibrium value of the real interest rate in this economy. Put a box around your answer. Show your work.
- Now, use those same equations to derive equations for saving and for investment. In your derivation of the saving equation, show the equations for household saving, government saving, and foreign saving separately, and then sum them. Put a box around each of the saving equations and around the investment equation. (5 boxes total -- S^H, S^G, S^F, S, I) Show your work.
- Using the saving and investment equations you derived in part (b), solve for the equilibrium value of the real interest rate in the economy. You should get the same answer you got in part a.
- What are the values of investment, household saving, government saving, and foreign saving in equilibrium? Show your work.
- Draw two graphs that show the determination of the equilibrium real interest rate. In one graph, use the AD and Y equations. In the second graph, use the S and I equations.
- Suppose there is a permanent cut in the tax rate to 14 percent. What are the new equilibrium values of the real interest rate, investment, household saving, government saving, and foreign saving? Show your work.
- Why does a change in the tax rate affect all three components of saving?
- Describe the process by which the economy adjusts from the equilibrium in part (a) to the equilibrium in part (f).

5. (3 points total, ½ point each)

Suppose the following equations describe a sticky-price economy. All flows are billions of dollars per year.

$$\begin{aligned}C &= 2,800 + 0.7Y^D \\T &= -1,000 + 0.15Y \\I &= 3,000 - 1,200r \\G &= 2,000 \\GX &= 520 + 0.1Y^f + 400\varepsilon \\Y^f &= 2,000 \\ \varepsilon &= 1.1 - 9.5(r - r^f) \\IM &= 700 + 0.195Y \\r &= 6 \text{ percent} = 0.06\end{aligned}$$

- What is the equilibrium value of the real income in this economy? Show your work. Box your answer.
- When the economy is in equilibrium, what are the values of consumption, investment, government spending, gross exports, and imports? Show your work. Box your answers.
- What is the value of the spending multiplier in this economy? Show your work. Box your answer.
- Suppose government spending increases by 1.5 percent to \$2.03 trillion per year. What is the new equilibrium value of Y ? Show your work. Box your answer.
- Describe the process by which the economy adjusts from the equilibrium in part (a) to the equilibrium in part (d).
- Why is there a spending multiplier in this sticky-price economy but no spending multiplier in the flexible-price economy of the previous question?

6. (2 points total, ½ point each)

(From Spring 2017, MT2, #6) Suppose that the government sector always has a balanced budget. In that case, $G = T = T_0 + tY$. There can be no autonomous or exogenous change in G in this economy unless there is also a change in net taxes, T . And, any change in net taxes will trigger a change in G .

- If there is a decrease in autonomous taxes, *in this economy* what is the effect on government spending?
- Is the spending multiplier in this economy larger, smaller, or the same size as the spending multiplier in an economy (such as in question 5) in which there is no connection between G and T ? Explain.
- In a short-run sticky price economy, *in this economy in which $G = T = T_0 + tY$* what is the effect of a decrease in autonomous taxes on equilibrium GDP? Would the effect on equilibrium GDP be the same if we had the usual equations (such as those in #5) in which there is no connection between G and T ? Explain.
- In a long run flexible price economy, *in this economy in which $G = T = T_0 + tY$* what is the effect of a decrease in autonomous taxes on the equilibrium real interest rate? Would the effect on the equilibrium interest rate be the same if we had the usual equations in which there is no connection between G and T ? Explain.