

Eastern Mediterranean University
Department of Economics
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Intermediate Macroeconomics
ECON202

Solutions to Questions and Problems

Chapter 7

Questions

3. (a) Shifts *LM* curve to the right; therefore *AD* shifts to the right.
 (b) Shifts *IS* curve to the right; therefore *AD* shifts to the right.
 (c) Shifts horizontal intercept of the *IS* curve to the left and makes *IS* steeper; therefore, *AD* curve shifts to the left and becomes steeper.
 (d) Shifts vertical intercept of the *IS* curve down and makes *IS* curve flatter; effect on horizontal intercept is ambiguous. Nevertheless, the *AD* curve shifts to the *right* and becomes flatter. For the *AD* curve, it can be shown that $\Delta Y/\Delta c > 0$ if $Y > T_c + tY$.
 (e) Makes *IS* pivot upward about its horizontal intercept, kA'_p , because the vertical intercept, A'_p/b , becomes larger as b becomes smaller. Therefore, *AD* shifts to the right and becomes steeper.
 (f) Leaves the original *IS* curve unchanged (absent a real balance effect), but shifts the *LM* curve to the left by decreasing the real money supply. Because the nominal money supply has not changed, however, this causes a movement along the original *AD* curve, rather than a shift in it.
 (g) Makes the *IS* curve shift to the right; therefore, *AD* curve shifts to the right.
 (h) Makes net exports increase thus shifting the *IS* curve to the right; therefore, *AD* curve shifts to the right.
6. (a) Increases.
 (b) No change.
 (c) Decreases.
 (d) Increases.
 (e) No change.
 (f) Increases.

Problems

1. (a) The equation of the *IS* curve is $Y = kA_p$. Therefore the equation of the *IS* curve is $Y = 2.5(5,200 - 200r) = 13,000 - 500r$. Since the price level is 1.0, the real money supply equals $1,800/1.0$. Therefore the equation for the *LM* curve is $Y = 5(1,800) + 500r = 9,000 + 500r$. To compute the equilibrium interest rate, set the equation for the *IS* curve equal to the equation for the *LM* curve to get $13,000 - 500r = 9,000 + 500r$. Adding $500r$ to and subtracting $9,000$ from both sides yields $1,000r = 4,000$. Dividing both sides by $1,000$ yields the equilibrium interest rate, $r = 4$. To compute equilibrium real output, substitute the equilibrium interest rate into the equations for the *IS* and *LM* curves to get $Y = 13,000 - 500(4) = 9,000 + 500(4) = 11,000$.
- (b) When the price level is 0.8, the real money supply equals 2,250. Therefore the equation for the *LM* curve is $Y = 5(2,250) + 500r = 11,250 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 12,125 and the equilibrium interest rate equals 1.75 percent. When the price level is 1.2, the real money supply equals 1,500. Therefore the equation for the *LM* curve is $Y = 5(1,500) + 500r = 7,500 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 10,250 and the equilibrium interest rate equals 5.5 percent. When the price level is 2.0, the real money supply equals 900. Therefore the equation for the *LM* curve is $Y = 5(900) + 500r = 4,500 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 8,750 and the equilibrium interest rate equals 8.5 percent.
- The points on the aggregate demand curve are: (12,125, 0.8); (11,000, 1.0); (10,250, 1.2); and (8,750, 2.0).

- (c) Long-run equilibrium requires the nominal wage rate and the price level at which aggregate demand and short-run aggregate supply are equal be such that the real wage rate equal the equilibrium real wage rate in the labor market. Therefore the long-run aggregate supply curve is vertical at natural real output, which in this problem equals 11,000. Therefore the long-run equilibrium real output is 11,000, the long-run equilibrium price level is 1.0, and the long-run equilibrium interest rate is 4 percent.
- (d) The equation of the new IS curve is $Y = 2.5(5,800 - 200r) = 14,500 - 500r$. Setting the equation for the new IS curve equal to the equations for the LM curves and solving for r and Y yields that: at a price level of 0.8, the equilibrium real output equals 12,875 and the equilibrium interest rate equals 3.25 percent; at a price level of 1.0, the equilibrium real output equals 11,750 and the equilibrium interest rate equals 5.5 percent; at a price level of 1.2, the equilibrium real output equals 11,000 and the equilibrium interest rate equals 7.0 percent; at a price level of 2.0, the equilibrium real output equals 9,500 and the equilibrium interest rate equals 10.0 percent. The points on the new aggregate demand curve are: (12,875, 0.8); (11,750, 1.0); (11,000, 1.2); and (9,500, 2.0).
- (e) Since aggregate demand exceeds aggregate supply at a price level of 1.0, the price level increases. Firms increase real output as the price level rises, which is a movement up the SAS curve. The rise in the price level also reduces the real money supply which results in a movement up the new AD curve. The price level continues to rise until aggregate demand and short-run aggregate supply are equal. The real wage rate falls as the price level rises, given the nominal wage rate.
- (f) The decline in the real wage rate drives it below the equilibrium real wage rate. That causes the nominal wage rate to rise as workers and firms negotiate new contracts. The rise in the nominal wage shifts the SAS curve left, resulting in a further rise in the price level and a drop in real output. The nominal wage rate and the price level continue to rise, while real output continues to fall until the real wage rate equals the equilibrium real wage rate, which occurs when the new AD curve, an SAS curve, and the LAS all intersect at natural real output, which in this problem equals 11,000. The new long-run equilibrium price level is 1.2 and the new long-run equilibrium interest rate is 7 percent.
2. (a) The equation of the IS curve is $Y = kA_p$. Therefore the equation of the IS curve is $Y = 2(6,400 - 250r) = 12,800 - 500r$. Since the price level is 0.8, the real money supply equals $2,400/0.8 = 3,000$. Therefore the equation for the LM curve is $Y = 4(3,000) + 500r = 12,000 + 500r$. To compute the equilibrium interest rate, set the equation for the IS curve equal to the equation for the LM curve to get $12,800 - 500r = 12,000 + 500r$. Adding $500r$ to and subtracting 12,000 from both sides yields $1,000r = 800$. Dividing both sides by 1,000 yields the equilibrium interest rate, $r = 0.8$. To compute equilibrium real output, substitute the equilibrium interest rate into the equations for the IS and LM curves to get $Y = 12,800 - 500(0.8) = 12,000 + 500(0.8) = 12,400$. When the price level is 1.0, the real money supply equals 2,400. Therefore the equation for the LM curve is $Y = 4(2,400) + 500r = 9,600 + 500r$. Setting the IS and LM curves equal to each other and solving for r and Y yields that the equilibrium real output equals 11,200 and the equilibrium interest rate equals 3.2 percent. When the price level is 1.2, the real money supply equals 2,000. Therefore the equation for the LM curve is $Y = 4(2,000) + 500r = 8,000 + 500r$. Setting the IS and LM curves equal to each other and solving for r and Y yields that the equilibrium real output equals 10,400 and the equilibrium interest rate equals 4.8 percent. When the price level is 2.0, the real money supply equals 1,200. Therefore the equation for the LM curve is $Y = 4(1,200) + 500r = 4,800 + 500r$. Setting the IS and LM curves equal to each other and solving for r and Y yields that the equilibrium real output equals 8,800 and the equilibrium interest rate equals 8.0 percent. The points on the aggregate demand curve are: (12,400, 0.8); (11,200, 1.0); (10,400, 1.2); and (8,800, 2.0).
- (b) Since the real wage rate equals the equilibrium real wage rate where the long-run and short-run aggregate supply curve intersect at natural real output, we have that $10,400 = 10,400 - 25W + 1,000P$ at the equilibrium real wage rate. Subtracting 10,400 from and adding $25W$ to both sides of the equation yields $25W = 1,000P$ at the equilibrium real wage rate. Dividing both sides of the equation by 25 and the price level yields that the equilibrium real wage rate, W/P , equals 40.
- (c) When the nominal wage rate equals 48, the equation for the SAS curve is $Y = 10,400 - 25(48) + 1,000P = 10,400 - 1,200 + 1,000P = 9,200 + 1,000P$. Therefore at price levels of 0.8, 1.0, 1.2, and 2.0, business firms are willing to produce real output equal to 10,000, 10,200, 10,400, and 11,200, respectively. The points on the SAS curve, given $W = 48$, are: (10,000, 0.8); (10,200, 1.0); (10,400, 1.2); and (11,200, 2.0).

- (d) Aggregate demand and short-run aggregate supply are equal at a price level of 1.2. Therefore equilibrium real output equals 10,400 and the equilibrium interest rate is 4.8 percent.
- (e) At a price level of 0.8, the new real money supply equals $2,000/0.8 = 2,500$. Therefore the equation for the *LM* curve is $Y = 4(2,500) + 500r = 10,000 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 11,400 and the equilibrium interest rate equals 2.8 percent. When the price level is 1.0, the real money supply equals 2,000. Therefore the equation for the *LM* curve is $Y = 4(2,000) + 500r = 8,000 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 10,400 and the equilibrium interest rate equals 4.8 percent. When the price level is 1.2, the real money supply equals 1,666.67. Therefore the equation for the *LM* curve is $Y = 4(1,666.67) + 500r = 6,666.67 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 9,333.33 and the equilibrium interest rate equals 6.13 percent. When the price level is 2.0, the real money supply equals 1,000. Therefore the equation for the *LM* curve is $Y = 4(1,000) + 500r = 4,000 + 500r$. Setting the *IS* and *LM* curves equal to each other and solving for r and Y yields that the equilibrium real output equals 8,400 and the equilibrium interest rate equals 8.8 percent. The points on the new aggregate demand curve are: (11,400, 0.8); (10,400, 1.0); (9,733.33, 1.2); and (8,400, 2.0).
- (f) The new aggregate demand curve intersects the short-run aggregate supply curve, given $W = 48$, at a price level of 1.0413. Equilibrium real output equals 10,241.3 at that price level.
- (g) The new aggregate demand curve intersects the vertical long run aggregate supply curve when actual real output equals natural real output, which is 10,400 in this problem. The new long-run equilibrium price level is 1.0 and the new long-run equilibrium interest rate is still 4.8. There is no change in the interest rate in the long run because the price level declines in the same proportion as the nominal money supply leaving the real money supply unchanged at 2,000. The economy adjusts from the short-run equilibrium of part f as the nominal wage rate declines. The nominal wage rate declines because the short-run fall in the price level from 1.2 to 1.0413 drives the real wage rate above the equilibrium real wage rate. Therefore, the workers and firms negotiate new contracts that result in lower nominal wage rates. The *SAS* curve shifts right as the nominal wage rate declines, resulting in a further drop in the price level, but a rise in real output. The nominal wage rate and the price level continue to decline, and real output continues to increase until the economy reaches its long-run equilibrium at a price level of 1.0 and real output equal to 10,400. In long-run equilibrium, the real wage rate equals the equilibrium real wage rate, which in this problem equals 40. Since the new long-run equilibrium price level equals 1.0, the nominal wage rate at the new long-run equilibrium equals 40 as well.