

EXAMINATION

September 2005

Subject CT7 — Models Core Technical

EXAMINERS' REPORT

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

M Flaherty
Chairman of the Board of Examiners

15 November 2005

1	B
2	D
3	B
4	B
5	D
6	C
7	A
8	A
9	D
10	A
11	B
12	A
13	D
14	C
15	A
16	C
17	D
18	B
19	B
20	A
21	D
22	B
23	A
24	D
25	A
26	D

- 27** (i) For maximum premium P , solve so that the utility from insuring equals the expected utility from not insuring.

$$E[U(a - X)] = U(a - P)$$

Where P is maximum premium the individual is prepared to pay to insure against a random loss X and a is the initial level of wealth.

$$0.2 (200 + 50 + 10) + 0.8 (200 + 250 + 2) = 200 + 250 - P + \frac{500}{250 - P}$$

$$413.6 = 450 - P + \frac{500}{250 - P}$$

$$- 36.4 + P = \frac{500}{250 - P}$$

$$- 36.4 (250 - P) + P(250 - P) = 500$$

$$- 9100 + 36.4P + 250P - P^2 = 500$$

$$P^2 = 286.4P - 9600$$

$$P^2 - 286.4P + 9600 = 0$$

$$P = [286.4 \pm \sqrt{286.4^2 - 4 * 9600}] / 2$$

$$P = [286.4 \pm 208.87]/2$$

$$P = 247.64 \text{ or } 38.77$$

The maximum premium the agent is willing to pay is therefore £38.77.

- (ii) The minimum insurance Premium Q which the insurer should be prepared to charge for insurance against a risk with a potential loss Y is given by the solution to the equation

$$E[U(a + Q - Y)] = U(a)$$

For minimum premium Q , solve so that the expected utility from taking on the insurance equals the utility from not taking it on.

$$0.2 * (5000 + 0.7 * (1500 - 200 + Q)) + 0.8 * (5000 + 0.7 * (1500 + Q)) \\ = 5000 + 0.7 * 1500$$

$$\rightarrow 1000 + 210 - 28 + 0.14Q + 4000 + 840 + 0.56Q = 6050$$

$$\rightarrow 6022 + 0.7 Q = 6050$$

$$\rightarrow Q = £40.00$$

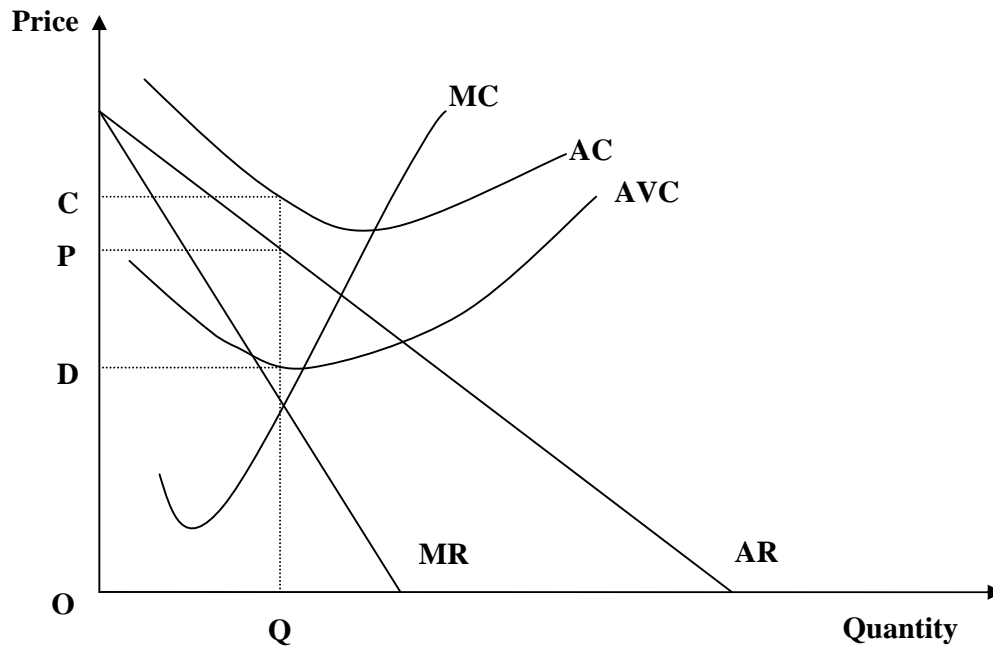
The minimum premium is therefore £40.00.

28	(i)	<i>Output</i>	<i>Average Total Cost</i>	<i>Marginal Cost</i>
		0	—	—
		1	60	10
		2	39	18
		3	35	27
		4	35	35
		5	37	45
		6	44	79

(ii) At 5 units of output. (Beyond this output MC exceeds MR.)

(iii) £65 = 250 – 185

29



- 30 (i) The equilibrium price is:

$$\begin{aligned} 5P &= 500 - 5P \\ 10P &= 500 \\ P &= \text{£}50 \end{aligned}$$

- (ii) 250 units
- (iii) The sales tax affects the supply curve:

$$Q_s = 5P^*$$

$$\text{Where } P^* = P - t = P - 10$$

The price received by the producer after the tax is paid is P^* which is $P - 10$:

$$\begin{aligned} Q_s &= 5(P - 10) \\ Q_s &= 5P - 50 \end{aligned}$$

We need $Q_s = Q_d$ so:

$$-50 + 5P = 500 - 5P$$

$$10P = £550$$

$$P = £55$$

- 31** Consider the pay-offs shown in the table below which result from the high output and low output strategies of the two firms (Firm A and Firm B). The payoff refers to A, B and represents the profit from the strategy of one firm given the strategy of the other firm.

	<i>Firm B High output</i>	<i>Firm B Low output</i>
Firm A High output	15, 15	45, 0
Firm A Low output	0, 45	30, 30

From the table we can see that if Firm A chooses a high output strategy, the optimal strategy for Firm B is high output. If Firm A chooses low output strategy the optimal strategy for Firm B is high output. Hence for Firm B the dominant strategy is high output. Similarly for Firm A the high output strategy dominates regardless of what the other decides to do.

Hence the optimal isolated strategy for each firm is to produce a high output. This leads to profits of 15 for each firm. If, however, there was a cooperation agreement between the two firms to both produce a low output then the profits will be 30 each which is better than the non cooperative outcome. This highlights the potential for collusion in oligopolistic markets.

- 32**
- (a) $£260b + £70b + £85b - £5b = £410b$
 - (b) $£410b - £60b = £350b$
 - (c) $£350b + £5b = £355b$
 - (d) $£350b - £20b = £335b$

- 33** The answers can be calculated using the equation:

$$\text{Money Supply} \times \text{Velocity of Circulation} = \text{Price Index} \times \text{Real Output}$$

- (a) 5
- (b) 15

- (c) 20
- (d) 208

- 34**
- (i) With a contractionary open market operation the Central bank sells Treasury bills in the money market. The result of the operation is that the banks and public holds less cash and more Treasury bills while the Central bank holds more cash and less Treasury bills. Hence the effect of the operation is to reduce the narrow money supply, the increase in the amount of Treasury bills reduces the price of Treasury bills and therefore constitutes a rise in the short term rate of interest.
 - (ii)
 - (a) the reserve requirement
 - (b) the discount rate

- 35**
- (i) The relative version of PPP theory argues that the exchange rate will adjust by the amount of the inflation differential between two economies. Algebraically this is expressed as:

$$\% \Delta S = \% \Delta P - \% \Delta P^*$$

Where $\% \Delta S$ is the percentage change in the exchange rate

$\% \Delta P$ is the domestic inflation rate

$\% \Delta P^*$ is the foreign inflation rate

According to the relative version of PPP, if the inflation rate in the UK is 4 per cent whilst that in the United States is 2 per cent, the pound per dollar exchange rate should be expected to depreciate by approximately 2 per cent from \$1.80/£1 to \$1.764/£1 (1.80×0.98).

- (ii) In principle, real interest rates in different countries could be expected to be the same with nominal rates in each country then reflecting local inflation rates. If the UK nominal interest rate is 11% and the US nominal interest rate is 7% then the pound is expected to depreciate against the dollar by 4% per annum. Hence the spot rate is expected to change from its current rate of \$1.80/£1 to \$1.728/£1 (1.80×0.96).

- 36 (i) (a) The multiplier is:

$$1/1 - (0.7 - 0.2) = 2$$

Therefore, the new equilibrium level of national income will be
 $(50 \times 2) + 100 = \text{£}200\text{m}$.

- (b) Initially:

$$\text{Imports} = \text{Exports} = 0.2 \times 100 = \text{£}20\text{m}$$

Following the increase in government expenditure:

$$\text{Imports} = 0.2 \times 200 = \text{£}40\text{m}$$

$$\text{Exports} = \text{£}20\text{m}$$

Therefore, the current account will move into a deficit of £20m

- (ii) (a) The new equilibrium level of national income will be
 $(50 \times 2) + 100 = \text{£}200\text{m}$.

- (b) Imports = $0.2 \times 200 = \text{£}40\text{m}$
Exports = $20 + 50 = \text{£}70\text{m}$

Therefore, the current account will move into a surplus of £30m.

- 37 The main solution for demand deficient unemployment advocated by Keynesian economists is an expansionary fiscal policy. The expansionary fiscal policy is usually associated with an increase in government expenditure which it is believed will then have a multiplier effect on aggregate demand. The simple multiplier is given by $1/\text{MPS}$ where MPS is the marginal propensity to save (or equivalently $1/1 - \text{MPC}$ where MPC is the marginal propensity to consume out of disposable income). An alternative to increasing government expenditure is cutting the tax rate which should in turn lead to increased demand in the form of higher consumption and investment, although Keynesians regard this as a less effective means of stimulating aggregate demand.

The main criticism of Keynesian expansionary fiscal policies concerns the possible crowding out effects. A fiscal expansion which is financed by borrowing may have the effect of raising national income but the increased bond sales will depress bond prices and raise the real interest rates and the increase in national income raises money demand which for a given money stock requires a higher interest rate to clear the money market. Higher interest rates may reduce private sector expenditure. Other crowding out effects include the tax effect whereby an increase in government expenditure which is financed by taxation will reduce consumer and firms investment expenditure. Also there are expectational effects — an increase in government expenditure financed by borrowing will lead to expectations of future increases in

taxes which will lead to increased saving and reduced investment by firms. Finally, critics point out that Keynesians ignore potential supply side effects, a fiscal expansion may lead to a tightening of the labour market and inflationary effects on the economy which will reduce investment and the demand for labour.

A good answer will expand on the items underlined.

- 38** There are significant differences between the market structures of monopolistic competition and monopoly. With monopolistic competition there are many competing firms whereas with monopoly there is only one firm. Under monopolistic competition each firm sells a differentiated product whereas a monopoly may sell either a single product or a range of differentiated but similar products.

A crucial difference between the two structures is that with monopolistic competition there are no barriers to entry whereas with monopoly there are barriers to entry. The absence of barriers to entry mean that firms in a monopolistic competition industry will only make normal profits in the long run although super normal profits can be made in the short run. With monopoly, the existence of barriers to entry means that in both the short and the long run super normal profits can be made.

Although both monopolistic and monopoly firms face downward sloping demand curves, the market demand curve is the demand curve for a monopolist whereas a monopolistic competitor firm only has a share of the market.

Both firms can be profit maximisers, the competitive stick means that a monopolistic competitor firm must seek to minimise costs whereas a monopoly firm can afford to some extent to be inefficient. Monopoly firms will be better able to exploit economies of scale as their production runs will be bigger than monopolistic competitor firms.

A good answer will expand on the items underlined.

END OF EXAMINERS' REPORT