

## 14.02 Solutions Quiz II Spring 03

### Multiple Choice Questions (30/100):

Please circle the correct answer for each of the multiple-choice questions. In each question, only one of the answers is correct. Each question counts 3 points.

1. The natural rate of unemployment depends on all of the following **except**:
  - a) The level of unemployment insurance
  - b) The mark-up
  - c) The bargaining power of workers with firms
  - d) Money supply**
2. In the AS-AD model, a deficit reduction without monetary accommodation leads to all of the following **except**:
  - a) A change in the composition of output
  - b) A reduction in the natural rate of unemployment**
  - c) A reduction in the price level in the short run
  - d) A reduction in the price level in the medium run
3. In the AS-AD model, a supply shock such as an increase in the price of oil leads to all of the following **except**:
  - a) A decrease of output in the short run
  - b) An adjustment of expectations to a lower level of prices in the medium run**
  - c) An increase of the interest rate in the short run
  - d) An increase of the interest rate in the medium run
4. The aggregate supply equation is a relation that comes out of the price-setting behavior of firms and
  - a) the wage-setting outcome of firms and workers**
  - b) the Phillips curve
  - c) Okun's law
  - d) the supply of products to the foreign markets
5. Fiscal policy has no effect on the level of output in the medium run unless
  - a) it affects aggregate demand
  - b) it changes the price-expectations of the agents in the economy
  - c) it changes the way firms and workers bargain over the wage**
  - d) it changes government spending together with taxes.
6. The "original" Phillips curve is a relation that captures a trade-off between
  - a) inflation and unemployment**
  - b) accelerating inflation and unemployment
  - c) inflation and price levels
  - d) output and accelerating unemployment
  - e) output and price levels

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7. The “original” Phillips curve can be obtained from
- a) **the aggregate supply equation and inflation expectations set to zero**
  - b) the aggregate demand equation and inflation expectations set equal to previous period inflation
  - c) the aggregate supply equation and inflation expectations set equal to previous period inflation
  - d) the aggregate demand equation and inflation expectations set to zero
8. The modified Phillips curve tell us that the **only way** to reduce inflation is through
- a) **unemployment rates higher than the natural rate**
  - b) expansionary fiscal policy
  - c) unemployment rates lower than the natural rate
  - d) contractionary fiscal policy
9. Stock prices increase if:
- a) Money supply increases, and this increase was anticipated a long time ago
  - b) The nominal interest rate increases unexpectedly
  - c) **It becomes known that profits two years from now will be higher than expected**
  - d) The economy enters a recession
10. Holding money supply fixed, the impact of an unexpected increase in government spending on the stock market is
- a) An increase in stock prices, as output increases unexpectedly in the short run
  - b) A drop in stock prices, as interest rates increase unexpectedly in the short run
  - c) **Ambiguous, as both the interest rate and output increases unexpectedly in the short run**
  - d) No effect, as output is unaffected in the medium run

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### Long Question I (40/100):

A new source of energy has been discovered in Macronesia. This new technology will reduce the costs of production of macronesian firms, and as a consequence will reduce the mark-up of price over wage charged by firms. (The change in the mark-up is the only way in which the new technology affects the economy.)

As the finance minister of Macronesia, you would like to analyze the impact of this shock on the economy.

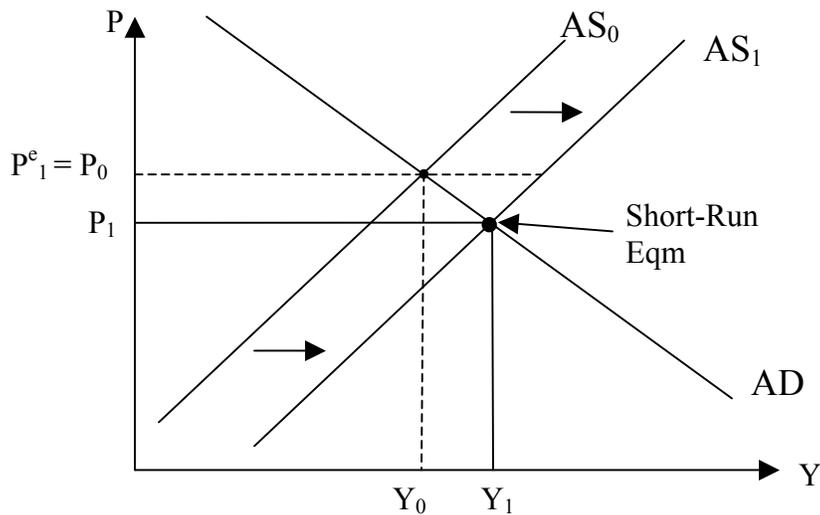
Answer the following questions a) – h), which count 5 points each.

- a) In the AS-AD set up, the reduction in production costs shifts which curve, the AS or the AD? How? Explain in words.

*Answer: It affects the AS only. For any output level, now the AS curve will relate to a lower price level (AS shifts down in the Y-P diagram).*

- b) What happens in the short-run? Show in a graph and describe the effect on the price and the level of output.

*Answer:*



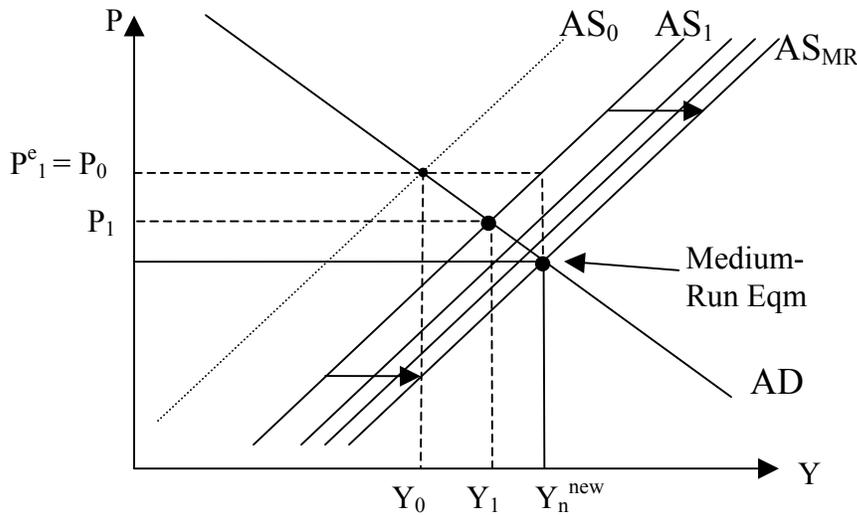
- c) What happens in the medium run?

*Answer: Prices decrease even further and output reaches a new higher natural level.*

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d) Describe the adjustment towards the medium-run. Show in the graph.

*Answer:*



e) Compare the composition of spending (consumption, investment, and government expending) in the medium run with the initial pre-shock situation.

*Answer: Recall*

$$Y = C(Y - T) + I(i, Y) + G$$

*In the new equilibrium, G and T haven't changed. Y is higher, so C has also to be higher. Now we need to see what happens to investment. In the IS-LM diagram, P is decreasing throughout the analysis, so M/P is increasing. The LM is then moving continuously to the right. This in turn implies that the interest rate is going down. In the medium run we are in equilibrium with a lower price level and a lower interest rate. So, as interest rates went down and output went up; investment went unambiguously up.*

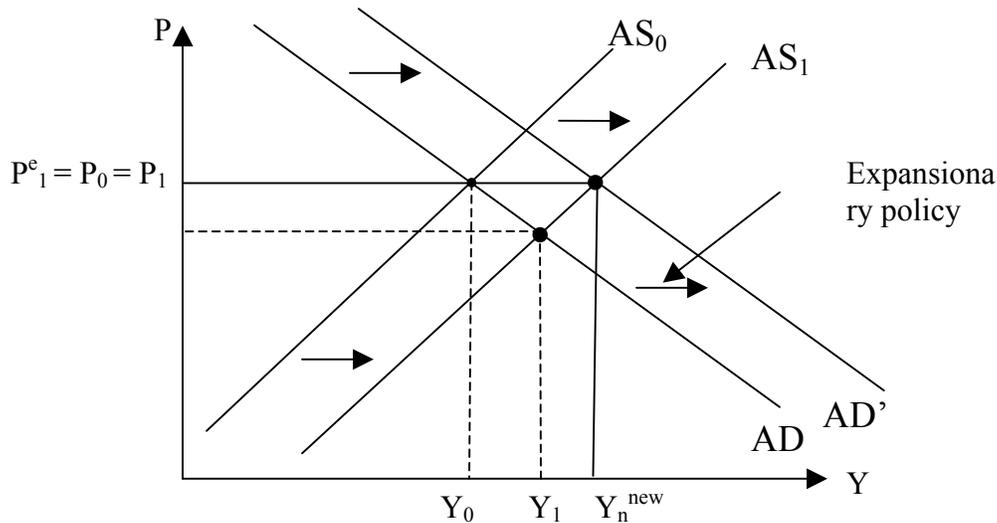
*So, in the medium run equilibrium, C is higher, I is higher and G is the same. The interest rate is lower.*

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Suppose now that after the initial discovery, you as finance minister would like to accelerate the transition to the medium run by using fiscal or monetary policies.

- f) What kind of policies would you follow? Can you stabilize the economy to its new medium run equilibrium level of output and keep prices constant? Show in a graph and explain.

*Answer: You would like to expand demand - this could be done with expansionary monetary policy (increasing  $M$ ) or expansionary fiscal policy (increasing  $G$  or reducing  $T$ ).*



- g) Suppose that you achieved the objective in part (f) by changing government expending. What can you say about the new composition of spending (consumption, investment and government expending) and the interest rate?

*Answer: Recall  $Y = C(Y-T) + I(i, Y) + G$*

**Comparison with pre-shock equilibrium**

*Output is higher in the medium-run. Given that  $T$  is constant, consumption  $C$  is higher. Now in the IS-LM diagram, prices do not move (they are kept constant by the expansionary policy), and given that  $M$  is constant, the LM does not move. However,  $G$  increased, so IS moves to the right. In equilibrium the interest rate is now higher than the pre-shock equilibrium. The effect in investment  $I$  is ambiguous.*

- h) Compare the composition of spending ( $Y, C, I, G$ ) and the interest rate in parts (c) and (g).

*Answer: Output in the medium run is the same. Consumption is the same.  $G$  is obviously higher in part f than in part d. Investment ( $I$ ) is lower in part f than in part d. The interest rate in part f is higher than in part d.*

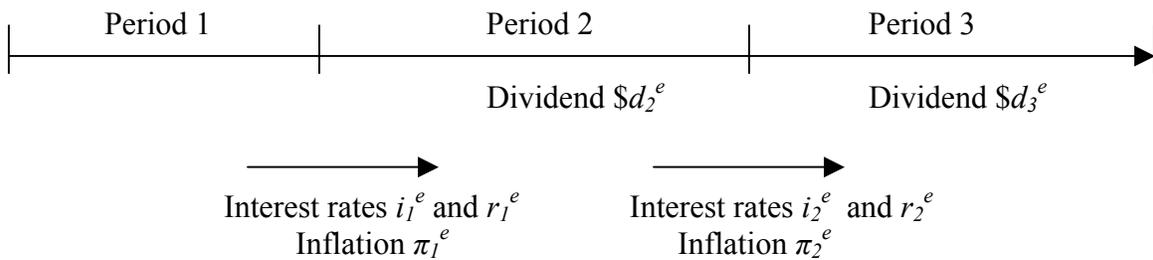
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### Long Question 2 (30/100):

This question is about the determination of stock prices. Imagine that we live in a world with only 3 periods,  $t=1$ ,  $t=2$ , and  $t=3$ . Use the following notation:

- The expected nominal interest rate between period  $t$  and  $t+1$  is denoted  $i_t^e$
- The expected real interest rate between period  $t$  and  $t+1$  is denoted  $r_t^e$
- Expected inflation between period  $t$  and  $t+1$  is denoted  $\pi_t^e$
- The expected nominal dividend in period  $t$  is denoted  $\$d_t^e$

The timing is the following:



Assume that the stock price equals the expected present discounted value of dividends.

Answer the following questions, which count 5 points each:

- a) What is the relationship between  $1+i_t^e$ ,  $1+r_t^e$ , and  $1+\pi_t^e$ ?

*Answer:*  $(1+i_t^e) = (1+r_t^e)(1+\pi_t^e)$

*Students using the approximation  $i_t^e = r_t^e + \pi_t^e$  lost 1 point.*

- b) Write down the nominal expected present value (in period 1) of a stock that pays an expected dividend of \$1 in each period 2 and 3; and denote it  $\$Q$ . (Hint:  $\$Q$  is a function of  $\$d_2^e$ ,  $\$d_3^e$ ,  $i_1^e$ ,  $i_2^e$ )

*Answer: The nominal expected present discounted value is:*

$$\$Q = \$1 / (1 + i_1^e) + \$1 / [(1 + i_1^e) (1 + i_2^e)]$$

- c) Using your answers from parts a) and b), what is the impact on the dollar value  $\$Q$  of an increase in expected inflation from period 1 to 2, assuming that the real interest rate does not change and that the nominal value of expected dividends do not change? Explain in words.

*Answer: Using a) and b) we get:*

$$\$Q = \$1 + \$1 / [(1 + r_1^e)(1 + \pi_1^e)] + \$1 / [(1 + r_1^e)(1 + \pi_1^e)(1 + r_2^e)(1 + \pi_2^e)]$$

*As it is assumed that the dividend is fix in nominal terms, and the real interest rate is fix, this implies that an increase in expected inflation lowers the nominal stock price.*

*The explanation is that inflation makes a given nominal value worth less in the future,*

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*i.e. prices are expected to be higher in the future, so that the dividend of \$1 buys less. This makes stock prices fall today. The explanation was worth 2 points.*

- d) Assume that the real interest rate is fixed, and that the dividend in period 2 and 3 are fixed in **real** terms. What is the impact on the **real** value of the discounted stream of dividends of an increase in expected inflation from period 1 to 2?

*Answer: The real value does not change, as it is unaffected by the increase in expected inflation. The real stock price is:*

$$Q = d + d / (1 + r_1^e) + d / [(1 + r_1^e) (1 + r_2^e)]$$

*where  $d$  denotes the real dividend (dollar dividend divided by the price deflator), and  $Q$  denotes the real stock price.*

- e) Assume that there is an unexpected increase in money supply in period 1. What is the short run impact of this policy on  $i_1^e$ ,  $r_1^e$  and  $\pi_1^e$ ?

*Answer:  $i_1^e$ ,  $r_1^e$  fall (2 points each),  $\pi_1^e$  is fixed in the short run (1 point). This can be seen in a standard IS-LM diagram.*

- f) Finally, the central bank president wants to change the stock price. Using your answer from part e), and assuming that  $d_2^e$  is an increasing function of output and expected inflation, what is the impact of the unexpected increase in money supply on the present discounted value of dividends?

*Answer: The stock price increases in the short run. In the short run, period 1 nominal interest rate falls, and output increases, both leading to a higher stock price. In the medium run, inflation and also expected inflation increases, again leading to a higher nominal stock price. So the effects are unambiguous.*