

INSTITUTE OF ACTUARIES OF INDIA

CT7 - Economics

OCTOBER 2009 EXAMINATION

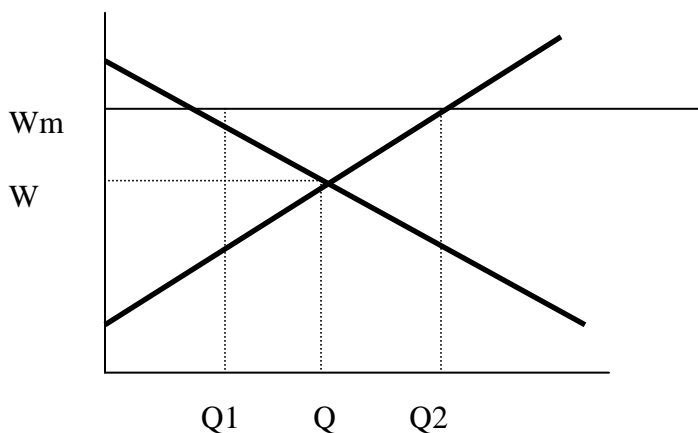
INDICATIVE SOLUTION

- | | | |
|-----|---|-------|
| 1. | C | [1.5] |
| 2. | D | [1.5] |
| 3. | B | [1.5] |
| 4. | D | [1.5] |
| 5. | D | [1.5] |
| 6. | B | [1.5] |
| 7. | B | [1.5] |
| 8. | B | [1.5] |
| 9. | C | [1.5] |
| 10. | B | [1.5] |
| 11. | C | [1.5] |
| 12. | D | [1.5] |
| 13. | C | [1.5] |
| 14. | B | [1.5] |
| 15. | C | [1.5] |
| 16. | D | [1.5] |
| 17. | B | [1.5] |
| 18. | B | [1.5] |
| 19. | D | [1.5] |
| 20. | A | [1.5] |
| 21. | C | [1.5] |
| 22. | B | [1.5] |
| 23. | A | [1.5] |
| 24. | D | [1.5] |
| 25. | D | [1.5] |
| 26. | D | [1.5] |
| 27. | C | [1.5] |
| 28. | A | [1.5] |

29. Minimum wage regulations
a. There are two cases to consider:

- a wage floor set at or below the free market equilibrium wage which will be non-binding
- a wage floor set above the free market equilibrium wage. This will affect the market

The diagram for the second scenario would be:



Demand schedule refers to the demand from employers and the “price” level is the wage rate, supply schedule refers to people who are prepared to work

So the surplus $Q_2 - Q_1$ represents unemployment. Although the government may pay unemployment benefit, it would be less than minimum wage. Consequently where minimum wage legislation exists there are often cases where some workers (who would otherwise be unemployed) are prepared to work for less than the minimum wage.

- b. People who are experienced and educated are likely to find jobs where the equilibrium wage is above the minimum wage. In labor markets where the equilibrium wage is above the minimum wage, the minimum wage does not create unemployment. Since people aged 20 and over tend to have more experience and education than younger persons, the minimum wage matters less and so creates lesser unemployment.

Note: The point in italics is important and integral to solution 29 b and marks should be deducted if not mentioned in the solution

[8]

30. Utility theory

a.

- Comparability: An investor can state a preference between all available certain outcomes
- Transitivity: If A is preferred to B and B is preferred to C, then A is preferred to C
- Independence: If an investor is indifferent between two certain outcomes, A and B, then he is also indifferent between the following two gambles:
 A with probability p and C with probability $(1 - p)$.
 B with probability p and C with probability $(1 - p)$.
- Certainty Equivalence: Suppose that A is preferred to B and B is preferred to C. Then there is a unique probability, p , such that the investor is indifferent between B and a gamble giving A with probability p and C with probability $(1 - p)$. B is known as the certainty equivalent of the above gamble.

b. This problem can be overcome either by using:

- Utility functions with the same functional form but different parameters over different ranges of wealth, or by using
- *state-dependent utility functions*, which model the situation where there is a discontinuous change in the state of the investor at a certain level of wealth.

[6]

31.

a. Solving for marginal utility of beer and peanuts

$$(dU/dB) = 10/B$$

$$(dU/dP) = 2/P$$

$$\text{Slope of utility function} = -(10/B) / (2/P)$$

Budget Constraint

$$1000 = 50(P) + 40(B)$$

$$\text{Slope of budget constraint} = -P_B/P_P = -4/5$$

$$\text{Setting the slopes equal: } -4/5 = -(10/B) / (2/P)$$

$$-8/P = -50/B$$

$$-8B = -50P$$

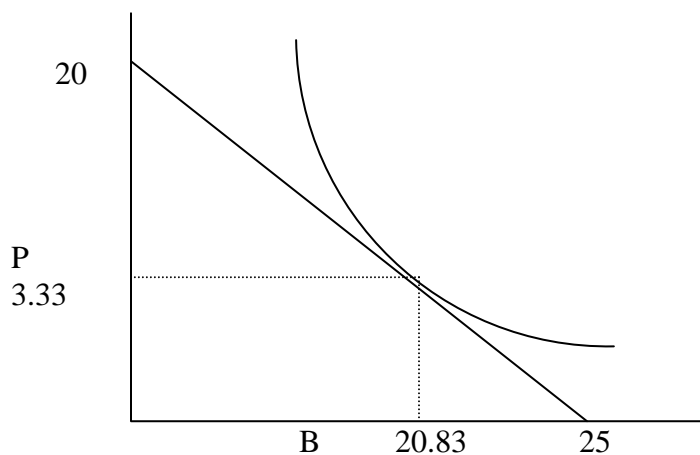
$$B = (50/8)P$$

$$B = 6.25P$$

$$\text{Substituting into the budget constraint equation: } 1000 = 50(P) + 40(6.25P)$$

$$P = 3.33$$

$$B = 20.83$$



b. New slope of budget constraint = -12/5

$$-(12/5) = -[(5/B) / (2/P)]$$

$$-(24/P) = -(25/B)$$

$$B = 1.04P$$

$$1000 = 120(1.04P) + 50(P)$$

$$P = 5.72$$

$$B = 5.95$$

[6]

32.

- a. A direct tax is a tax on a payment made to a factor of production e.g. wages, rent dividend/interest/company profits.

Examples are: income tax, national insurance payments, capital gains tax and corporation tax.

An indirect tax is a tax on expenditure. In other words, an indirect tax is a tax paid whenever a good is sold, or a service provided.

Examples are: value added tax, excise duties on tobacco petrol and alcohol, licence fees for motorcars and television, customs duties on imports.

- b. A tax is said to be progressive if it takes an increasing proportion of a person's income as income rises.

Examples include income tax where the rate of tax increases with higher incomes and indirect taxes on goods and services on which the rich spend a much higher proportion of income than do the poor.

A tax is said to be regressive if it takes a decreasing proportion of a person's income as income rises.

Examples include indirect taxes on goods and services on which the poor spend a much higher proportion of income than do the rich.

[4]

33.

- a. $Y = C + I + G + X - Z$

$$Y = 0.75 * \{(1 - 0.30) * Y\} + 250 + 800 + 600 - 0.15 * Y$$

$$Y = 0.375Y + 1650$$

$$0.625Y = 1650$$

$$Y = 2640$$

Hence $Y = \text{INR } 2640 \text{ million}$

- b. Exports = 600m
Imports = $0.15(2640) = 396\text{m}$
Hence current account is in surplus of INR 204m

- c. Tax revenue = $0.3(2640) = 792 \text{ million}$
Government expenditure = 800million
Hence budget is in deficit of INR 8million i.e -8

- d. The increase in government expenditure will increase Y to INR 2896m.
Exports = INR 600m
Imports = $0.15(2896) = \text{INR } 434.6\text{m}$.
Hence the current account surplus will fall by INR 38.4m to INR 165.6m.

[4]

34. The government can pay for its expenditure in one of five ways:

- taxation
- profits from publicly owned companies and other income
- sales of public assets
- Borrowing
- printing money

The government can finance its fiscal deficit by:

- borrowing
- printing money

The two lists are not the same because the proceeds from the sale of nationalized industries and also their profits are treated as negative expenditure; therefore increased proceeds from nationalised industries will reduce the fiscal deficit, rather than being a way of funding it. Taxation also reduces the PSBR, by definition, and, therefore, does not fund it.

[5]

35. Answer

a. Possible measures to correct a balance of payments deficit include:

- devaluation or depreciation of the currency
- reducing the level of aggregate demand
- encouraging exporters
- discouraging imports.

b. The Marshall-Lerner condition states that, starting from a position of balance, a small depreciation will lead to a balance of payments surplus if, and only if, the sum of the import and export elasticity is more negative than -1 .

If the currency depreciates, imports become more costly in terms of local currency. If chief import of a country is an essential product like petroleum, then the volume of petroleum imported would not change materially and hence the overall value of imports would go up (Volume stays same and cost goes up). This implies the import elasticity would be positive.

If the currency depreciates, then exports become less costly. The chief export of the country is another essential product salt and again the volume of exports would not change materially (given that all other countries are already importing salt from this country for their essential needs). Overall value of exports would then remain relatively unchanged because local prices have not changed anyway. This implies the export elasticity would be close to 0.

Overall, sum of two elasticities is positive rather than more than unit negative and hence the condition fails which means that a small depreciation in currency actually deteriorates the balance of payment

[6]

36. Answer

- a. When the Pasteur is privately owned, the profit function of the owner would be $P [c]= T [c] - ac$ where $P [c]$ and $T [c]$ are the profits and total yield as a function of number of cows. a is the cost of each cow equal to 19 units.

$$P [c] = 100c - c^3 - 19c$$

$$\text{First order condition } P'[c]=0$$

$$100 - 3c^2 - 19 = 0$$

$$c = \text{SQRT}(81/3)$$

$$c = 5.19$$

Checking at $c=5$ and $c=6$ we get $p [5]= 280$ and $p [6] = 270$ and hence we get $c = 5$ cows

Checking for second order condition $P''[c]=-6c < 0$

Note: Marks must be deducted if other conditions are not verified even if the answer is correct

- b. When the Pasteur is publicly owned, i.e there is no cost of entry for any villager to graze their cows; the villager would graze their cows till the point that their return would be more than cost of the cow

Hence a villager contemplating grazing additional cow would do so till the point where $T [c+1] / c+1 > a$ or where $T [c]/c = a$

$$100 - c^2 = 19$$

$$c = 9 \text{ cows}$$

Note: Marks must be deducted if principle is not stated even if the answer is correct

- c. Total yield and total profits under both scenarios is

$$T [5] = 375 \text{ units}$$

$$T [9] = 171 \text{ units}$$

$$P[5] = 280 \text{ units}$$

$$P [9] = 0 \text{ units}$$

As we can observe, the total yield and total profits under private ownership with lesser no of cows is higher as compared to the scenario where there is public ownership and more number of cows. There is a negative externality on the total milk production because addition of extra cows to the ones already present reduces the average yield for all cows. With no cost of entry, this negative externality is not accounted for and too many cows would be allowed to graze in the same field

[9]

37. Fiscal policy is a distinct aggregate demand tool than the monetary policy to boost economic activities.

The Government can adopt an expansionary fiscal policy either through an increase in government expenditure (financed by increases in taxes and/or increased government borrowing) or by a decrease in taxes.

In response to an expansionary fiscal policy, national income and therefore employment will increase in the short run. Higher government expenditure will add directly to aggregate demand. Lower taxes will increase consumption and the effect of the higher fiscal deficit will be increased by the multiplier effect.

The main arguments that have been given against the use of an active fiscal policy include the following:

- (a) Unpredictability — the effects of a fiscal expansion are difficult to estimate and there is a danger that it could lead to overheating of the economy
- (b) Time lags — the time delay necessary for fiscal policy to work is not known with certainty and there is a danger that fiscal expansion may overheat an economy that is already moving out of recession.
- (c) Crowding out effects — there are a number of crowding out effects that limit the effectiveness of fiscal policy:
 - Interest rate effects — a fiscal expansion which is financed by the government borrowing will lead to higher interest rates due to the depressing effect on bond prices. The higher interest rate will then hit investment and consumer expenditure.
 - Tax effects — an increase in government expenditure which is financed by taxation will hit consumer and firm's investment expenditure.
 - Expectational effects — an increase in government expenditure financed by borrowing will lead to expectations of future increases in taxes. This will lead to increased saving and reduced investment by firms.
- (d) Fiscal policy is not as flexible an instrument as monetary policy since both expenditure and tax sides are generally determined annually.
- (e) An expansionary fiscal policy that raises output may also lead to an increase in import volumes that may lead to balance of payments problems and/or a depreciating currency which can lead to inflation.

An **expansionary monetary policy** is achieved via an open market operation.

It involves a purchase of Treasury bills by the central bank which increases the money supply held by the public and reduces the stock of Treasury bills held by the public. The effect is to raise Treasury bill prices and lower the short term interest rate. The fall in the domestic interest rate should give some spur to consumption and investment. However, an expansionary monetary policy

may raise inflation expectations and thereby raise longer term interest rates which may adversely affect longer term investment.

One of the major problems with an expansionary monetary policy is that it may lead to inflationary pressures. If the country has a fixed exchange rate, the currency will come under pressure in the foreign exchange market and the current account position will worsen. This will necessitate purchases of the currency in the foreign exchange market. These purchases will have to continue until the initial increase in the money stock is reversed if the peg is to be maintained.

If the country has a floating exchange rate it is likely that the exchange rate may depreciate in the short run by an even greater percentage than the initial rise in the money stock ("overshooting" its long run equilibrium value). This will ensure that the expansion in the money stock will quickly lead to inflation.

[10]

[Total 100 Marks]
