

1. Suppose that the Fed reduces the money supply by 5%.
  - a) What happens to the AD curve?
  - b) What happens to the level of output and the price level in the short run and in the long run?
  - c) According to Okun's Law, what happens to unemployment in the short run and in the long run?
  
2. Let's examine how the goals of the Fed influence its response to shocks. Suppose Fed A cares only about keeping the price level stable, and Fed B cares only about keeping output and employment at their natural rates. Explain how each Fed would respond to:
  - a) an exogenous decrease in the velocity of money.
  - b) an exogenous increase in the price of oil.
  
3. Suppose that the LRAS curve for Utopia is vertical at  $Y = 5000$  while the SRAS curve is horizontal at  $P = 1.00$ . The AD curve is  $Y = 3000 + 1.00(M/P)$ , and  $M$ , the money supply, is 2000. The initial position of the economy is in long-run equilibrium at  $Y = 5000$ ,  $P = 1.00$ .
  - a) Draw a graph with LRAS, SRAS, and AD curves. Label the long-run equilibrium point E and the given AD curve  $AD_0$ . Substitute  $M = 2000$  to get the formula for  $AD_0$ . Write the formula for the  $AD_0$  curve.
  - b) If the money supply is increased to 2500, what is the formula for the new AD curve? On the same graph from part (a), draw the new AD curve and label it  $AD_1$ .
  - c) On the same graph, plot the new short-run equilibrium point and label it point A. Label the new long-run equilibrium point B. What are the output and price levels at point A? What are the new output and price levels at point B?
  
4. Suppose that the short- and long-run aggregate supply curves are the same as in problem 3 above. Now consider two alternative AD curves (both of which cannot be true at the same time). They are:
$$AD_0: Y = 3000 + 1.00(M/P)$$
and
$$AD_1: Y = 2.5(M/P)$$
Assume that the money supply is 2000 and  $P = 1.00$  initially.
  - a) Draw a graph with the LRAS, SRAS, and the two AD curves. Labeling the first AD curve  $AD_0$  and the second AD curve  $AD_1$ .
  - b) What is the income velocity of money at the initial equilibrium?
  - c) Suppose that  $M$  increases to 3000 so that the AD curve shifts. What are the short-run values of  $Y$  and  $P$  along the new curve  $AD_0$ ? What are the long-run values of  $Y$  and  $P$  along the new curve  $AD_0$ ? What are the income velocities of money in the short run and long runs?
  - d) Suppose that  $M$  increases to 3000 but curve  $AD_1$  actually holds in the economy. What are the short-run values of  $Y$  and  $P$  in this case? What are the values of  $Y$  and  $P$  in the long run? What are the income velocities of money in the short and long runs?
  - e) Does the quantity theory of money apply in either of these cases in the short run? In which case(s)? Does the quantity theory hold in either case in the long run? In which case(s)?
  
5. Use the Keynesian cross to examine the impact of:
  - a) an increase in government purchases.
  - b) an increase in taxes.
  - c) an equal increase in government purchases and taxes.

6. Suppose that the LRAS curve is vertical at  $Y = 6000$  while the SRAS curve is horizontal at  $P = 2.00$ . The AD curve is  $Y = 6.0(M/P)$  and  $M = 2000$ .
- Draw a graph with the three curves. Label the curves  $LRAS_0$ ,  $SRAS_0$ , and  $AD_0$ . What are the initial values of  $Y$  and  $P$  at short-run and long-run equilibrium? Label this point E.
  - Now suppose that there is a supply shock that moves SRAS to  $P = 2.50$ , and LRAS to  $Y = 5500$ . On the same graph from part (a), draw the new curves, labeling them  $SRAS_1$  and  $LRAS_1$ .
  - If the AD curve is unchanged, what are the new short-run equilibrium values of  $P$  and  $Y$ ? On the graph, label this point A.
  - If the AD curve is unchanged, what are the new long-run equilibrium values of  $Y$  and  $P$ ? On the same graph, label this point B.
  - If the Fed wanted to increase money supply enough to keep  $Y$  at 6000 in the short run, how much would  $M$  have to be? If it kept  $M$  at this level in the long run, what would long-run equilibrium  $Y$  and  $P$  be?
7. Consider the simple Keynesian cross model as described by the following equations:
- $$Y = E \quad (\text{equilibrium condition})$$
- $$E = C + I + G$$
- $$C = 700 + 0.70(Y - T)$$
- $$I = 800$$
- $$G = 500$$
- $$T = 500$$
- Graph planned expenditures as a function of income.
  - What is the equilibrium level of income?
  - If government purchases increase to 550, what is the new equilibrium income?
  - What level of government purchases is needed to achieve an income of 6000?
8. Suppose that the money demand function is:  $(M/P)^d = 4000 - 200r$ , where  $r$  is the interest rate in percent. The money supply  $M$  is 5500 and the price level  $P$  is 2.5.
- Graph the supply and demand for real money balances.
  - What is the equilibrium interest rate?
  - Assuming the price level is fixed, what happens to the equilibrium interest rate if the supply of money is raised from 5500 to 6000?
  - If the Fed wishes to raise the interest rate to 10 percent, what money supply should it set?
9. What does the IS curve represent? Why does the IS curve slope downward?
10. What does the LM curve represent? Why does the LM curve slope upward?
11. According to the IS-LM model, what happens to the interest rate, income, consumption, and investment when:
- the central bank increases the money supply?
  - the government increases purchases?
  - the government decreases taxes?
  - the government increases purchases and taxes by equal amounts?
12. Suppose that the government wants to raise investment but keep output constant. In the IS-LM model, what mix of monetary and fiscal policy will achieve this goal? In the early 1980s, the US government cut taxes and ran a budget deficit while the Fed pursued tight monetary policy. What effect should this policy mix have?

13. Suppose that the consumption function is given by  $C = 200 + .5(Y-T)$  and the investment function is  $I = 1000 - 200r$ , where  $r$  is measured in percent,  $G$  equals 300, and  $T$  equals 200.
- What is the equation for the IS curve? Express the equation two ways. (Hint: Substitute for  $C$ ,  $I$ , and  $G$ , in the equation  $Y = C + I + G$  and then write an equation for  $Y$  as a function of  $r$  and then  $r$  as a function of  $Y$ .)
  - What is the slope of the IS curve? (Hint: The slope of the IS curve is the coefficient of  $Y$  when the IS curve is written expressing  $r$  as a function of  $Y$ .)
  - If  $r = 1$ , what is  $I$ ? What is  $Y$  along the IS curve? If  $r = 3$ , what is  $I$ ? What is  $Y$  along the IS curve? If  $r = 5$ , what is  $I$ ? What is  $Y$  along the IS curve?
  - If  $G$  increases, does the IS curve shift right or left?
  - If  $T$  increases, does the IS curve shift right or left?
  - If the interest sensitivity of investment ( $-200$  in this example) increases in absolute value, does the IS curve become steeper or flatter?
  - If the marginal propensity to consume ( $0.5$  in this example) becomes larger, does the IS curve become steeper or flatter?
14. Suppose that the equilibrium in the money market can be described as  $M/P = 0.5Y - 100r$ , and  $M/P$  equals 800.
- Write the LM curve two ways, expressing  $Y$  as a function of  $r$  and  $r$  as a function of  $Y$ .
  - What is the slope of the LM curve?
  - If  $r = 1$ , what is  $Y$  along the LM curve? If  $r = 3$ , what is  $Y$  along the LM curve? If  $r = 5$ , what is  $Y$  along the LM curve?
  - If  $M/P$  increases, does the LM curve shift left or right?
  - If  $M$  increases and  $P$  is constant, does the LM curve shift to the left or right?
  - If  $P$  increases and  $M$  is constant, does the LM curve shift to the left or right?
  - If the interest sensitivity of money demand ( $-100$  in this example) increases in absolute value, does the LM curve become steeper or flatter?
  - If the sensitivity of money demand to income ( $0.5$  in this example) becomes greater, does the LM curve become steeper or flatter?
15. Assume the following model of the economy, with the price level fixed at 1.00.
- $$Y = C + I + G \qquad M^s/P = M^d/P = 0.4Y - 40r$$
- $$C = 0.9(Y-T) \qquad M^s = 1800$$
- $$I = 1000 - 20r$$
- $$G = T = 1200$$
- Write the equation for the IS curve, showing  $Y$  as a function of  $r$ .
  - Write the equation for the LM curve, showing  $Y$  as a function of  $r$ .
  - What are the short-run equilibrium values of:  $Y$ ,  $r$ ,  $Y-T$ ,  $C$ ,  $I$ , private saving, public saving, and national saving.
  - Suppose that  $G$  increases by 200. By how much will  $Y$  increase in short-run equilibrium? What is the government purchase multiplier (the change in  $Y$  divided by the change in  $G$ )?
  - Suppose  $G$  is back to its original level of 1200, but  $M^s$  increases by 200. By how much will  $Y$  increase in short-run equilibrium? What is the multiplier for money supply (the change in  $Y$  divided by the change in  $M^s$ )?

16. The Fed is considering two alternative monetary policies:
- \* holding the money supply constant,
  - \* adjusting the money supply to hold the interest rate constant.
- In the IS-LM model, which policy will better stabilize output if:
- a) all shocks to the economy arise from exogenous changes in the demand for goods and services?
  - b) all shocks to the economy arise from exogenous changes in the demand for money?
17. Consider the following model of the economy for Nirvana:
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|-----------------------|--------------------|
| $Y = C + I + G$       | $M_s/P = M_d/P$    |
| $C = 200 + 0.75(Y-T)$ | $M_d/P = Y - 100r$ |
| $I = 200 - 25r$       | $M_s = 1000$       |
| $G = 100$             | $P = 2$            |
| $T = 100$             |                    |
- a) Write an equation for both the IS and LM curves expressing  $Y$  as a function of  $r$ .
  - b) What are the equilibrium values of  $r$  and  $Y$ ?
  - c) Suppose that government purchases are raised from 100 to 150. What are the new equilibrium values of  $r$  and  $Y$ ?
  - d) Suppose that the money supply is raised from 1000 to 1200. What are the new equilibrium values of  $r$  and  $Y$ ?
  - e) With the initial values for monetary and fiscal policy, suppose that the price level rises from 2 to 4. What are the new equilibrium values of  $r$  and  $Y$ ?
  - f) Derive and graph an equation for the AD curve. What happens to this AD curve if fiscal or monetary policy changes, as in parts (c) and (d)?
18. Suppose that an economy is characterized by an IS curve given by  $Y = 3500 - 100r$  and by an LM curve given by  $Y = 1500/P + 100r$ . The LRAS curve for this economy is vertical at  $Y = 3000$ .
- a) Draw two graphs, side by side: an IS-LM graph, also including LRAS, and an AD-AS graph, with LRAS at  $Y = 3000$  and SRAS at  $P = 1.0$ . Label  $P = 1.0$  as  $P_1$ .
  - b) On the IS-LM graph, draw the IS curve and the LM curve for  $P = 1.0$  and label it  $LM_1$ . What are the short-run equilibrium values of  $Y$  and  $r$ ? Label that point A on the IS-LM graph.
  - c) Write the formula for the AD curve. On the AD-AS graph, draw the AD curve. Label the short-run equilibrium point A on that graph.
  - d) What is the long-run equilibrium price level? On the same IS-LM graph, draw the LM curve for that price level and label it  $LM_2$ . On the same AD-AS graph, draw the SRAS curve for the long-run equilibrium. Label the new price level  $P_2$ . Label the points of long-run equilibrium on both graphs points B.