14.02 Final Exam

Fall 1995

Instructions: You have three hours to complete this exam, although it should take you *considerably less* time. The exam consists of 100 points and we recommend that you pace yourself at a minute per point. Good luck and have a good holiday!

Multiple Choice (20 points)

1. Currently, the annual GDP of the United States is approximately
a. $65 million
b. $65 billion
c. $650 billion
d. $6.5 trillion
e. $65 trillion

2. In order of **increasing** unemployment rate (i.e., from lowest to highest), the United States (US), Europe Union (EU) and Japan should be ranked as:
a. US, EU, Japan
b. Japan, US, EU
c. EU, Japan, US
d. none of the above
e. (a) and (c)

3. The major economic policy events of the early 1980s in the United States can be summarized as
a. Contractionary monetary and expansionary fiscal policies leading to a trade and budget deficit.
b. Expansionary monetary and expansionary fiscal policies leading to a trade and budget deficit.
c. Expansionary monetary and contractionary fiscal policies leading to a trade and budget surplus.
d. Contractionary monetary and contractionary fiscal policies leading to a trade and budget surplus.
e. None of the above.

4. Which of the following countries has the highest imports to GDP ratio
a. Japan
b. the United States
c. Small European countries like Belgium
d. None of the above

5. The available evidence on consumers' planning horizons suggests that

a. A small percentage of retirement wealth comes from individual saving decisions.

b. A large precentage of retirement wealth comes from individual saving decisions.

c. People do not react to expected changes in future taxes, such as the pre-announced Reagan tax cuts.

d. (a) and (c)

e. None of the above

FOR QUESTIONS 6-8 you should think in terms of a static closed-economy model, and assume that consumption depends positively on after-tax income, and that investment depends positively on income and negatively on the interest rate.

6. If the price level and the interest rate are fixed, then goods market equilibrium implies that a decrease in the autonomous component of consumption (i.e., the part of consumption that does not depend on income) leads to

a. an increase in output and a decrease in the level of saving

b. a decrease in output and a decrease in the level of saving

c. a decrease in output and an increase in the level of saving

d. a decrease in output and a decrease in the level of saving

e. none of the above

7. If the price level is fixed, but the interest rate is determined by goods and financial market equilibrium, a decrease in the autonomous component of consumption (i.e., the part of consumption that does not depend on income) leads to

a. an increase in output, a decrease in the interest rate and a decrease in the level of saving

b. a decrease in output, a decrease in the interest rate and a decrease in the level of saving

c. a decrease in output, an increase in the interest rate and an increase in the level of saving

d. a decrease in output, an increase in the interest rate and a decrease in the level of saving

e. a decrease in output, a decrease in the interest rate and the overall effect on the level of saving is ambiguous.

8. If neither the price level nor the interest rate are fixed, but they are jointly determined with output by the **long run** equilibrium of the goods, financial and labor markets, a decrease in the autonomous component of consumption (i.e., the part of consumption that does not depend on income) leads to

a. an increase in output, a decrease in the interest rate and a decrease in the level of saving

b. a decrease in output, a decrease in the interest rate and a decrease in the level of saving

c. no change in output, an increase in the interest rate and an increase in the level of saving

d. no change in output, a decrease in the interest rate and an increase in the level of saving

e. no change in output, a decrease in the interest rate and the overall effect on the level of saving is ambiguous.

9. *Ceteris paribus* (i.e., assuming that all other foreign and domestic economic variables are unchanged), an increase in expected future short-term interest rates is likely to lead to:

a. A decrease in stock prices, a decrease in long-term bond prices, and an appreciation.

b. An increase in stock prices, an increase in long-term bond prices, and a depreciation.

c. A decrease in stock prices, a decrease in long-term bond prices, and a depreciation.

d. An increase in stock prices, a decrease in long-term bond prices, and a depreciation.

e. An increase in stock prices, a decrease in long-term bond prices, and an appreciation.

10. Consider goods market equilibrium in the static open economy model (i.e., fixed prices and interest rates), where consumption depends positively on after-tax income, and investment depends negatively on the interest rate. Also, assume that the country starts from a position of balanced trade. If the country increases government spending and the entire increase in government spending is used to import foreign-made jet fighters,

[Hint: take your time and think in terms of the ZZ and DD curves (it may help you to write them out). Do both curves actually shift?]

a. Output decreases and there is a trade deficit.

b. Output increases and there is a trade deficit.

c. Output increases and there is a trade surplus.

d. Output remains unchanged and there is a trade surplus.

e. Output remains unchanged and there is a trade deficit.

Medium Question I: Mundell-Fleming model with fixed exchange rates (20 Points)

Consider the standard Mundell-Fleming open economy model for a small economy:

IS: $Y = C(Y\text{-}T) + I(Y,i) + G + NX(Y,Y^*,E)$

LM: $\frac{M}{P} = YL(i)$

interest parity: $i = i^* + \frac{\overline{E}^e - E}{E}$

where i* is the interest rate in the rest of the world (ROW), and both prices (P and P*) are fixed.

Assume that in a context of perfect capital mobility, the authorities decide to fix the exchange rate such that $E = \overline{E}^e$. Note that given our small economy assumption, any policy change in this country will not affect foreign variables (e.g., i* and Y* are given).

(a) Write down the new interest parity condition after the exchange rate is fixed. Use your result to show graphically the equilibrium in a standard IS-LM diagram.

(b) Suppose the government decides to increase spending. Show in a graph what happens to output and the interest rate. Is fiscal policy effective in a fixed exchange rate regime?

(c) Assume the ROW decides to implement an expansionary fiscal policy together with a contractionary monetary policy such that i* increases but Y* remains constant. Show in a graph what happens to output and the interest rate in our small open economy. Describe briefly what happens to the components of demand.

Medium Question II: Using and Abusing the Phillips Curve (20 Points)

Take yourself back to the early 1960s. The AFL Boston Patriots play at Harvard Stadium, the youngest US president ever has promised to put a man on the moon, and your UROP assistant is estimating the following relationship between inflation and unemployment

$$\pi_t = \theta * \pi^e_{t-1} + k - a * u(t),$$

where t denotes years.

(a) In one sentence interprete your UROP's finding that θ=0.

(b) Your UROP also reports that a=1. Suppose that JFK Jr knew what the natural rate of unemployment was, and decided to use fiscal policy to bring the rate of unemployment to two percentage points below the natural rate. Without knowing the value of k, can you tell the president what rate of inflation to expect? If so, please tell us, too.

(c) Before collapsing from lack of sleep, your UROP assistant mutters that k=5. What is the natural rate of unemployment?

(d) Suppose that in 1965 inflation is 3%, people realize that inflation has been consistently positive, and therefore your 14.02 knowledge tells you that θ=1. If the democrats want to maintain the rate of unemployment at one percentage point below the natural rate for the next five years, what should we expect the inflation rate to be in 1970?

Long Question: Productivity and Aggregate Supply (40 Points)

In class, we often modelled production as $Y = N$, where N is employed labor. In this problem, we will model production a little more generally as $Y = AN$, where A measures the productivity of labor. We will consider how changes in A affect economic variables. To get you started, here are some important equations:

$u = 1 - \frac{N}{L} = 1 - \frac{Y}{AL}$
$P = (1 + \mu)\frac{W}{A}$ (price setting equation)
$W = P^e F(u, z)$ (wage setting equation)

The Long Run (15 points)

1. Take A as given and $P = P^e$. On a graph with u on the x-axis and $\frac{W}{P}$ on the y-axis, draw the relationship between the real wage (i.e., $\frac{W}{P}$) and u implied by wage setting. In the same graph, draw the relationship between the real wage and u implied by price setting. Show the natural rate of unemployment.

2. Now consider an increase in A. Redraw your graph from part 1 (again assuming $P = P^e$) and show how the graph changes as a result of the increase in A. What happens to the natural rate of unemployment and the real wage? Explain in words. What happens to the natural level of output?

3. If wages are set by bargaining between workers and firms, is it possible for the increase in A to affect wages directly, i.e., for the wage setting equation to be of the form: $W = P^e F(A, u, z)$? Explain why this might be so. How would the function F be affected by an increase in A? How does this affect your answer to part 2? (In other words, if F is a function of A, how does an increase in A affect the real wage and the natural rate of unemployment?)

The Short Run (22 points)

4. Using the equations listed above part 1 (ignoring the modifications discussed in part 3), derive the aggregate supply curve for a given value of P^e and a given value of A. Draw this curve in a graph with Y on the x-axis and P on the y-axis. (By the way, you must draw the graph in addition to deriving the equation, you cannot do one or the other.) Given P^e, what is the effect of an increase in A on the aggregate supply curve? Show on the graph and explain in words.

5. Graph the standard aggregate demand relation we used in class in a figure with Y on the x-axis and P on the y-axis. What is the effect of an increase in A on the aggregate demand curve? (There is no set answer here. Think about how an increase in productivity—which implies an increase in future output and income—may affect consumption and investment.)

6. Using your answers to parts 5 and 6, what is the effect of an increase in A on output in the short run? Illustrate your answer with a graph of aggregate supply and aggregate demand. Why is it that you cannot tell what happens to employment or unemployment in the short run?

The Wisdom (3 points)

7. Discuss the following statement. Higher productivity implies that the same amount of output can be produced by less workers. Thus, it inevitably leads to more unemployment. Therefore, the only way to get unemployment down is to stop technological progress.