

Chapter 9 Analytical Problems with Answers

ANALYTICAL PROBLEMS

1. Use the *IS-LM* model to determine the effects of each of the following on the general equilibrium values of the real wage, employment, output, real interest rate, consumption, investment, and price level.
 - a. A reduction in the effective tax rate on capital increases desired investment.
 - b. The expected rate of inflation rises.
 - c. An influx of working-age immigrants increases labor supply (ignore any other possible effects of increased population).
 - d. Increased usage of automatic teller machines reduces the demand for money.
2. Use the *IS-LM* model to analyze the general equilibrium effects of a permanent increase in the price of oil (a permanent adverse supply shock) on current output, employment, the real wage, national saving, consumption, investment, the real interest rate, and the price level. Assume that, besides reducing the current productivity of capital and labor, the permanent supply shock lowers both the expected future *MPK* and households' expected future incomes. (Assume that the rightward shift in labor supply is smaller than the leftward shift in labor demand.) Show that, if the real interest rate rises at all, it will rise less than in the case of a temporary supply shock that has an equal effect on current output.

Answers

1. (a) The increase in desired investment shifts the *IS* curve up and to the right, as shown in Figure 9.21. The price level rises, shifting the *LM* curve up and to the left to restore equilibrium. Since the real interest rate rises, consumption declines. In summary, there is no change in the real wage, employment, or output; there is a rise in the real interest rate, the price level, and investment; and there is a decline in consumption.

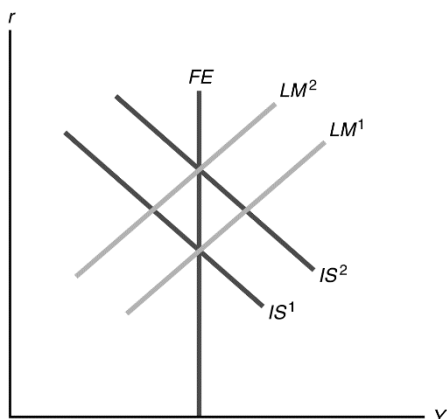


Figure 9.21

- (b) The rise in expected inflation shifts the LM curve down and to the right, as shown in Figure 9.22. The price level rises, shifting the LM curve up and to the left to restore equilibrium. Since the real interest rate is unchanged, consumption and investment are unchanged. In summary, there is no change in the real wage, employment, output, the real interest rate, consumption, or investment; and there is a rise in the price level.

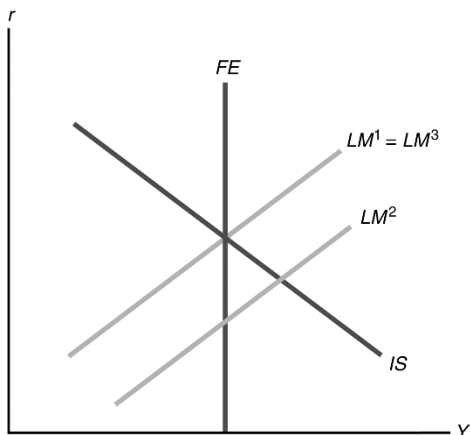


Figure 9.22

- (c) The increase in labor supply is shown as a shift in the labor supply curve in Figure 9.23 (a). This leads to a decline in the real wage rate and an increase in employment. The rise in employment causes an increase in output, shifting the FE line to the right in Figure 9.23 (b). To restore equilibrium, the price level must decline, shifting the LM curve down and to the right. Since output increases and the real interest rate declines, consumption and investment increase. In summary, the real wage, the real interest rate, and the price level decline; and employment, output, consumption, and investment rise.

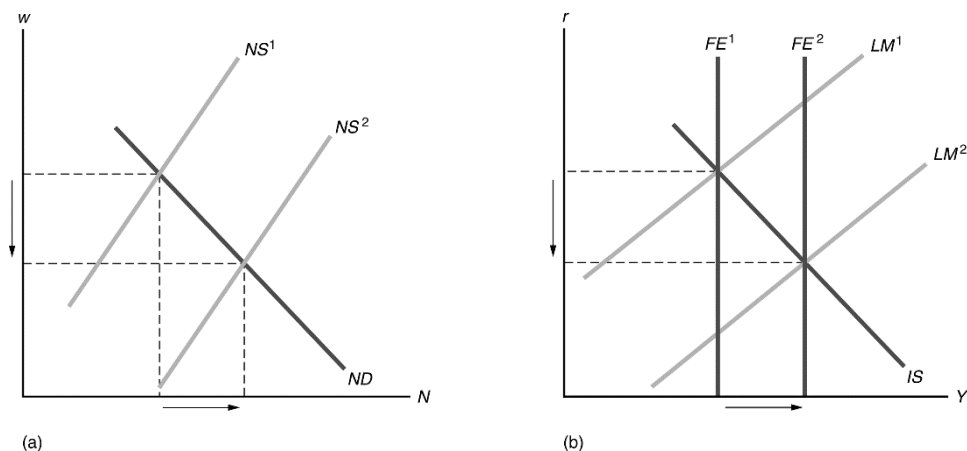


Figure 9.23

- (d) The reduction in the demand for money gives results identical to those in part (b).
2. The increase in the price of oil reduces the marginal product of labor, causing the labor demand curve to shift to the left from ND^1 to ND^2 in Figure 9.24. Since households' expected future incomes decline, labor supply increases, shifting the labor supply curve from NS^1 to NS^2 (but by assumption, the shift to the left in labor demand is larger than the shift to the right in labor supply). At equilibrium, there is a reduced real wage and lower employment. The productivity shock results in a shift to the left of the full-employment line from FE^1 to FE^2 in Figure 9.25, as both employment and productivity decline. Because the shock is permanent, it reduces future output and reduces the future marginal product of capital, both of which result in a downward shift of the IS curve. The new equilibrium is located at the intersection of the new IS curve and the new FE line. If, as shown in the figure, this intersection lies above and to the left of the original LM curve, the price level will increase and shift the LM curve upward (from LM^1 to LM^2) to pass through the new equilibrium point. The result is an increase in the price level, but an ambiguous effect on the real interest rate. Since output is lower, consumption is lower. Since the effect on the real interest rate is ambiguous, the effect on saving and investment are ambiguous as well, though the fall in the future marginal product of capital would tend to reduce investment.

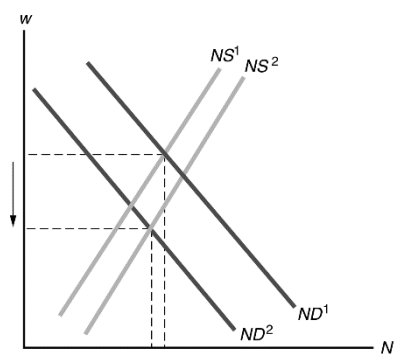


Figure 9.24

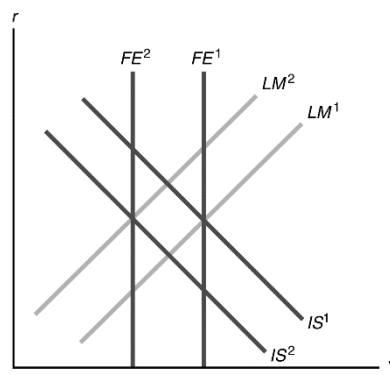


Figure 9.25

The result is different from that of a temporary supply shock; when the shock is temporary there is no impact on future output or the marginal product of capital, so the IS curve does not shift. In that case the price level increases to shift the LM curve up and to the left from LM^1 to LM^2 in Figure 9.26 to restore equilibrium. In that case, the real interest rate unambiguously increases. Under a permanent shock, the IS curve shifts down and to the left, so the rise in the real interest rate is less than in the case of a temporary shock, and the real interest rate can even decline.

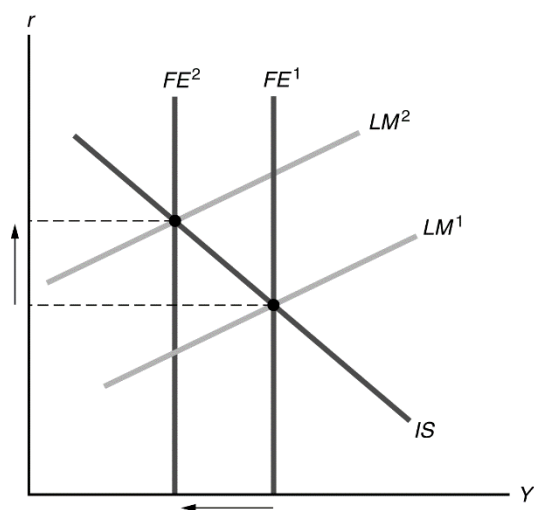


Figure 9.26