

Answers to be Used as an Informal Guide by TAs

1. Multiple Choice:

- (a) (C)
- (b) (B)
- (c) (E)
- (d) (B)
- (e) (B)

The equations of our basic model are:

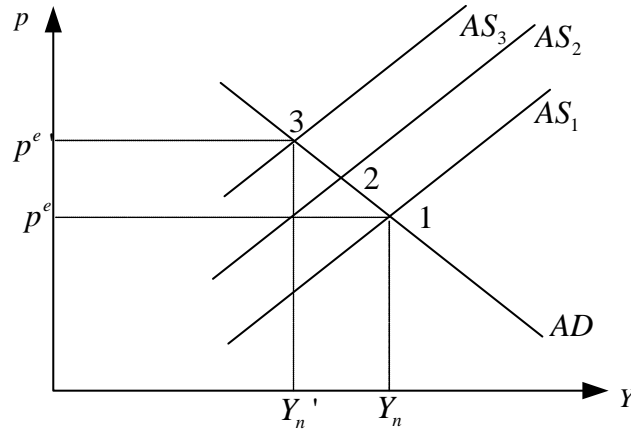
$$\begin{aligned}C^d &= c_0 + c_1(Y - T) \\G^d &= \bar{G} \\T &= \bar{T} \\I^d &= \bar{I} - b \times i \\M^d &= P \times L(i, Y) \\W &= P^e F(u, z), \quad u = 1 - \frac{N}{L} \\P &= (1 + \mu)W,\end{aligned}$$

where  $N$  denotes employment and  $L$  is the labor force. In a ‘short run’ equilibrium, goods and financial markets are in equilibrium, and the equations characterizing price and wage determination are satisfied. A ‘medium run’ equilibrium is a short run equilibrium where, in addition,  $P^e = P$ .

2. Suppose that for some reason the labor force participation rate falls, so that  $L$  is reduced.

- (a) Since  $L$  does not enter into the pricing equation or the wage setting equation, nothing happens to the natural rate of unemployment. However, the natural rate of output is lower because the given natural rate of unemployment implies a lower level of employment,  $N$ , in the medium run by the relation,  $u = 1 - N/L$ . By the production function, this implies a lower natural rate of output. Denote the old natural rate of output by  $Y_n$  and the new one by  $Y'_n$ . Let  $L'$  denote the new labor force. We know that  $Y_n/L = Y'_n/L'$ .
- (b) The location of the AD curve is unaffected because  $L$  (the labor force) does not enter into the goods market or the financial market. The AS curve shifts to the left, by  $Y_n - Y'_n$ . The reason for this is that for a given  $P^e$ , the price level implied by the AS curve when output is at its natural rate is  $P^e$ . When the new AS curve is drawn, it is important that it shift to the left, and that it intersect a horizontal line drawn through the old medium run equilibrium at  $Y'_n$ . It is important that it be explained that the AD curve does not

shift because  $L$  does not appear in it.



- (c) The point labelled '1' is the intersection of the AD curve and the old AS curve. The point labelled '2' is the intersection of the AD curve and the new AS curve. The point labelled '3' is the intersection of the AD curve and a vertical line drawn above  $Y_n'$ . The expected price level in the old medium run equilibrium is the old medium run price level. The expected price level in the new medium run equilibrium is the actual price level at point 3.
- (d) Note that the short run equilibrium occurs at a level of output higher than the new natural rate,  $Y_n'$ . As a result, in the short run equilibrium, the unemployment rate is below the natural rate. In the new medium run equilibrium, the unemployment rate is back down to its natural rate.
- (e) In the new and old medium run equilibria output per person in the labor force are the same because the unemployment rates are the same, and because  $Y = N$ . But, output in the short run equilibrium is higher than what it is in the new medium run equilibrium, so that  $Y/L' > Y_n/L$ . That is, output per person in the labor force goes up in the short run, and then drops back down to where it started before.
- (f) From the point of view of the goods market, nothing shifts the IS curve. All that happens is that the price level rises, first to the short run equilibrium, and then some more to the medium run equilibrium. So, from the point of view of the IS-LM diagram, what happens is that the LM curve shifts left along a stationary IS curve. We conclude from this that the interest rate rises, first to the short run equilibrium and then some more to the medium run equilibrium.
3. (a) The AD curve shifts left by the magnitude of the multiplier in the IS-LM model. This is because the AD curve summarizes the  $P, Y$  combinations that clear the goods and financial markets. If we ask how much the level of output that is equilibrium in these markets falls, holding  $P$  fixed, then we are asking what the multiplier is in the IS-LM model. The AS curve does not shift because  $\bar{G}$  does not appear in it.
- (b) The old equilibrium is the intersection between the original curves. The short run equilibrium is the intersection between the new AD and the old AS curve, because  $P^e$  is fixed in the short run and nothing has happened to shift AS. The new medium run equilibrium is the intersection of a line drawn above the natural rate of output and the new AD curve. The new AS curve should be drawn through that intersection.

- (c) The IS curve shifts left by the magnitude of the Keynesian Cross multiplier. This is because this magnitude is the drop in output that is consistent with equilibrium in the goods market, under the assumption that the interest rate does not change. This drop is just the Keynesian Cross multiplier.
- (d) In the new medium run equilibrium, the level of output is the same as it was in the old medium run equilibrium,  $Y_n$ . The level of consumption is also the same, because there has been no change in the determinants of consumption. Since  $Y_n = C + I + G$ , it follows that investment jumps by  $\Delta\bar{G}$ . The interest rate must fall by the amount required to induce this rise in investment. That is, it must fall by  $\Delta\bar{G}/b$ . In the short run, the interest rate falls by less than  $\Delta\bar{G}/b$ . So, investment rises then, but by less than the amount that it rises by in the new medium run equilibrium.
- (e) The cut in government spending leads to a pickup in unintended inventories. This produces a fall in output which results in a rise in unemployment. The bargaining power of workers is hurt by this and their wages fall. The resulting fall in costs produces a fall in the price level. The fall in the price level causes
4. (a) The AS curve shifts up. The intersection of the AS curve with a vertical line drawn above  $Y_n$  indicates the value of  $P^{e'}$ . This reflects a basic property of the AS curve. There is no impact on the AD curve. The point, 1, is the intersection of the old AS and AD curves. The point, 2, is the intersection of the AD curve and the AS curve with expected price,  $P^{e'}$ . The point, 3, is the intersection of the AD curve with the vertical line above  $Y_n$ . The AS curve in the new medium run goes through this point, and so the new medium run expected price is  $P^e$ .
- (b) The rise in the expected price level leads to an increase in wages. The resulting upward pressure on costs drives up the price level. The higher price level leads to a higher demand for money, which produces a rise in the interest rate. The higher interest rate produces a fall in output. So, in the short run, you end up with a higher interest rate, lower output and a higher price level. Although the price level in the short run is higher, it is still lower than  $P^{e'}$  (see the answer to (a)). As a result, the expected price level falls. This produces a fall in the actual price level through the wage bargaining and price-setting process. The fall in the actual price level results in a fall in the interest rate, which stimulates output. This process continues until the expected price level ends up back where it started in the old medium run equilibrium.
- (c) xx
1. The monetary authority increases the money supply, with the consequence that the AD curve shifts up enough to guarantee that the new short run equilibrium occurs at the old medium run level of output.
  2.  $M/P$  is constant, and the jump in  $P$  coincides with the magnitude of the jump in  $P^e$ .
  3. Yes, the rise in the expected price level is justified by the actual jump in the price level that occurs.