

Suggested Solutions to Problem Set 5

Question 1

For the period analyzed, of all quarterly changes in the civilian unemployment rate by at least 0.2 percentage points, about 80 were followed by changes of similar magnitude in the same direction; about 30 were followed by changes of similar magnitude in the opposite direction; and about 20 were followed by no changes of similar magnitude. We conclude that the unemployment rate is a persistent variable.

Question 2

The IS curve is found by setting desired saving equal to desired investment.

Desired saving is $S^d = Y - C^d - G = Y - [1275 + 0.5(Y - T) - 200r] - G$.

Setting $S^d = I^d$ gives $Y - [1275 + 0.5(Y - T) - 200r] - G = 900 - 200r$, or
 $Y = 4350 - 800r + 2G - T$.

The LM curve is $M/P = L = 0.5Y - 200i = 0.5Y - 200(r + \pi) = 0.5Y - 200r$.

(a) For this question, $T = G = 450$, $M = 9000$.

The IS curve gives

$$Y = 4350 - 800r + 2G - T = 4350 - 800r + (2 \times 450) - 450 = 4800 - 800r.$$

The LM curve gives $9000/P = 0.5Y - 200r$.

To find the aggregate demand curve, eliminate r in the two equations by multiplying the LM curve through by 4 and rearrange the resulting equation and the IS curve.

LM : $9000/P = 0.5Y - 200r$. Multiplying by 4 gives $36000/P = 2Y - 800r$. Rearranging gives $800r = 2Y - 36000/P$.

IS : $Y = 4800 - 800r$. Rearranging gives $800r = 4800 - Y$.

Setting the right-hand sides of these two equations to each other (since both equal $800r$) gives: $2Y - (36000/P) = 4800 - Y$, or $3Y = 4800 + (36000/P)$, or $Y = 1600 + (12000/P)$; this is the AD curve.

With $Y = 4600$ at full employment, the AD curve gives $4600 = 1600 + (12000/P)$, or $P = 4$.

From the IS curve, $Y = 4800 - 800r$, so $4600 = 4800 - 800r$, or $800r = 200$, so $r = 0.25$.

Consumption is

$$C = 1275 + 0.5(Y - T) - 200r = 1275 + 0.5(4600 - 450) - (200 \times 0.25) = 3300.$$

Investment is $I = 900 - 200r = 900 - (200 \times 0.25) = 850$.

(b) Following the same steps as above, with $M = 4500$ instead of 9000, gives the aggregate

demand curve

$AD : Y = 1600 + (6000/P)$. With $Y = 4600$, this gives $P = 2$. Nothing has changed in the IS equation, so it still gives $r = 0.25$. And nothing has changed in either the consumption or investment equations, so we still get $C = 3300$ and $I = 850$. Money is neutral here, as no real variables are affected and the price level changes in proportion to the money supply.

(c) For this question, $T = G = 330$, $M = 9000$.

The IS curve is

$$Y = 4350 - 800r + 2G - T = 4350 - 800r + (2 \times 330) - 330 = 4680 - 800r.$$

$$LM : 36000/P = 2Y - 800r, \text{ or } 800r = 2Y - 36000/P.$$

$$IS : Y = 4680 - 800r, \text{ or } 800r = 4680 - Y.$$

$$AD : 2Y - (36000/P) = 4680 - Y, \text{ or } (36000/P) + 4680 = 3Y, \text{ or } Y = 1560 + (12000/P).$$

With $Y = 4600$ at full employment, the AD curve gives $4600 = 1560 + (12000/P)$, or $P = 3.95$.

From the IS curve, $Y = 4680 - 800r$, so $4600 = 4680 - 800r$, or $800r = 80$, so $r = 0.10$.

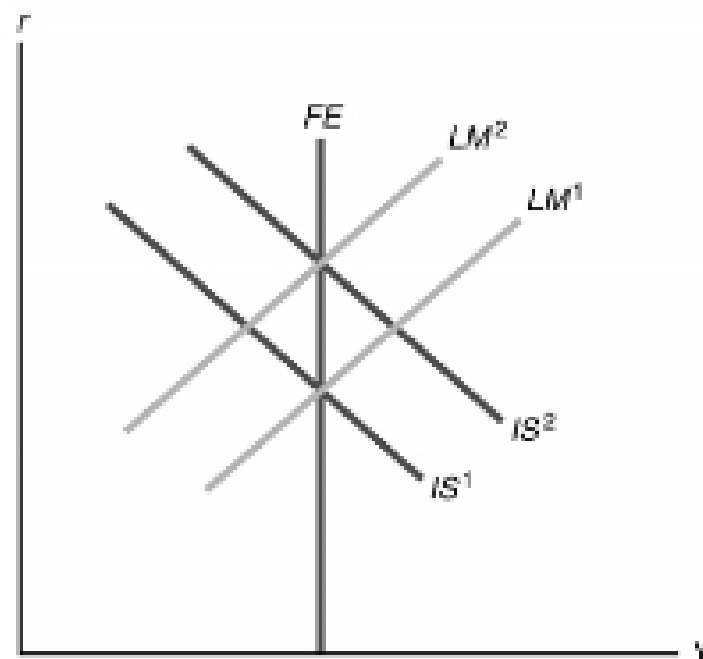
Consumption is

$$C = 1275 + 0.5(Y - T) - 200r = 1275 + 0.5(4600 - 330) - (200 \times 0.10) = 3390.$$

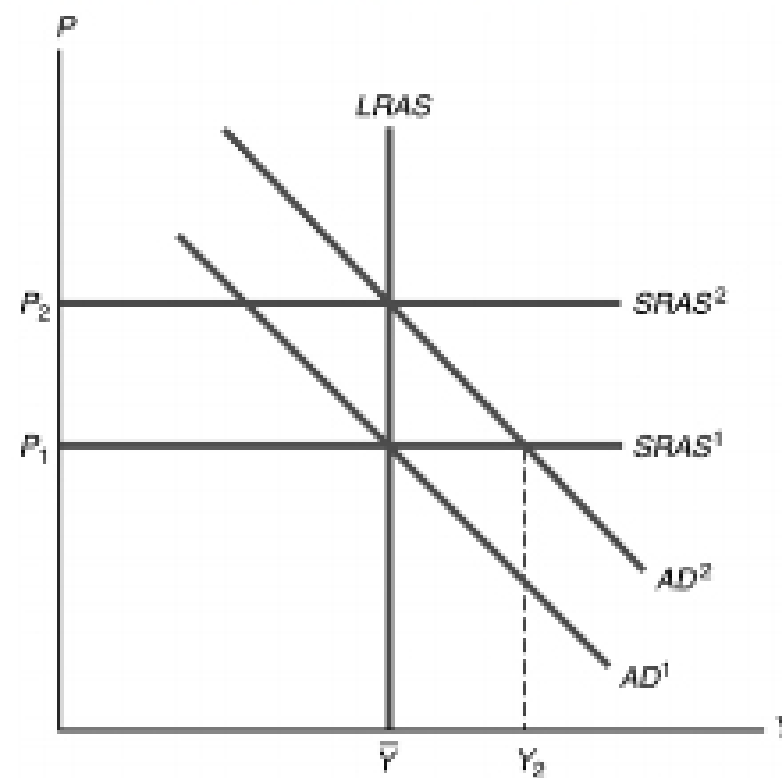
$$\text{Investment is } I = 900 - 200r = 900 - (200 \times 0.10) = 880.$$

Question 3

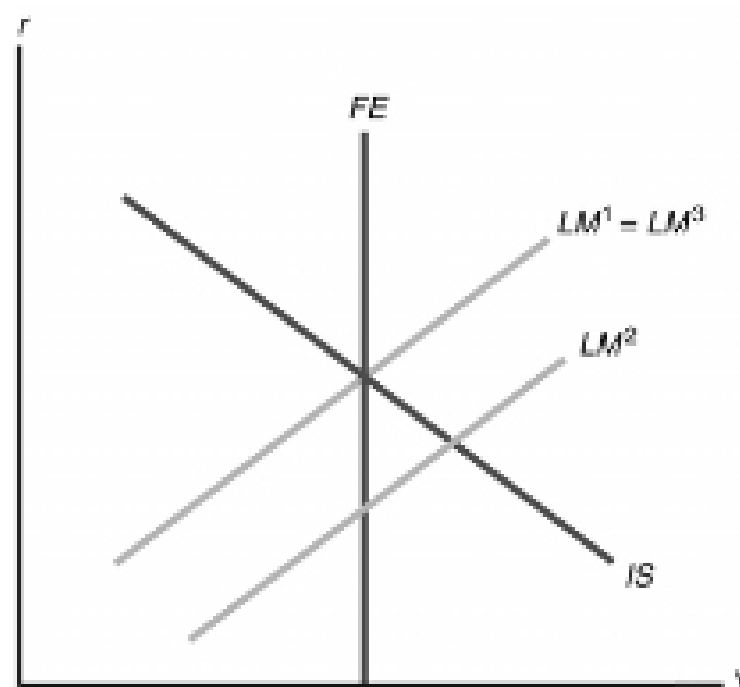
(a) The increase in desired investment shifts the IS curve up and to the right, as shown below. The price level rises, shifting the LM curve up and to the left to restore equilibrium. Since the real interest rate rises, consumption declines. In summary, there is no change in the real wage, employment,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



In the AD-AS framework, the increase in desired investment shifts the AD curve up and to the right, from AD^1 to AD^2 . Prices adjust, and the SRAS curve shifts from $SRAS^1$ to $SRAS^2$. The conclusions are the same as in the IS-LM framework.



(b) The rise in expected inflation shifts the LM curve down and to the right, as shown below. 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.



In the AD-AS framework, the rise in expected inflation shifts the AD curve up and to the right, from AD^1 to AD^2 . Prices adjust, shifting the SRAS curve from $SRAS^1$ to $SRAS^2$. The conclusions are the same as in the IS-LM framework.