

*A2*  
Level

*Understanding*  
**Economics**

*Useful for*  
*Economics Essays*  
*Topical MCQs*  
*(2002 Onwards)*



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PUBLICATIONS

**Muhammad Kamran Malik**

# UNDERSTANDING ECONOMICS

## A2 Level (Fourth Edition)

- \* Complete Textbook      \* Topical MCQs (2002 – 2016)
- \* Useful for Economics Essays

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Edited by	Amna Ansari
Published by	Read & Write Publications
Composed by	Rashid Mehmood
Title designed by	Rashid Mehmood
Legal Advisor	Mian Tariq Ahmad (Advocate Supreme Court) Room No. 10, 11, 12 Al-Majeed Centre 1-Mozang Road, Lahore. Tel: 042-37236145, Fax: 042-37241367
Edition:	2016-17
Price	<b>Rs.650/-</b>

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## PREFACE

I feel delighted in presenting the fifth edition of *Understanding Economics A2* as apart from other useful changes in accordance with the revised syllabus for exams in June 2016 onwards, it includes exercises that augment students' ability to tackle tricky examination questions. I always advise students to pull up their socks in second year as A2 Economics syllabus is far more demanding, challenging and complex. It, therefore, comes as little surprise that I myself have invested much more time in writing this book than I had initially calculated. I am hopeful that my efforts will reflect in the text you're about to read. More exercises have been incorporated into the text so as to make the entire experience of learning much more rigorous and thorough.

It took me nearly six months to complete this book, leaving my colleagues to wonder if it was possible to produce a good quality textbook in a few months' time. My answer to that lies in my 20 year struggle to teach this course well to all my students. In fact, I must not hesitate in giving them credit for what you hold in your hands right now- had it not been for my students' intelligent and not so intelligent questions, I would never have been able to come up with a comprehensive text as this. As mentioned earlier, the A2 syllabus is trickier to deal with as all sections are largely interlinked and weaknesses in any reflect more pronouncedly in others. Consistency, therefore, demands that students attend classes regularly and seek help from other textbooks as well.

Lastly, I look forward to your criticism and suggestions as they will help me improve subsequent editions of this book. I am extremely thankful to all those who appreciated my efforts in *Understanding Economics- AS Level* (text book) and *An Easy Approach to AS Economics* (essays and data responses). I present the fifth edition of *Understanding Economics- A2* with the hope that I do justice to your valuable comments and do not disappoint any of my readers.

Thank you.



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Principal,  
KIMS.



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This book covers the entire A2 syllabus designed by Cambridge International Examinations for exams in June 2016 onwards. It has been divided into 30 sections according to the sequence mentioned in the syllabus, with only slight alterations where needed.

### **HOW TO USE THIS BOOK**

- Apart from the relevant text, every section contains a topical arrangement of multiple choice questions from 2002-2012's examination papers (Both May/June and October/November sessions). Students are advised to read the text before attempting them.
- Students must use a lead pencil to answer all questions and avoid writing in the margins, so that repeated attempts can be made without clues to the correct answers.
- Every section ends with a student evaluation card. Students must make use of it by making entries for the question numbers they get wrong in each attempt. The correct answers for each section are listed at the end of the book so that students can compare them with their own answers and evaluate their performance.
- Repeated mistakes in each successive attempt in the evaluation card signal that a student has trouble with topics that those particular questions concern. He must, therefore, refer to the text again for a better understanding of those topics.
- Essay questions have been answered within the text provided to students. A careful study of the text will yield, either directly or indirectly, the answers to the toughest of essay type questions in past examination papers.
- Lastly, this book is by no means the only source of a comprehensive A2 text. We, therefore, recommend that students complement its use with other reputed textbooks.

**Note:** In case students desire to locate them in the yearly past papers, all questions have been assigned labels such as J/02/1/01. It provides information about the session, the year of examination, the paper number and the question number respectively. J/02/1/09 implies that the selected question is the ninth in June 2002's Paper 1. Similarly, N/07/1/12 refers to the twelfth question in November 2007's Paper 1.

For popular subjects like Economics, CIE introduced three variants of examination papers in June 2010 preceded by two variants in November 2009. Students appearing for CIE A Level examinations from Pakistan follow the second variant. This book, therefore, provides guidance on only Variant 2 Multiple Choice Question Papers. However, students are encouraged to attempt essays from all variants for good practice. To identify the variant of a certain examination paper, students may refer to the code in the top right corner of the paper's cover page. 9708/42 can be deciphered as the syllabus code for Economics (9708) followed by the Paper No. (4) and the Variant No. (2). Likewise, 9708/31 refers to variant 1 of paper 3.

Mathematical derivations are not a requirement of the CIE syllabus, yet they have been produced extensively in a few topics like monopoly and multiplier to help students attain a good grasp over key concepts.

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## Section: 1

## Utility

As consumers, each one of us can imagine the amount of satisfaction derived from a cool drink on a hot summer day, or a pack of salted pop corns during a movie at the cinema – thus each one of us has *some* idea what utility is all about. Utility is the power, ability or capacity of a product to satisfy a human need or want. It is subjective, since products differ in their utility to different people, in different places and at different times. Thus, utility varies from:

- person to person: A walking stick provides an old man with more utility than a young lad. This simple observation acts as a guiding principle for firms, helping them devise their marketing strategies and target segments with needs which they can serve better.
- place to place: A gas station on a busy road or a grocery store near one's residence has a higher utility than less accessible outlets. An intensively distributed product adds 'place utility' making purchases convenient and thus provides an edge to the manufacturing firm over its competitors.
- time to time. Emergency goods such as medicines have 'time utility' and can fetch a good price only when provided on time. Thus firms not maintaining proper stocks lose out on business opportunities when demand emerges.

It is impossible to measure utility and assign it a value, yet we use *utils* or units of utility obtained by consuming different units of a product for the purpose of comparison. The theory of utility is discussed below with the help of two economic laws.

### Law of Diminishing Marginal Utility

"Assuming other factors constant, a consumer receives lesser and lesser satisfaction from additional units of a product, when consumed successively".

To understand this economic law, a simple example of a thirsty man is taken. Assuming all other factors such as the quality of water unchanged, the amount of satisfaction that the individual gains from drinking the second glass of water is lesser than the satisfaction he gets from drinking the first glass.

Total Utility (TU) is the utility obtained by consuming all the units of a product.

Marginal Utility (MU) is the utility obtained by consuming one extra unit of a product. MU is the change in total utility.

$$MU_n = TU_n - TU_{n-1}$$

Marginal Utility of a certain number of units is the total utility for that quantity minus the total utility for a unit less.

Diminishing marginal utility (assuming MU is positive) implies rising total utility but, at a falling rate.

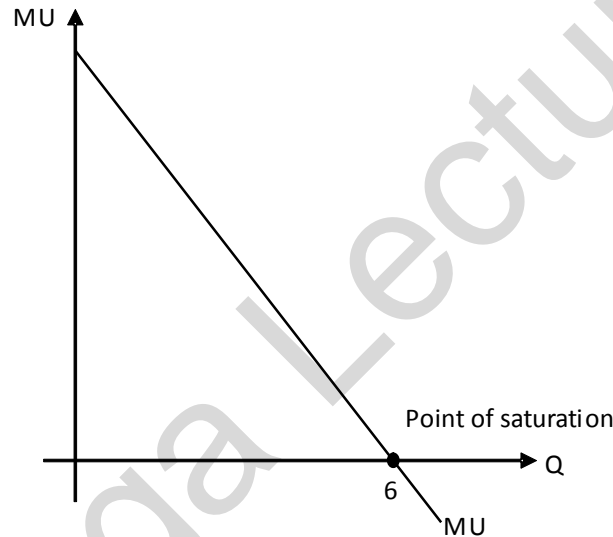
Total Utility falls only when MU is negative.

Total Utility from a single commodity is maximized when MU is zero. It is the point of saturation.

The following table shows different units of utility that a consumer obtains from consuming different units of the same product. MU diminishes when more and more units of the same product are consumed successively. However, TU rises till the individual consumes the seventh unit whose MU is negative. TU is maximized by consuming six units. MU at this point is zero.

Number of units	Total Utility (TU) Units of Utility	Marginal Utility (MU) Units of Utility
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2

Diagram 1.1



**Link between demand and marginal utility**

One of the reasons consumers pay a lower price for additional units (Law of Demand) is that they provide lesser and lesser satisfaction (Law of diminishing Marginal Utility). Consider the table above. Assuming constant marginal utility of money (i.e. marginal utility of money does not increase when a consumer parts with a greater amount), a consumer who assigns a monetary value of \$1 for 1 unit of utility is willing to pay \$10 for unit 1 but only \$4 for unit 4. Thus, the MU curve drawn in diagram 1.1 is also the demand curve.

**Conditions**

This law holds true only if the following conditions are met:

- Quality of different units of the product is similar.
- Quantity of different units is reasonable, like a glass of water instead of a teaspoon or a jug!
- Consumption of different units occurs without a time lag.
- Income, tastes, preferences and expectations of the consumer remain unchanged.

**Example:** The following table shows the marginal utility an individual derives from a good at different levels of consumption.

Quantity (number of units)	1	2	3	4	5	6
Marginal utility (units)	120	100	80	60	40	20

The utility derived from the last \$ spent on every good is 2 units. Assuming constant marginal utility of money, which quantity is purchased, given a price of:

- (i) \$70
- (ii) \$60
- (iii) \$50
- (iv) \$45
- (v) \$20

**Answer**

- (i) No amount of the good is purchased since none of the units yields 140 units of utility, the minimum acceptable utility from spending \$70 (\$1 gives 2 units of utility).
- (ii) At a price of \$60 the consumer purchases 1 unit.
- (iii) At a price of \$50 the consumer purchases 2 units.
- (iv) At a price of \$45 the consumer purchases 2 units since unit number 3 yields only 80 units of utility, less than the minimum 90 needed to justify spending \$45.
- (v) At a price of \$20 the consumer purchases 5 units.

**Exceptions**

According to some economists, this law does not apply to wealth. However, others argue that the satisfaction of earning the first million dollars is more than the satisfaction of earning the second or the third million.

**Paradox of value**

The following example may force some of you to wonder what queer buying habits do human beings possess! Think about this- water is essential to human life, yet we pay a petty price for it compared to something as fancy as diamonds which cannot save a human life. This paradox of value is resolved by the fact that relative prices of goods reflect their marginal utilities rather than total utilities. Water is available in abundance, hence its marginal utility is quite low whereas diamonds are scarce and possess a much higher marginal utility- thus, they are priced higher. The marginal utility of water, used to wash cars, feed plants etc is almost zero in our daily lives and we pay a negligible price for it. Exceptions however, may exist. Consider a thirsty man lost on a desert- for him, water has a higher marginal utility and given an opportunity, the individual would readily exchange his diamonds (if he has any!) for water.

## Law of Equi Marginal Utility

Lying at the heart of the theory of consumer choice, rational behavior involves considering the relative costs and benefits of the alternatives we could spend our money on. Relative benefits are measured by calculating satisfaction at the margin, or in terms of marginal utilities and relative costs, in terms of prices consumers have to pay. Total utility is maximized when the utility derived from the last dollar worth of say good A equals that derived from the last dollar worth of good B. This is what the Equi Marginal Principle states:

“A household maximizes total utility from a given level of income by equating the weighted marginal utilities of last units of all products it purchases, *ceteris paribus*.”

Weights imply prices of products and weighted marginal utility is the ratio of marginal utility and price i.e. utility per dollar. In the following equation,  $\frac{MU}{P}$  is equal for ALL commodities – thus total utility is being maximized.

$$\frac{MU_A}{P_A} = \frac{MU_B}{P_B} = \frac{MU_C}{P_C} = \frac{MU_D}{P_D} \dots \dots \dots \frac{MU_Z}{P_Z}$$

Consider the example of a consumer who spends his entire daily income, £10, on just two commodities: X and Y, which cost £2/unit and £1/unit respectively. Given these market prices and the consumer’s level of income, he can buy any of the following combinations.

X	5	4	3	2	1	0
Y	0	2	4	6	8	10

However, the decision rests upon the utilities derived from consuming different units of X and Y. The table below provides information regarding the utility obtained from consuming successive units of X and Y.

Unit #	MU <sub>x</sub>	$W.M.U_x = \frac{MU_x}{P_x}$	MU <sub>y</sub> = W.M.U <sub>y</sub>
1	20	10	9
2	18	9	7
3	16	8	5
4	14	7	3
5	12	6	1

A rational agent chooses the product with a higher weighted marginal utility, a dollar spent on which would yield greater satisfaction. Consider the following table:

No of units	Options				Decision	Utility obtained	Money spent	Remaining amount
	Product X		Product Y					
	No	W.M.U	No	W.M.U		Utility units		
I	1	10	1	9	X	20	£2	£8
II	2	9	1	9	X	18	£2	£6
III	3	8	1	9	Y	9	£1	£5
IV	3	8	2	7	X	16	£2	£3
V	4	7	2	7	X	14	£2	£1
VI	5	6	2	7	Y	7	£1	0

W.M.U of first unit of X is 10 units whereas that of Y is a unit less i.e. 9. The consumer opts for the product with a higher W.M.U- he purchases the 1st unit of X. For the second unit, the consumer compares the weighted marginal utility of second unit of X and FIRST unit of Y. Since both are equal, the consumer is indifferent between X and Y. However, we assume that he continues buying X. Continuing likewise, we learn that the consumer chooses to buy 4 units of X and 2 units of Y. This combination maximizes total utility (84 units of utility) since weighted marginal utility for last (i.e. 4<sup>th</sup>) unit of X equals that of the last (i.e. 2<sup>nd</sup>) unit of Y. There is no way to increase total utility by reallocating resources i.e. shifting expenditures from X to Y or vice versa.

**Example:** Assuming a consumer spends his income on just two commodities, X and Y, he should purchase quantities as suggested by the following table in each of cases I, II and III.

Situation		To maximize utility, a consumer consumes:	
		Quantity of X	Quantity of Y
I	$\frac{MU_x}{P_x} > \frac{MU_y}{P_y}$	More	Less
II	$\frac{MU_x}{P_x} < \frac{MU_y}{P_y}$	Less	More
III	$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$	Unchanged	Unchanged

The consumer should purchase more X and less Y if  $\frac{MU_x}{P_x} > \frac{MU_y}{P_y}$  since spending £1 on buying X provides more utility than Y. The consumer increases utility by buying more X and less Y since utility gained by buying more of X outweighs the loss in total utility by consuming fewer units of Y.  $MU_x$  diminishes with additional units of X and  $MU_y$  increases. The process continues till  $\frac{MU_x}{P_x}$  equals  $\frac{MU_y}{P_y}$ . Likewise, he must substitute Y for X if  $\frac{MU_x}{P_x} < \frac{MU_y}{P_y}$ . A utility maximizing combination is obtained where  $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$  - no other combination of X and Y increases total utility (try N/04/3/02).

The utility theory however, has its own criticisms. Utility is subjective in nature and it is almost impossible to quantify the benefit derived from consuming a good or service. Moreover, the assumption of rational behavior may seem unrealistic at times since consumers do not have complete information regarding all products and may be influenced by advertisements or impulse buying.

J/02/3/03

**Q.** The table shows the marginal utility derived by a consumer who devotes the whole of his weekly income of \$32 to two goods X and Y, whose unit prices are \$2 and \$4 respectively.

Unit	Marginal utility of X (units)	Marginal utility of Y (units)
1	9	28
2	8	26
3	7	24
4	6	22
5	5	20
6	4	18
7	3	16
8	2	14

In order to maximise his utility, which quantities of X and Y should the consumer purchase?

	X	Y
(A)	2	7
(B)	4	6
(C)	6	4
(D)	8	3

**Answer:**

Option A is correct since weighted marginal utility of second (last) unit of X is  $4 \left( \frac{MU_x}{P_x} = \frac{8}{2} \right)$  and equals weighted marginal utility of 7<sup>th</sup> unit of Y  $\left( \frac{MU_y}{P_y} = \frac{16}{4} \right)$ . Consumer spends his entire income of \$32 to buy two units of X and seven units of Y. This is the utility maximizing combination because:

- Weighted marginal utility of last units of both products are equal
- Entire income is spent

### Indifference Analysis

The problem with the use of marginal utility theory in explaining consumer choice and equilibrium is that utility is subjective and cannot be measured accurately. The alternative approach is indifference curves analysis. Instead of measuring utility, this approach ranks various combinations of commodities in order of preference.

An indifference curve (see diagram 1.2), shows combinations of two commodities that yield the SAME utility for the consumer. Thus the consumer is indifferent towards any two combinations on an indifference curve i.e. he cannot prefer one combination over another. Indifference curve is negatively sloped because if a consumer chooses to have one more unit of a product e.g. X, he will have to give up the other product Y to keep his total utility unchanged. In this case, utility lost by consuming less of Y will be compensated by gain in utility because of a greater quantity of X.

A higher indifference curve yields greater utility, and given the affordability (see budget line), a consumer would like to move to a higher indifference curve. In diagram 1.3, all combinations on  $IC_1$  give the same utility to the consumer, whereas combinations on  $IC_2$  give a higher utility than combinations on  $IC_1$ . There are an infinite number of indifference curves between two indifference curves, however they can never intersect each other as such an intersection is against the principle of consistency. This principle states that if a consumer prefers A over B and B over C, then he must prefer A over C. This is explained with the help of diagram 1.4.

Diagram 1.2

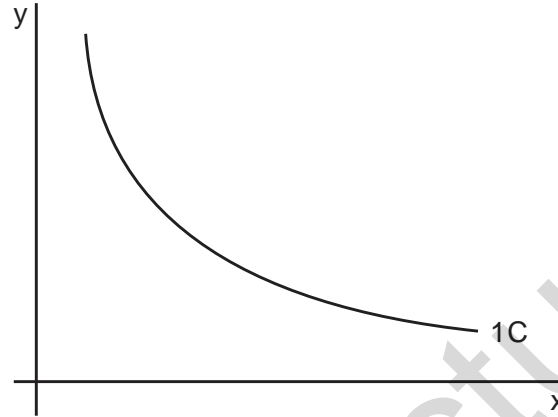


Diagram 1.3

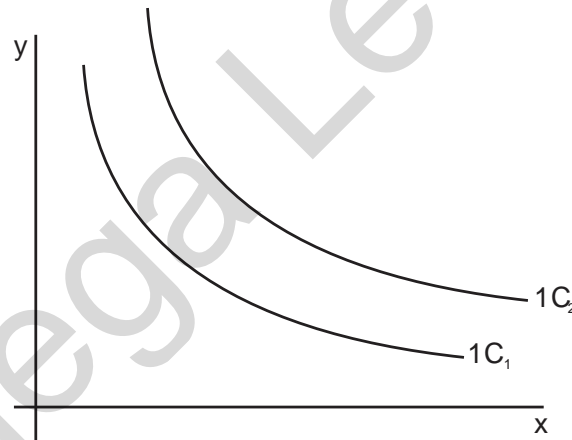
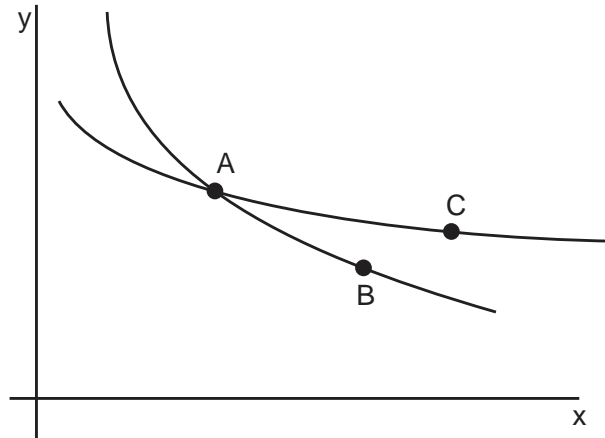


Diagram 1.4



In this diagram, combinations A and B are on the same indifference curve, so they should give the same utility to the consumer. Similarly, A and C are also on the same indifference curve, so they should also be yielding the same utility for the consumer. Consistency demands that combinations B and C should also give the same utility, but combination C gives a higher utility than B as it is on a higher indifference curve, violating the principle of consistency.

An indifference curve is not a straight line, rather it is convex if viewed from the origin i.e. its slope decreases throughout. The reason for the convex shape of an indifference curve is that the consumer is willing to give up smaller and smaller quantities of Y to have additional units of X because of the law of diminishing marginal utility. The following table helps to explain this:

X	1	2	3	4	5
Y	20	15	11	8	6

All combinations of X and Y shown in this table are on the same indifference curve, thus providing the same level of satisfaction to the consumer. In order to increase his consumption of X from 1 to 2 units, the consumer is willing to give up 5 units of Y, as he believes that utility lost by not having 5 Y is compensated by having one more X. However, the utility of the third unit of X is lesser than the second X, so he is willing to give up a smaller quantity of Y (only 4 Y). Similarly, for the fourth X, he is willing to sacrifice an even smaller quantity of Y (3 Y). The slope of indifference curve is known as Marginal Rate of Substitution (MRS), which decreases throughout along an indifference curve. It is the ratio of the change in Y to the change in X. It is also the ratio of  $MU_x$  to  $MU_y$ . For example, if  $MU_x$  is 20 units and  $MU_y$  is 10 units, the consumer is willing to give up 2 units of Y to have 1 more unit of X, so the slope of indifference curve is:

$$\frac{dy}{dx} = \frac{MU_x}{MU_y} = \frac{20}{10} = 2Y / X$$



## Multiple Choice Questions (Section 1)

J/02/3/03

- 1 The table shows the marginal utility derived by a consumer who devotes the whole of his weekly income of \$32 to two goods X and Y, whose unit prices are \$2 and \$4 respectively.

Unit	Marginal utility of X (units)	Marginal utility of Y (units)
1	9	28
2	8	26
3	7	24
4	6	22
5	5	20
6	4	18
7	3	16
8	2	14

In order to maximise his utility, which quantities of X and Y should the consumer purchase?

	X	Y
A	2	7
B	4	6
C	6	4
D	8	3

N/02/3/02

- 2 The table shows the total utility that a consumer obtains from consuming good X.

quantity (units)	TU (units of utility)
1	10
2	18
3	24
4	28
5	30
6	31

The price of good X is \$4.

What additional information is needed to determine the quantity of X that the consumer will purchase?

- A the consumer's income elasticity of demand for good X
- B the consumer's price elasticity of demand for good X
- C the marginal utility of money to the consumer
- D the marginal utility that the consumer obtains from substitute goods

J/03/3/02

3 A household makes the following purchases of fruit.

fruit	quantity purchased (kg)	price per kg (\$)
bananas	5	1.00
apples	10	0.50

The household derives twice as much utility from the fifth kg of bananas as from the tenth kg of apples.

What should the household do to maximise utility from the purchase of these fruits?

	purchase of bananas	purchase of apples
<b>A</b>	increase	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	increase
<b>D</b>	no change	no change

N/03/3/02

4 A utility-maximising consumer spends his disposable income on food and clothing. When his weekly income is \$40 he buys 5 units of food at a unit price of \$5. His marginal utility from food consumption is 10 utility units.

If the price of a clothing unit is \$0.50, the consumer's marginal utility from clothing is

- A** equal to that derived from food.      **B**  $\frac{1}{10}$  utility unit.  
**C** 1 utility unit.      **D** 10 utility units.

N/04/3/02

5 A consumer allocates his expenditure between three goods, X, Y and Z. The table shows the prices of goods and the consumer's marginal utilities.

Good	X	Y	Z
Price(\$)	20	15	10
Marginal utility (units)	40	30	15

How should the consumer's expenditure be reallocated in order to maximise his utility?

	X	Y	Z
<b>A</b>	more	more	less
<b>B</b>	more	less	more
<b>C</b>	less	more	less
<b>D</b>	less	less	more

J/05/3/02

6 The relative prices of goods reflect their marginal utilities rather than their total utilities. What is explained by this statement?

- A** the law of diminishing returns  
**B** the limitations of marginal utility theory  
**C** the paradox of value  
**D** the role of prices as a rationing mechanism

Mega Lecture

N/05/3/02

- 7 The table shows the total utility that an individual derives from consuming different quantities of a good.

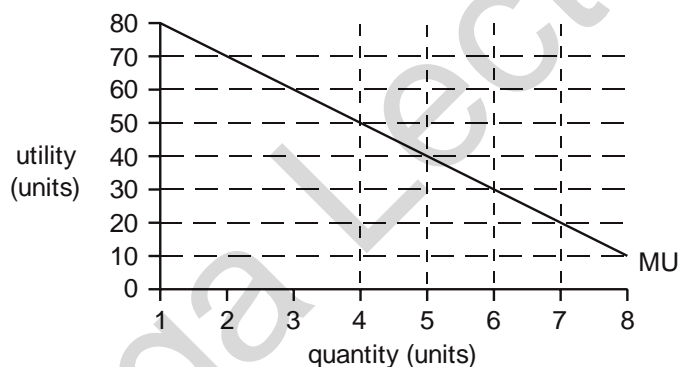
quantity of good (units)	total utility (units)
1	20
2	36
3	50
4	62
5	72
6	80

The individual's marginal utility of money is \$1 = 2 units of utility.  
 What is the maximum quantity of the good that the individual will buy when its price is \$6?

- A** 2 units      **B** 3 units      **C** 4 units      **D** 5 units

N/06/3/02

- 8 The diagram shows the marginal utility that an individual derives from a good at different levels of consumption.



The utility he derives from the last \$ he spends on every good is 2 units.

Assuming the marginal utility of money is constant, which quantity will he purchase if the price of the good is \$20?

- A** 4 units      **B** 5 units      **C** 6 units      **D** 7 units

J/07/3/02

- 9 A consumer seeks to maximise their utility. Up to what point should they continue to consume each good?

- A** until the marginal utility from each good is the same  
**B** until the marginal utility per dollar from each good is the same  
**C** until the marginal utility from each good reaches a maximum  
**D** until the marginal utility from each good is zero

N/07/3/02

- 10** A consumer allocates his expenditure between three goods, X, Y and Z.  
 The table shows the consumer's marginal utilities for these goods and their prices.

good	X	Y	Z
marginal utility (units)	50	30	25
price (\$)	20	15	10

How should the consumer's expenditure be reallocated in order to maximise his utility?

	X	Y	Z
<b>A</b>	more	more	Less
<b>B</b>	more	less	More
<b>C</b>	less	more	Less
<b>D</b>	less	less	More

J/08/3/02

- 11** The table shows the total utility that an individual derives from consuming different quantities of a good.

quantity of good (units)	total utility (units)
1	24
2	45
3	63
4	78
5	90
6	99

The individual's marginal utility of money is \$1 = 2 units of utility.

What is the maximum quantity of the good that the individual will buy when its price is \$6?

- A** 2 units      **B** 3 units      **C** 4 units      **D** 5 units

J/09/3/02

- 12** The table shows the marginal utility derived by a consumer who devotes the whole of his weekly income of \$42 to two goods X and Y, whose unit prices are \$3 and \$6 respectively.

unit	marginal utility of X (units)	marginal utility of Y (units)
1	12	34
2	11	30
3	10	26
4	9	22
5	8	18
6	7	14
7	6	10
8	5	6

In order to maximise his utility, which quantities of X and Y should the consumer purchase?

	X	Y
<b>A</b>	2	6
<b>B</b>	4	5
<b>C</b>	6	4
<b>D</b>	8	3

N/09/3/01

- 13** The schedule shows the total utility derived by a consumer of a good X at different levels of consumption.

quantity of X consumed	1	2	3	4	5	6	7	8
total utility (units)	28	40	50	58	64	68	71	73

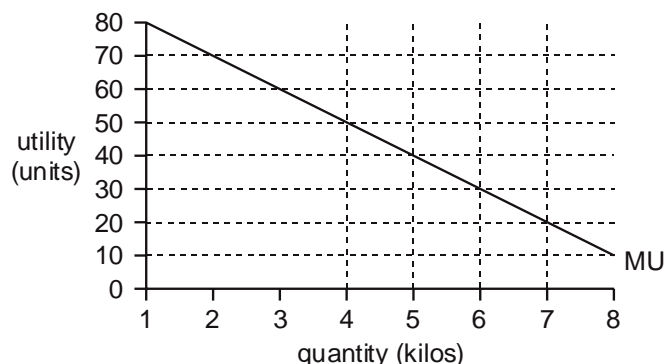
The consumer obtains two units of satisfaction from the last cent she spends on each good that she purchases.

What is the maximum number of units of X that she will consume if the price of X is 6 cents?

- A** 2  
**B** 5  
**C** 7  
**D** 8

J/10/3/01

- 14** The diagram shows the marginal utility (MU) that an individual derives from a good at different levels of consumption.



The utility he derives from the last \$ he spends on every good is 3 units.

Assuming the marginal utility of money is constant, which quantity will he purchase if the price of the good is \$10?

- A** 4 kilos      **B** 5 kilos      **C** 6 kilos      **D** 7 kilos

N/10/3/02

- 15** The schedule shows the total utility derived by a consumer of a good X at different levels of consumption.

quantity of X consumed	1	2	3	4	5	6	7
total utility (units)	30	50	65	75	80	83	84

The consumer obtains three units of utility from the last \$ she spends on each good that she purchases.

What is the maximum number of units of X that she will consume if the price of X is \$5?

- A** 3      **B** 4      **C** 5      **D** 6

J/11/32/01

- 16** A consumer seeks to maximise his utility.  
Up to what point should he continue to consume each good?

- A** until the marginal utility per dollar from each good is the same  
**B** until the marginal utility from each good is the same  
**C** until the marginal utility from each good reaches a maximum  
**D** until the marginal utility from each good is zero

J/12/32/2

- 17** The table shows the total utility that an individual obtains from consuming different quantities of a good.

quantity of good (units)	total utility (units)
1	20
2	36
3	50
4	62
5	72
6	80

The individual's marginal utility of money is \$1 = 3 units of utility.

What is the maximum quantity of the good that the individual will buy when its price is \$4?

- A** 2 units      **B** 3 units      **C** 4 units      **D** 5 units

N/12/32/02

- 18** A consumer who aims to maximise his utility will arrange his consumption so that

- A** the total utility obtained from each commodity is the same.  
**B** the total utility per \$ spent on each commodity is the same.  
**C** the same utility is obtained from the last unit of each commodity.  
**D** the same utility is obtained from the last unit of expenditure on each commodity.

J/13/32/02

- 19** The table shows the total utility that an individual derives from consuming different quantities of a good.

quantity of good (units)	total utility (units)
1	20
2	36
3	50
4	62
5	72
6	80

The individual's marginal utility of money is \$1 = 2 units of utility.

What is the maximum quantity of the good that the individual will buy when its price is \$6?

- A** 2 units      **B** 3 units      **C** 4 units      **D** 5 units



N/13/32/02

**20** The table shows the total utility that an individual derives from consuming different quantities of a good.

quantity of good (units)	total utility (units)
1	24
2	45
3	63
4	78
5	90
6	99

The individual's marginal utility of money is \$1 = 2 units of utility.  
What is the maximum quantity of the good that the individual will buy when its price is \$6?

- A** 2 units      **B** 3 units      **C** 4 units      **D** 5 units

N/14/32/02

**21** A household makes the following purchases of fruit.

fruit	quantity purchased (kg)	price per kg (\$)
bananas	5	1.00
apples	10	0.50

The household derives twice as much utility from the tenth kg of apples as from the fifth kg of bananas.

What should the household do to maximise utility from the purchase of these fruits?

	purchase of bananas	purchase of apples
<b>A</b>	decrease	increase
<b>B</b>	increase	decrease
<b>C</b>	increase	increase
<b>D</b>	no change	no change

J/15/32/02

- 22** A utility-maximising consumer spends the whole of his disposable income of \$40 on food and clothing.  
 The table shows the price of food, the quantity purchased by the consumer, and the marginal utility he derives from food consumption.

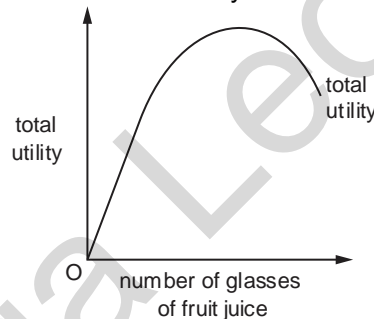
food	
price per unit	\$5
quantity demanded	5
marginal utility (units)	10

His marginal utility from clothing is 2 units.  
 What is the price of clothing per unit and the quantity purchased by the consumer?

	clothing	
	price (\$)	quantity (units)
<b>A</b>	0.5	30
<b>B</b>	1.0	15
<b>C</b>	3.0	5
<b>D</b>	5.0	3

N/15/32/02

- 23** The diagram shows an individual's total utility from consuming glasses of fruit juice.



How can this information help to derive the individual's demand curve for fruit juice?

- A** by revealing the individual's marginal utility curve
- B** by revealing the money value of marginal utility
- C** by showing how total utility is maximized
- D** by showing the relationship between utility and expenditure

J/16/32/05

- 24** To maximise the satisfaction he derives from a given level of expenditure on two goods, X and Y, a consumer should allocate his expenditure between the two goods so that

- A** marginal utility of X = price of X and marginal utility of Y = price of Y.
- B** marginal utility of X plus marginal utility of Y is maximised.
- C** marginal utility of X = marginal utility of Y.
- D**  $\frac{\text{marginal utility of X}}{\text{marginal utility of Y}} = \frac{\text{price of X}}{\text{price of Y}}$

**Section: 2**

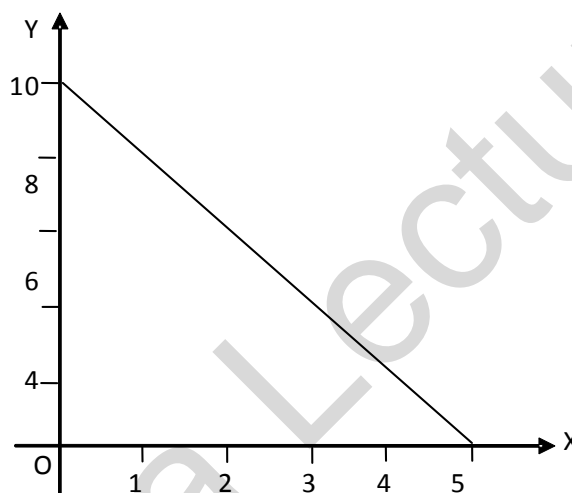
**Budget Line**

If a product's demand is represented by a coin, utility is just one side of it. This is because effective demand entails both the willingness (desirability) and the ability (affordability) to obtain a product. The concept measuring affordability i.e. budget lines, represents the other side of the coin.

A budget line shows all possible combinations of two products that a consumer can purchase with a given income and fixed market prices. Considering the example in Section 1, where consumer's income is £10 and prices of X and Y are £2 and £1 per unit respectively, any of the following combinations of X and Y can be purchased.

X	5	4	3	2	1	0
Y	0	2	4	6	8	10

Diagram 2.1



A budget line slopes downward, depicting scarcity- as income is limited, buying more units of one product requires buying fewer of the other.

The following equation shows the entire income being spent on the two commodities.

$$M = P_X \cdot X + P_Y \cdot Y$$

Where:

M = Consumer's money income

$P_X$  = Price of X/unit

X = Quantity of X purchased

$P_Y$  = Price of Y/unit

Y = Quantity of Y purchased

Dividing both sides by  $P_Y$ ,

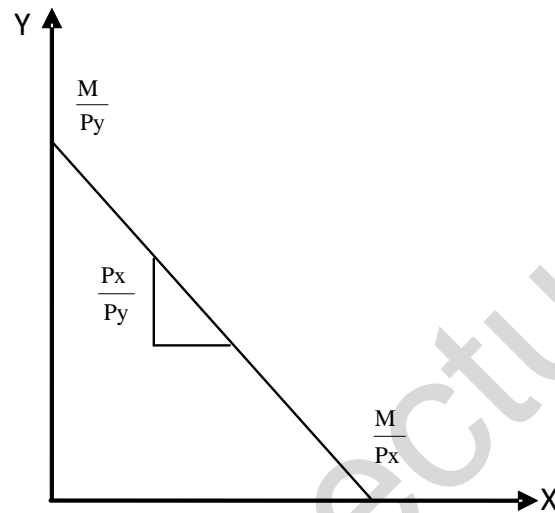
$$\frac{M}{P_Y} = \frac{P_X}{P_Y} \cdot X + Y$$

Rearranging,

$$Y = \frac{M}{P_Y} - \frac{P_X}{P_Y} \cdot X$$

This is the linear equation of the budget line where  $\frac{M}{P_Y}$  is the vertical intercept,  $\frac{M}{P_X}$  is the horizontal intercept and  $-\frac{P_X}{P_Y}$ , the slope of the budget line. The slope is negative as the budget line is downward sloping. (See diagram 2.1 (a))

Diagram 2.1(a)

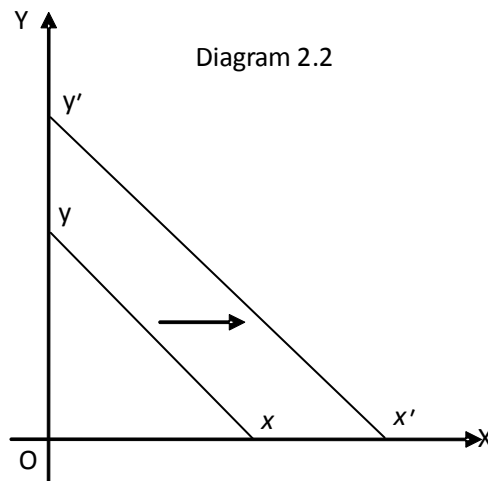


In diagram 2.1, the slope or price ratio of X and Y is -2. The respective intercepts have been calculated assuming 0 units of the other good, thus the Y intercept and X intercept are 10 and 5 respectively.

### Shifts In Budget Line

Changes in either consumer's income or prices of X and Y shift the budget line. The impacts of such changes on the intercept and slope of the budget line are explained below:

**Changes in income:** Increase in income (while prices remain unchanged) increases the vertical intercept  $\left(\frac{M}{P_Y}\right)$  but has no effect on the slope of the budget line  $\left(\frac{P_X}{P_Y}\right)$ . The budget line shifts rightward, as shown in diagram 2.2. Similarly, a decrease in income causes a leftward shift.



**Changes in prices of both X and Y:** The slope of the budget line remains unchanged if prices of both X and Y change with the same percentage and in the same direction. The vertical intercept falls in case prices of X and Y increase. Budget line shifts rightwards with an unchanged slope (as shown in diagram 2.2) if prices of both X and Y decrease with the same percentage. Thus diagram 2.2 is relevant for both an increase in income and a proportionate fall in the prices of X and (try J/06/3/02).

**Change in the price of X:** Decreased price of X (while money income and price of Y remain unchanged) decreases the slope of budget line  $\left(\frac{P_X}{P_Y}\right)$ , making it flatter. The resulting rightward shift is pivoted around the Y intercept, as shown in diagram 2.3(a). When price of X rises, consumer affords fewer units of X at the same income level. In this case, the budget line shifts from LL to LL<sub>1</sub> as shown in diagram 2.3(b).

Diagram 2.3(a)

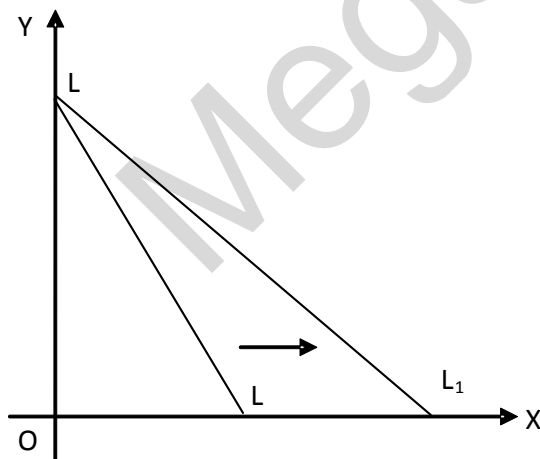
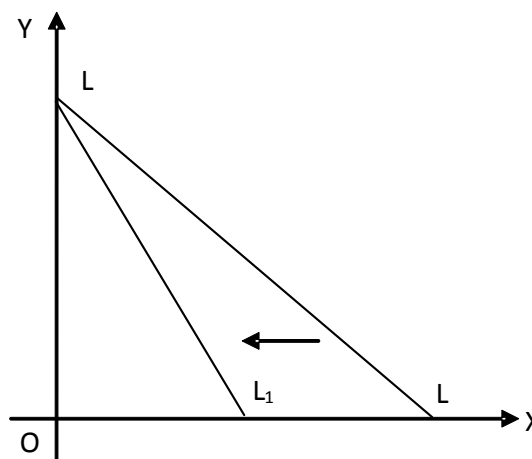


Diagram 2.3(b)



**Changes in the price of Y:** Changes in the price of Y (assuming unchanged money income and price of X) change vertical intercept  $\left(\frac{M}{P_Y}\right)$  as well as the slope of budget line  $\left(\frac{P_X}{P_Y}\right)$ .

Increased price of Y reduces vertical intercept and the budget line becomes flatter, as shown in diagram 2.4(a). Likewise, decrease in the price of Y makes the budget line steeper, pivoting about the X intercept (see diagram 2.4(b)).

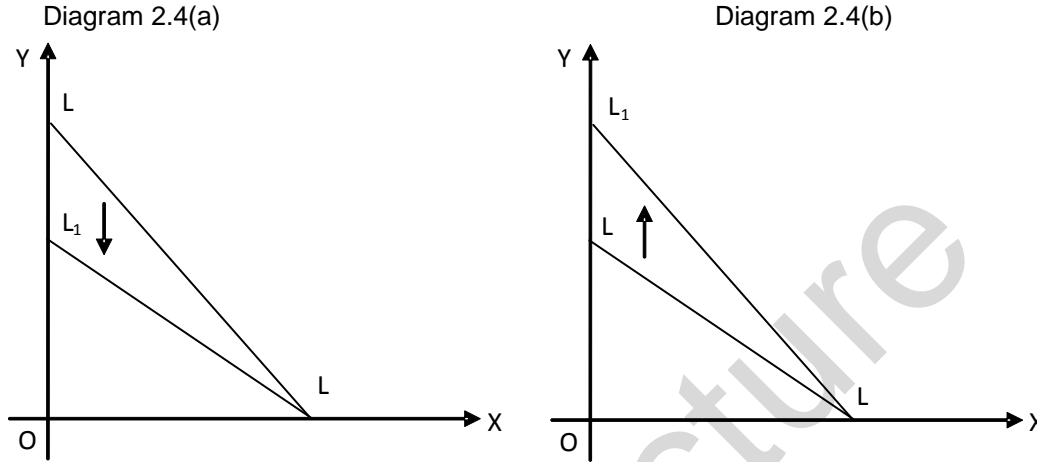
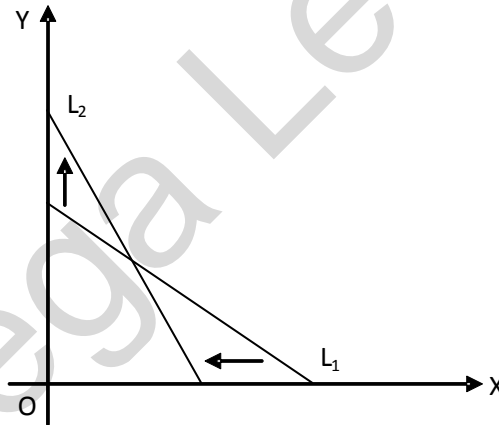


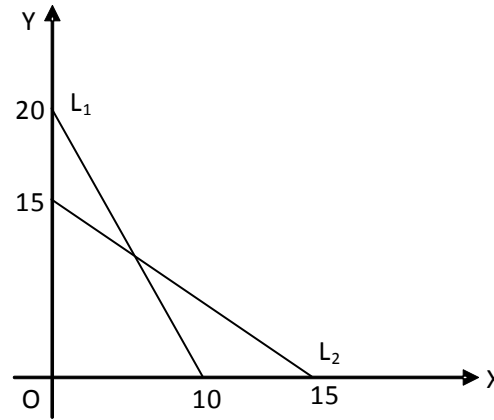
Diagram 2.5



Now consider diagram 2.5, which presents a rather interesting case. The budget line shifts from L<sub>1</sub> to L<sub>2</sub> showing that more units of Y and less of X can now be purchased (L<sub>2</sub> is steeper than L<sub>1</sub> and product X becomes expensive in relation to product Y). The Y intercept has increased and that could be either because of increased income or decreased price of Y. The X intercept has decreased and that could be either because of decreased income or increased price of X. The only certain change is an increase in the slope- otherwise, we remain uncertain of what causes it since it can be either of the two reasons mentioned.

**Example:** The following diagram shows a consumer's budget line  $L_1$  when the consumer's income is \$50 per day and the prices of X and Y, \$5 and \$2.5 respectively.

Diagram 2.6



Consumer's income increases to \$60 and prices of X and Y change at the same time. If the new budget line is  $L_2$ , find the new prices of X and Y.

**Answer:** Remember that:

- Vertical (Y) intercept is  $\frac{M}{P_y}$
- Horizontal (X) intercept is  $\frac{M}{P_x}$
- Slope is  $\frac{P_x}{P_y}$

	Before	After
Vertical intercept	$\frac{M}{P_y} = \frac{50}{2.5} = 20$	$\frac{M}{P_y} = \frac{60}{4} = 15$
Horizontal intercept	$\frac{M}{P_x} = \frac{50}{5} = 10$	$\frac{M}{P_x} = \frac{60}{4} = 15$
Slope	$\frac{P_x}{P_y} = \frac{5}{2.5} = 2$	$\frac{P_x}{P_y} = \frac{4}{4} = 1$

Thus, price of X and Y is \$4 each (try J/02/3/04).

The following diagrams help students understand the reasons for changing plans to buy commodities from consumers' point of view and reasons for changing plans for buying (hiring) different quantities of labour and capital from firm's point of view.

Diagram 2.7(a)

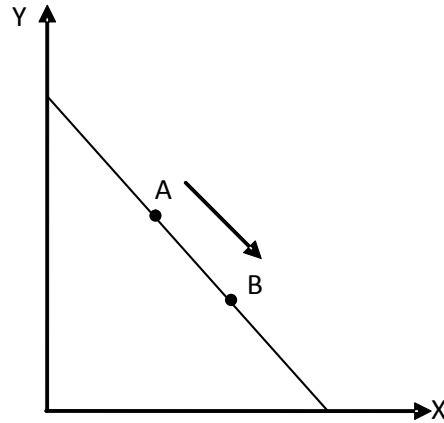


Diagram 2.7(b)

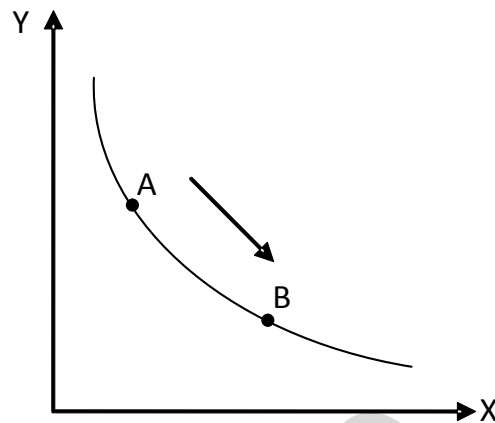


Diagram 2.7(c)

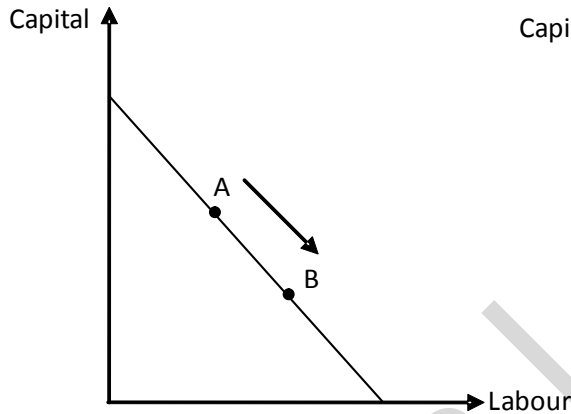
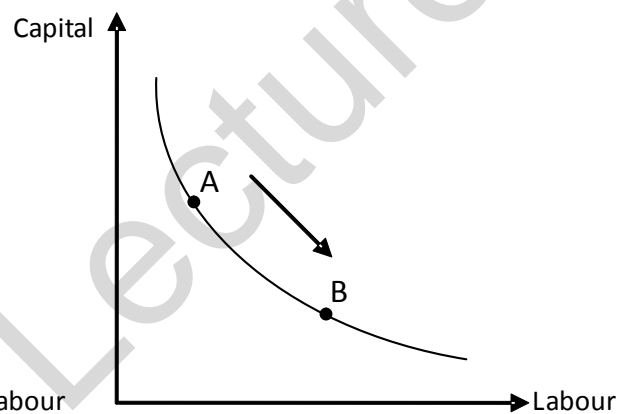


Diagram 2.7(d)



The following discussion explains the movement from point A to B in each of the diagrams shown above:

Diagram 2.7(a) : Both points lie on the same budget line so budget constraint i.e. income and prices of X and Y are unchanged and consumer's decision to buy more X only means increased preference for product X.

Diagram 2.7(b) : Points A and B lie on different budget lines so consumer's decision to buy more X can be attributed to decreased price of X. The preferences of X and Y are unchanged however decreased price of X has encouraged consumers to increase the demand for X.

Diagram 2.7(c) : Budget constraint i.e. resources and prices of labour (wage) and capital (interest rate) are unchanged however the increased productivity of labour (may be through better training or increased motivation) has encourage the firm to hire more workers.

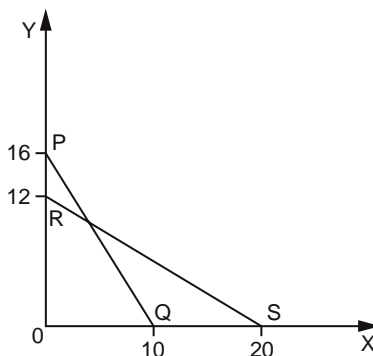
Diagram 2.7(d) : Productivity of labour and capital is unchanged however decreased price of labour has probably encouraged the firm to hire more workers. A relative increase in the price of capital (may be because of increased interest rates or removal of a subsidy on capital) could also encourage firms to hire more labour in relation to capital (try N/02/3/03 & J/02/3/05)



### Multiple Choice Questions (Section 2)

J/02/3/04

- 1 The diagram shows a consumer's budget line PQ when the consumer's income was \$20 per day and the prices of X and Y were \$2 and \$1.25 respectively.



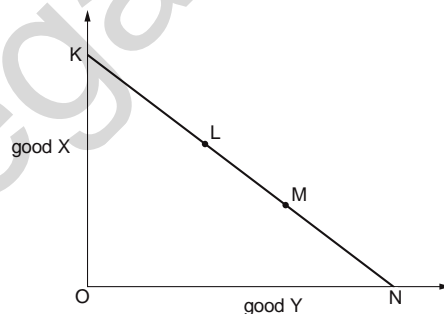
The consumer's income increases to \$30 and, at the same time, the prices of X and Y change.

If the consumer's budget line is now RS, what are the new prices of X and Y?

	X	Y
<b>A</b>	\$1.50	\$2.50
<b>B</b>	\$1.80	\$1.00
<b>C</b>	\$2.50	\$1.50
<b>D</b>	\$3.00	\$2.50

N/02/3/03

- 2 In the diagram, KN is a budget line showing the different combinations of two normal goods, X and Y, that a consumer is able to purchase. A consumer initially chooses point L on the budget line.



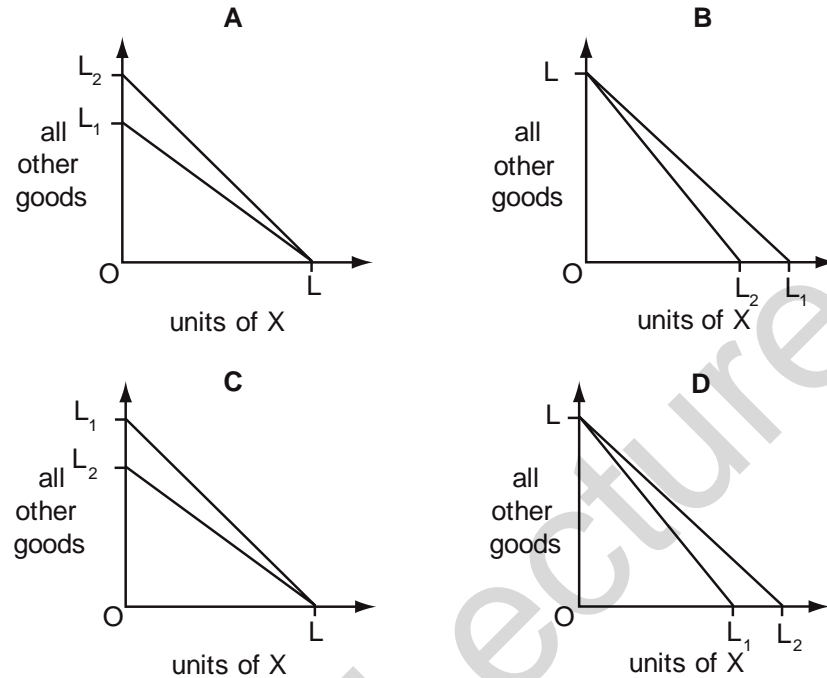
In a subsequent period, the consumer chooses the combination of X and Y shown by point M.

What could explain this change?

- A** a change in the consumer's preferences
- B** an increase in the consumer's income and an increase in the price of Y
- C** a reduction in the consumer's income
- D** a reduction in the consumer's income and a reduction in the price of X

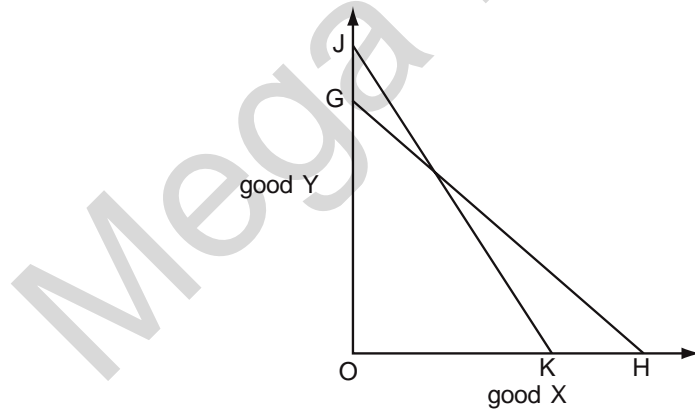
J/03/3/03

- 3 The diagrams show a change in a consumer's budget line from an initial position of  $LL_1$  to  $LL_2$ . Which diagram shows the effect of a fall in the price of X, money income remaining unchanged?



N/03/3/03

- 4 In the diagram a consumer's budget line shifts from JK to GH.

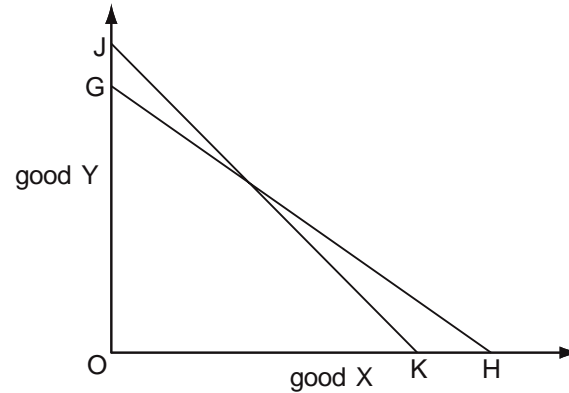


Which of the following **must** be correct?

- A There has been a change in the consumer's money income.
- B There has been a change in the consumer's real income.
- C The prices of both goods have changed.
- D The price of good Y has increased relative to the price of good X.

N/04/3/04

5 In the diagram a consumer's initial budget line is JK.

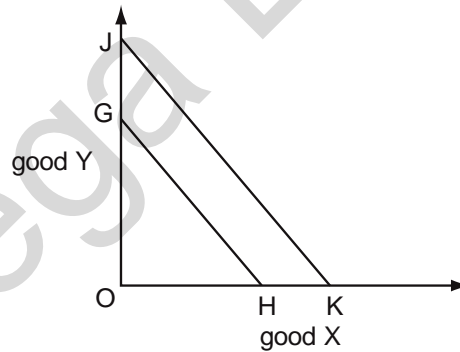


Assuming no change in the price of X, what could explain a shift in the consumer's budget line to GH?

	price of good Y	consumer's money income
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

J/05/3/03

6 In the diagram a consumer's budget line shifts from GH to JK.

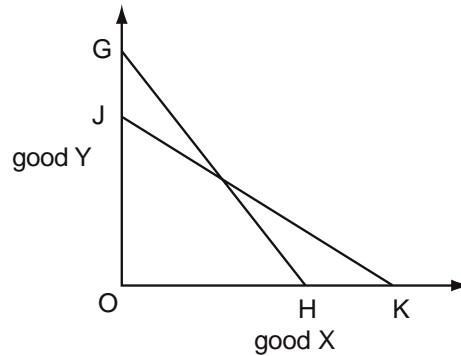


Regardless of any other changes that might occur, what must be correct?

- A** There has been an increase in the consumer's money income.
- B** There has been an increase in the consumer's real income.
- C** There has been an equal proportionate increase in the price of X and Y.
- D** There has been an equal proportionate decrease in the price of X and Y.

N/05/3/03

7 In the diagram a consumer's budget line shifts from GH to JK.

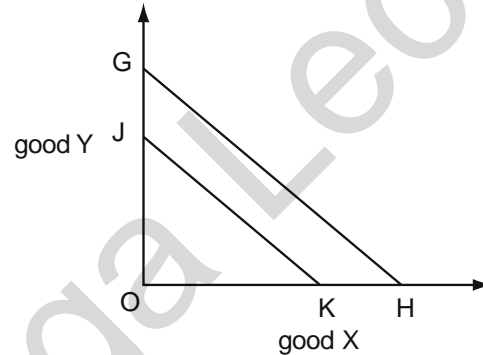


What must be true?

- A The prices of both goods have changed.
- B There has been no change in the consumer's real income.
- C There has been no change in the consumer's money income.
- D The price of good Y has increased relative to the price of good X.

J/06/3/02

8 In the diagram a consumer's budget line shifts from JK to GH.

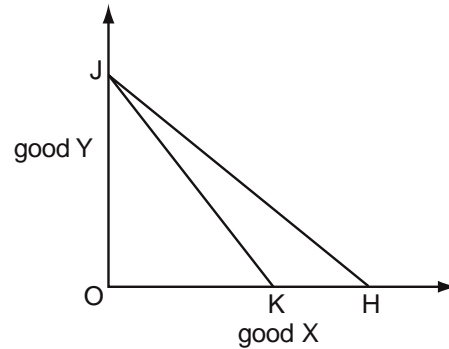


What can definitely be deduced from the diagram?

- A There has been an increase in the consumer's money income.
- B There has been a reduction in the price of both X and Y.
- C There has been no change in the price of X or Y.
- D There has been no change in the price of X relative to the price of Y.

J/07/3/03

9 In the diagram a consumer's budget line shifts from JK to JH.

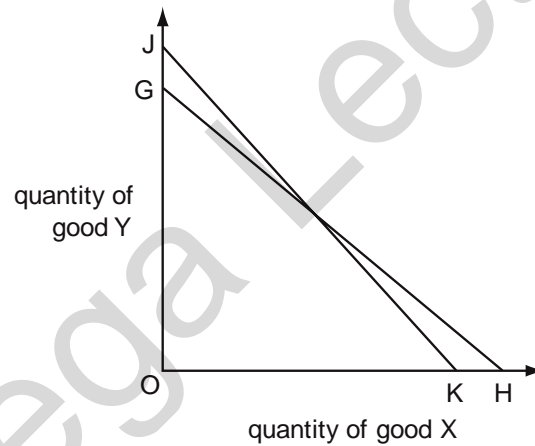


What can definitely be concluded from the diagram?

- A There has been no change in the price of good Y.
- B There has been a reduction in the price of good X.
- C There has been an increase in the consumer's money income.
- D There has been an increase in the consumer's real income.

J/08/3/03

10 In the diagram a consumer's initial budget line is JK.

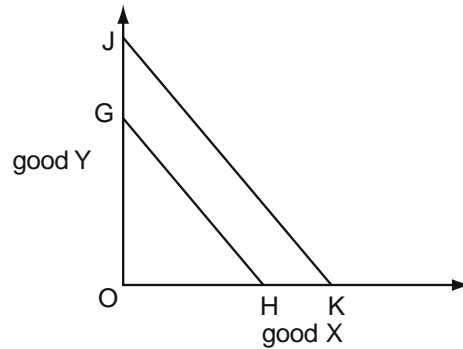


Assuming no change in the price of Y, what could explain a shift in the consumer's budget line to GH?

	price of good X	consumer's money income
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

N/08/3/03

11 In the diagram a consumer's budget line shifts from GH to JK.

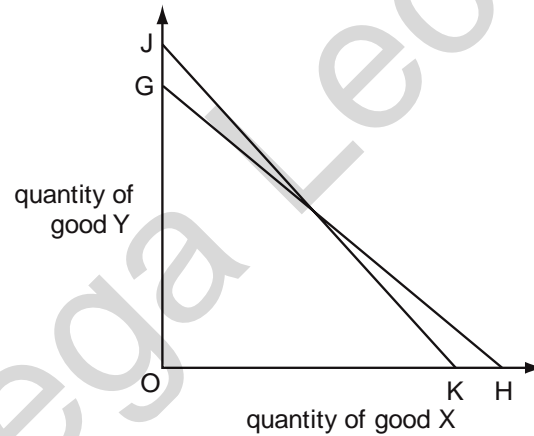


Regardless of any other changes that might occur, what **must** be correct?

- A There has been an equal proportionate increase in the price of X and Y.
- B There has been an equal proportionate decrease in the price of X and Y.
- C There has been an increase in the consumer's money income.
- D There has been an increase in the consumer's real income.

J/09/3/03

12 In the diagram a consumer's budget line shifts from JK to GH.

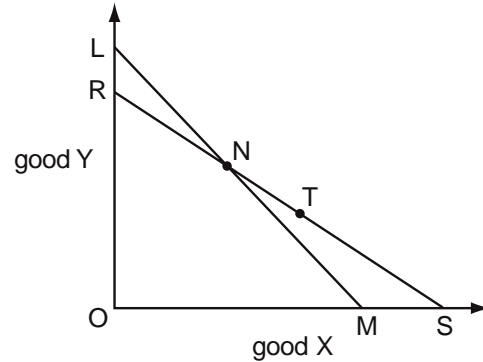


Which statement must be correct?

- A There has been an increase in the consumer's money income.
- B There has been a decrease in the consumer's real income.
- C Good Y has become relatively more expensive.
- D The price of good X has increased.

N/09/3/02

- 13** In the diagram, an individual initially chooses combination N on budget line LM. An increase in his money income accompanied by an increase in the price of good Y causes his budget line to shift to RS, and he now chooses combination T.

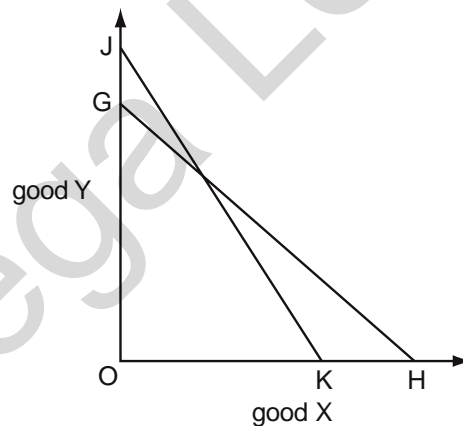


How does this affect his economic welfare?

- A** He is definitely better off because his money income has increased.
- B** He is definitely worse off because he has to pay more for good Y.
- C** He is better off since combination T, which he now chooses, was not previously available to him.
- D** He is worse off since combinations of X and Y along LN are no longer available to him.

J/10/3/02

- 14** In the diagram a consumer's budget line shifts from GH to JK.

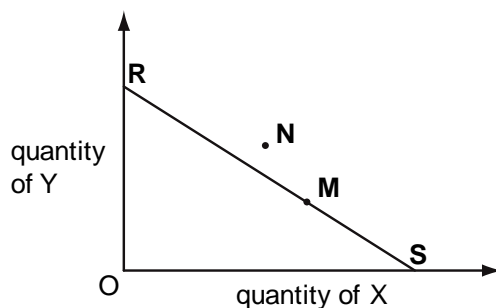


Which statement must be correct?

- A** The price of good X has increased relative to the price of good Y.
- B** The prices of both goods have fallen.
- C** There has been an increase in the consumer's real income.
- D** There has been an increase in the consumer's money income.

N/10/3/03

**15** The line **RS** in the diagram shows the different combinations of goods X and Y that a consumer can afford with his present income.

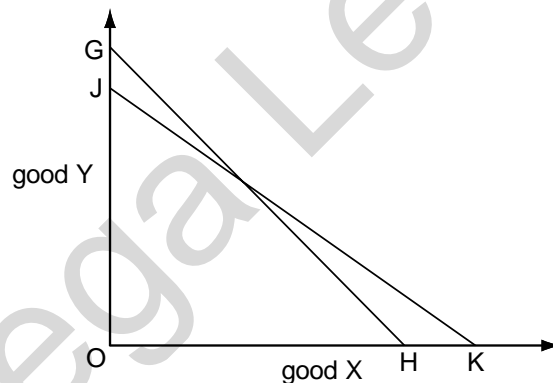


The consumer's original equilibrium is at **M**.  
 What could explain a change in his equilibrium position to **N**?

- A** a change in his tastes
- B** a decrease in the price of X and a bigger percentage increase in the price of Y
- C** an increase in the price of X and an increase in his income
- D** equal percentage increases in his income and in both prices

J/11/32/02

**16** In the diagram, a consumer's initial budget line is JK.



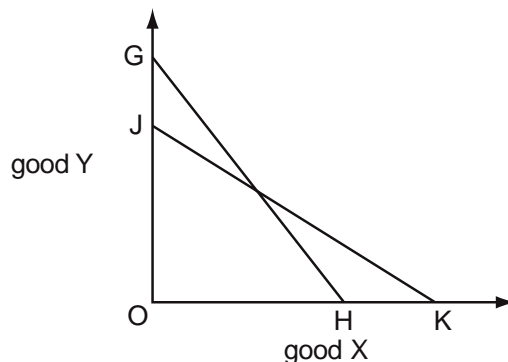
Assuming no change in the price of X, what could explain a shift in the consumer's budget line to GH?

	price of good Y	consumer's money income
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase



J/12/32/3

17 The curve GH in the diagram is a consumer's initial budget line.

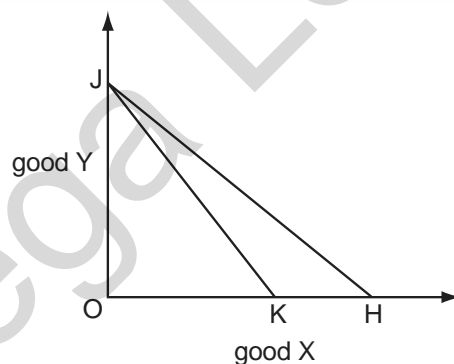


Which combination could cause the budget line to shift to JK?

	price of good X	consumers' money income
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

N/12/32/03

18 In the diagram a consumer's budget line shifts from JK to JH.

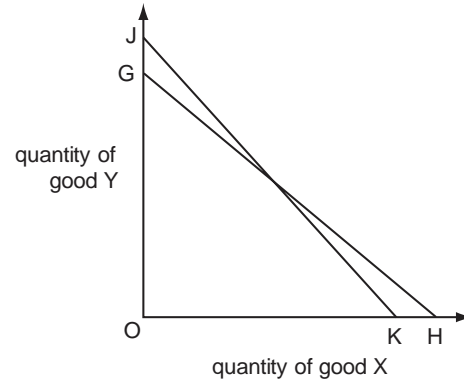


What can definitely be concluded from the diagram?

- A** There has been a decrease in the price of good Y.
- B** There has been a decrease in the consumer's money income.
- C** There has been an increase in the consumer's real income.
- D** There has been no change in the price of good X.

J/13/32/03

19 In the diagram a consumer's budget line shifts from GH to JK.

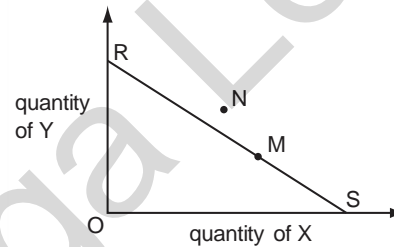


Which statement must be correct?

- A The price of good Y has fallen relative to the price of good X.
- B There has been a decrease in the price of good Y.
- C There has been an increase in the price of good X.
- D There has been an increase in the consumer's real income.

N/13/32/03

20 The line RS in the diagram shows the different combinations of goods X and Y that a consumer can afford with her present income.



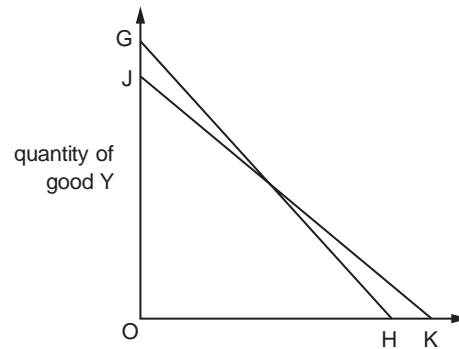
The consumer's original equilibrium is at M.

What could explain a subsequent change in her equilibrium position to N?

- A a change in her tastes
- B an increase in the price of X and a fall in the price of Y
- C an increase in the price of X and a smaller percentage increase in the price of Y
- D equal percentage increases in her income and in both prices

J/14/32/02

21 In the diagram, a consumer's initial budget line is JK.

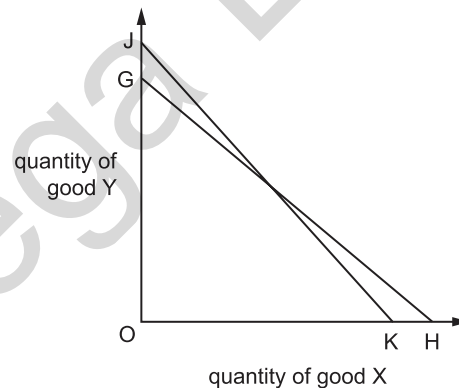


Assuming no change in the price of X, what could explain a shift in the consumer's budget line to GH?

	price of good Y	consumer's money income
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

N/14/32/03

22 In the diagram a consumer's budget line shifts from GH to JK.

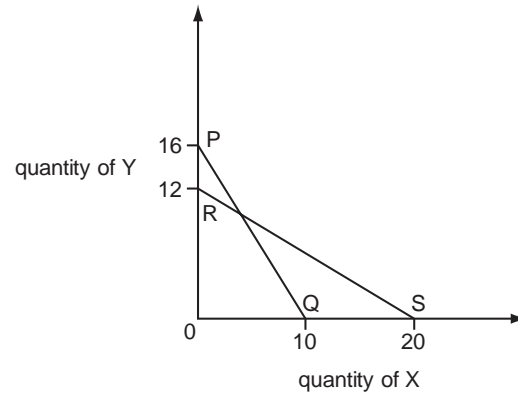


Which statement must be correct?

- A** There has been an increase in the consumer's real income.
- B** There has been a decrease in the consumer's real income.
- C** Good Y has become relatively more expensive.
- D** Good X has become relatively more expensive.

N/15/32/03

**23** In the diagram, PQ is a consumer's original budget line.



The consumer's income increases from \$80 to \$120 and, at the same time, the prices of X and Y change.

If the consumer's budget line is now RS, what are the new prices of X and Y?

	price of X (\$)	price of Y (\$)
<b>A</b>	4	12
<b>B</b>	6	10
<b>C</b>	10	8
<b>D</b>	12	6

### Section: 3 Normal, Inferior and Giffen Goods

Normal goods are those, the demand of which varies directly with income whereas that of inferior goods moves inversely with income. Giffen goods are a special type of inferior goods, the demand of which rises directly with price. They are named after a farmer who observed an abnormal relationship between price and quantity demanded of potatoes. To his surprise, increased prices of potatoes increased their demand and consumers purchased fewer potatoes when they were cheaper. Potatoes were considered to be a low quality inferior good and the money saved from their price reduction was spent on other food items with a higher nourishment value rather than potatoes themselves.

Consider the example of a hotel undergoing major renovation work. The owner, wanting to furnish 100 rooms with high definition LCD televisions, finds out that his budget does not allow this lavish expense. He decides to furnish only 30 rooms with modern high definition (HD) televisions and purchase 70 traditional televisions for remaining ones. However, just before the actual purchase, the price of old fashioned televisions decreases, increasing the purchasing power of the hotel owner.

Where is he more likely to spend this “gain” in purchasing power? Will he buy more of the cheaper, old fashioned televisions or more of HD televisions?

It is pretty likely that the owner will buy more of better quality televisions and less of low quality ones, even though they're cheaper.

Consider another example where a family regards mutton as a normal good and beef, inferior. Their budget restrains the consumption of mutton to twice a week and beef is consumed on the remaining days. What does the family do when beef becomes cheaper? The amount saved from reduced price of beef is more likely to be spent on mutton. Likewise, increased price of beef forces the family to consume beef more frequently and forgo the luxury of eating mutton. Thus price and quantity demanded of beef are directly related.

Old fashioned televisions and beef are examples of Giffen goods. The increased purchasing power of consumers resulting from decreased prices of Giffen goods is spent on buying more of better quality goods rather than low quality Giffen goods.

### Real Income and Substitution Effects of a Price Change

The difference between normal, inferior and Giffen goods brings us to the discussion of price, income and substitution effects.

Substitution effect and real income effect are the two components of total price effect.

Price effect = substitution effect + real income effect

Price effect is usually negative- price of a product and its quantity demanded move inversely, hence a downward sloping demand curve. However, price effect may be positive in an exceptional case and result in an upward rising demand curve.

The substitution effect of price change is ALWAYS negative as increased price makes consumers substitute away from the relatively expensive product to cheaper alternatives.

Real income shows the purchasing power and decreases whenever price level rises.

Purchasingpower / realincome =  $\frac{\text{Money income}}{\text{Price level}}$

Real income effect could either be positive or negative. Income effect is positive where increased real income raises quantity demanded i.e. in the case of normal goods and negative for inferior goods.

Negative substitution effect and positive real income effect reinforce each other, resulting in a negative price effect.

Negative substitution effect and negative real income effect weaken each other. Where substitution effect outweighs the income effect, total price effect remains negative. It becomes positive and results in an upward sloping demand curve if negative income effect offsets the negative substitution effect. This happens in the case of Giffen goods.

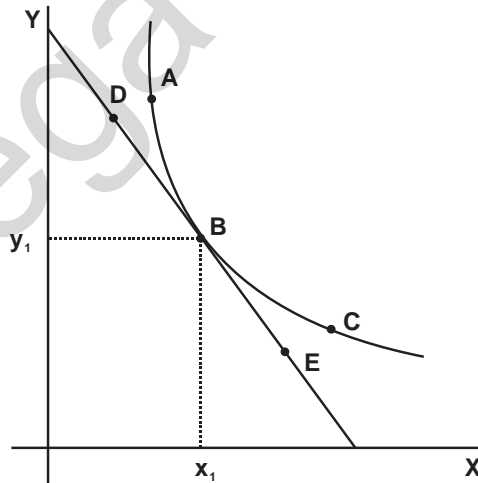
For Giffen goods, income effect is not only negative but also stronger than the substitution effect. Thus every Giffen is inferior but every inferior is not Giffen. The following table summarizes the effects of a price increase for different categories of products.

Product categories		Substitution effect	Real income effect	Price effect	Demand curve
Normal		Qd ↓	Qd ↓	Qd ↓	Downward sloping
Inferior	Non – Giffen inferior	Qd ↓	Qd ↑	Qd ↓	Downward sloping
	Giffen	Qd ↓	Qd ↑	Qd ↑	Upward rising

### Consumer's Equilibrium

The concepts of normal, inferior Giffen goods, and substitution and income effects are explained below with the help of indifference curves. A consumer attains equilibrium by allocating his limited resources in such a manner that he maximizes his utility. Graphically, it is established by the intersection of the budget line (which highlights the consumer's affordability) and indifference curves (which highlight a consumer's aspirations) as shown in diagram 3.1.

Diagram 3.1



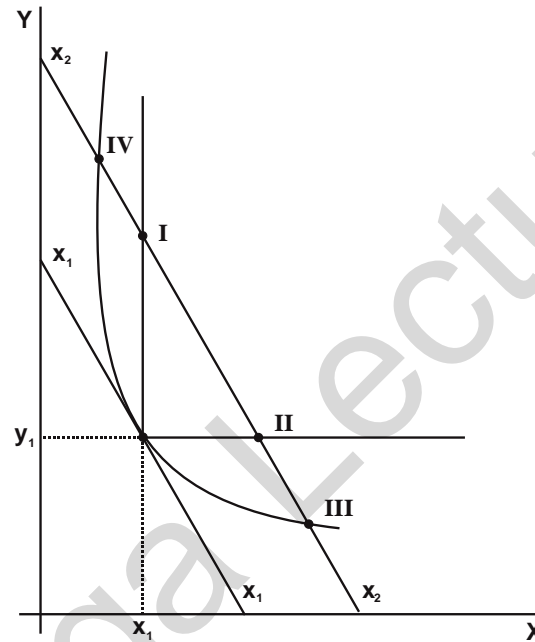
Though combinations A, B and C provide the same utility, the consumer will choose B, as combinations A and C lie outside the budget line, and are hence unaffordable. Similarly,

combinations D, B and E lie on the same budget line and hence cost the same to the consumer, but the consumer chooses B, as combinations D and E are on lower indifference curves, giving lesser utility to the consumer. Thus, the consumer's equilibrium is combination B, where he consumes  $x_1$  units of commodity X and  $y_1$  units of commodity Y. The slope of the indifference curve is  $MU_X / MU_Y$  and the slope of the budget line is  $P_X / P_Y$ , so at the point of intersection,  $MU_X / MU_Y$  equals  $P_X / P_Y$ , which is exactly similar to the condition of consumer's equilibrium established earlier in law of equi marginal utility.

#### Impacts of Changes in Consumer's Income on Consumer's Equilibrium

Increased income shifts the budget line towards the right, raises the demand for normal goods and decreases it for inferior goods. Diagram 3.2 illustrates the effects of increased income over consumer's equilibrium.

Diagram 3.2



The initial budget line is  $xx_1$ , where the consumer buys  $x_1$  units of commodity X and  $y_1$  units of commodity Y. Increased income shifts the budget line towards  $xx_2$  and the new consumer's equilibrium will be between points III and IV as the consumer chooses to move to a higher indifference curve as a result of increased income and purchasing power. However, the exact location of the new equilibrium depends on the consumer's perception of X and Y. Assuming that both X and Y are normal goods, the new consumer's equilibrium will be somewhere between point I and II, showing an increased demand for both X and Y. However, if the consumer perceives Y as a normal good and X as an inferior one, the new consumer's equilibrium will be between points I and IV, showing a decreased demand for X and a higher demand for Y. Assuming Y to be inferior and X to be a normal good, the new equilibrium will be between points II and III, showing an increased demand for X and a lower demand for Y as a result of increased income. It is worth noting that both X and Y can be normal goods at the same time but both cannot be inferior.

### Income Consumption Curve (ICC)

A higher income induces consumers to move to a higher indifference curve, so there is a separate equilibrium point for every different level of income, given by the intersection of indifference curves and budget lines. The curve which joins all such equilibrium points is known as Income Consumption Curve (ICC). ICC is upward rising if the consumer perceives all commodities as normal (Diagram 3.3a). However, it is negatively sloped if the consumer perceives one of the two commodities as inferior. In diagram 3.3b, X is assumed to be inferior (higher income reduces demand) and Y a normal good (higher income raises demand), whereas in diagram 3.3c, Y is assumed to be inferior and X is a normal good.

Diagram 3.3a

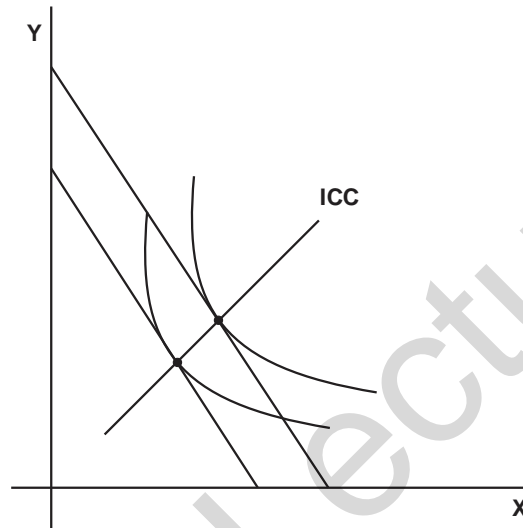


Diagram 3.3b

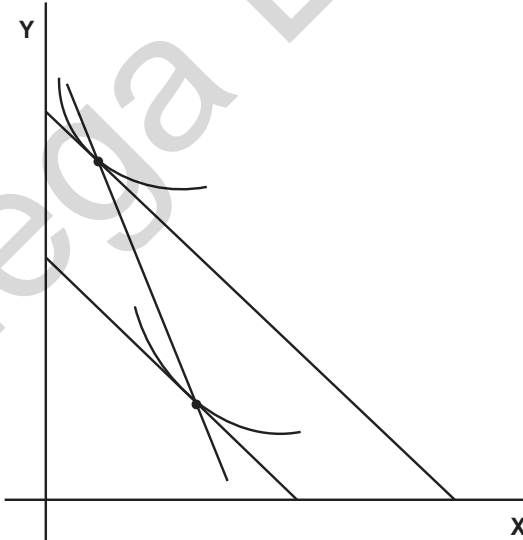
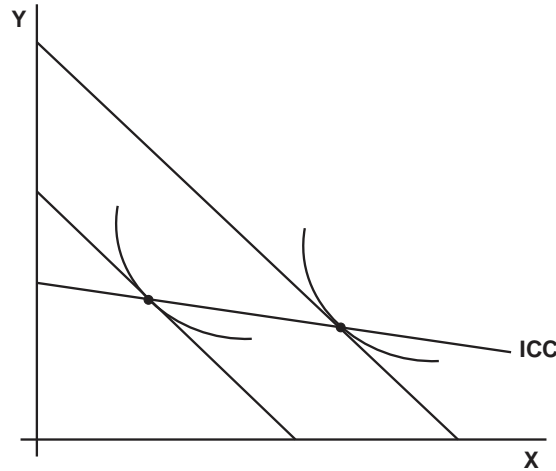




Diagram 3.3c



### Impacts of Changes in Price

The budget line pivots when either price of commodity X or Y changes. Diagram 3.4 shows the impact of reduction in price of X on the budget line. Before price reduction, the consumer was buying  $x_1$  units but after the reduction in price of X, the quantity demanded rises to  $x_2$ . This is known as price effect. Price effect can be divided into substitution and real income effects. Diagram 3.5 illustrates substitution and real income effects separately.

Diagram 3.4

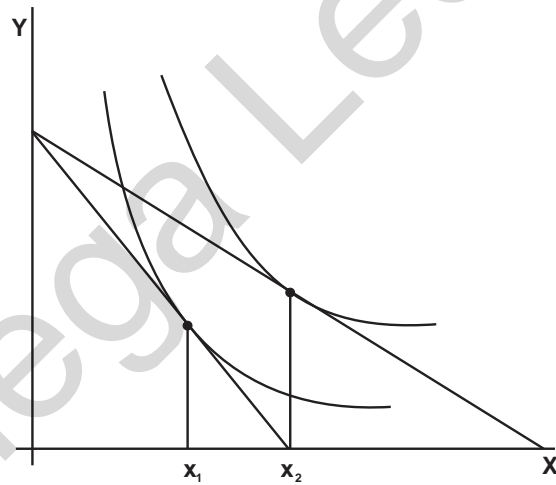
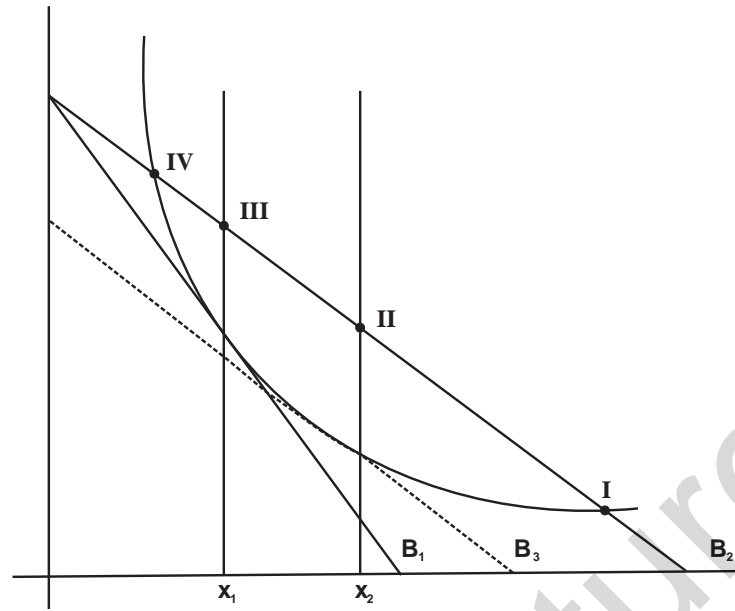


Diagram 3.5



The initial quantity purchased by the consumer is quantity  $x_1$ . The decrease in price of X causes a pivotal move to the new budget line  $B_2$ . To show the substitution effect separately, a hypothetical budget line  $B_3$  is drawn, which is parallel to  $B_2$  AND tangent to the initial indifference curve. This budget line shows the new price ratio of X and Y but the unchanged income. According to the substitution effect alone, the consumer raises the demand of X from  $x_1$  to  $x_2$ . Substitution effect is always negative and raises the demand of relatively cheaper products. However, real income effect may be positive or negative, depending on the nature of the product. The increased real income prompts the consumer to move to a higher indifference curve tangent to  $B_2$ . This is real income effect. Assuming that X is a normal good, the demand for X increases as a result of increased income and the new equilibrium will be to the right of  $x_2$  (between I and II). In this case, income effect is positive and is reinforced by the substitution effect i.e. they both raise the demand for X. However, if X is inferior, the new equilibrium will be between II and IV i.e. increased real income lowers the demand of X. In this case, the income effect is negative and tries to outweigh the substitution effect. In case the income effect is smaller than the substitution effect, the new equilibrium will be between II and III. Though the demand decreases as a result of increased income (negative income effect), the net effect on demand is an increase in demand, as a stronger substitution effect outweighs the income effect. This is a case of non Giffen inferior goods. In case negative income effect is stronger and outweighs the substitution effect, the new equilibrium will be between III and IV. This is a case of Giffen goods, where a decrease in price decreases the demand and results in an upward rising demand curve.

## Multiple Choice Questions (Section 3)

J/04/3/02

- 1 What is not held constant when calculating the income effect of a change in the price of a good?
- A the consumer's money income
  - B the consumer's preferences
  - C the consumer's real income
  - D the prices of other goods

N/04/3/03

- 2 What explains the slope of an individual's demand curve for a normal good?
- A market imperfections
  - B the law of variable proportions
  - C diminishing returns
  - D diminishing marginal utility

N/07/3/03

- 3 What is **not** held constant when calculating the substitution effect of a change in the price of a good?
- A the consumer's expenditure on other goods
  - B the consumer's money income
  - C the consumer's tastes
  - D the prices of other goods

N/11/32/01

- 4 Why does a normal demand curve for a product slope downwards from left to right?
- A Buyers' additional satisfaction declines as consumption rises.
  - B Consumers are faced with choices between competing products.
  - C Sellers are willing to accept lower prices on larger orders.
  - D The average cost of production falls as the scale of production increases.

N/11/32/04

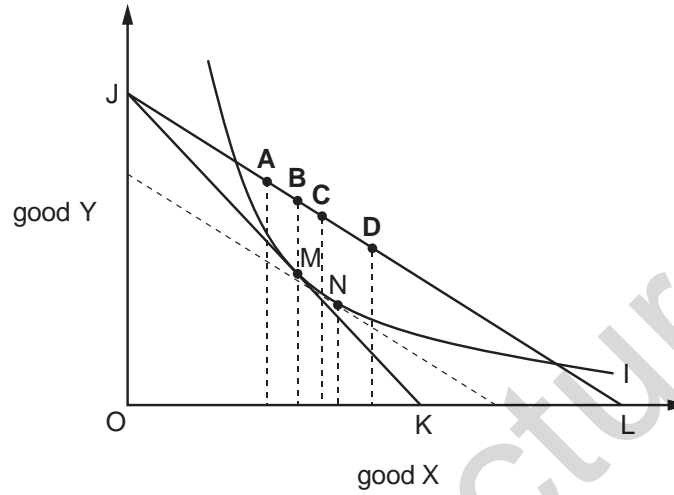
- 5 For the purposes of measuring the income effect of a change in the price of a good, what is not held constant?
- A consumer preferences
  - B relative prices
  - C the consumer's money income
  - D the consumer's real income

J/15/32/03

- 6 For the purposes of measuring the income effect of a change in the price of a good, what is not held constant?
- A consumer preferences
  - B relative prices
  - C the consumer's money income
  - D the consumer's real income

J/16/32/04

- 7 In the indifference curve diagram point M is the consumer's initial equilibrium and MN is the substitution effect of a fall in the price of good X.  
If good X is a Giffen good which point will be the consumer's new equilibrium point after the fall in the price of good X?



Mega Lecture

## Section: 4 Costs of the businesses

While looking at the theory of consumer choice and how much should people consume, we learnt that rational agents maximize total utility by consuming up to the point where relative benefits equal relative costs. Likewise, observing producer behavior typically yields that rational producers maximize profits and make pricing and output decisions accordingly. However, these decisions require some measure of input costs and the output obtained- cost curves are precisely, a way of obtaining that.

A production function measures the maximum amount of output that can be obtained using a given amount of inputs. Inputs, typically called factors of production, include land, labour, capital and entrepreneurship. Output directly depends on the quantity of inputs so employing a higher number of labor hours and machine hours per week produces higher output per week.

Costs on the other hand, can be split up into short run and long run costs on the basis of time. Short run costs are dictated by the Law of Diminishing Returns (see below) whereas long run costs are determined using the concept of returns to scale (see Section 5).

Short run is an economic period of time where at least one input is fixed i.e. its quantity can't be varied. Inputs, the quantity of which can not be varied immediately are said to be fixed e.g. purchasing and installing new equipment and machinery takes considerable time, thus rendering capital fixed. However, all types of capital are not fixed e.g. raw materials, the quantity of which can be altered instantly.

Labour on the other hand, is considered to be a variable input as its quantity can be varied according to the firm's requirements. An immediate labour requirement for instance, can be met through overtime, which is one way of increasing labour supply

Following is a short run production function where  $X$  denotes output made in a certain period of time,  $L$ , the number of labour hours and  $K$ , the number of machine/capital hours (Note that the quantities of inputs are in terms of hours and not in terms of number of workers or number of machines).

$$X = f(L, \bar{K})$$

$\bar{K}$  shows that capital is a fixed input, the quantity of which can not be changed in the short run.

The cost of inputs depends on both their quantities and prices. The cost of labour and capital for instance, depends on their respective number of hours employed and 'w' and 'r', where w is the wage rate per hour and r, the cost of one machine hour. Cost of machine hour includes the opportunity cost of capital tied up in plant and equipment as well as depreciation and normal wear and tear. Since an ordinary firm employs only a fraction of such a large market, input prices are beyond the control of an individual firm- w and r are given and constant.

## Laws of Variable Proportion

(Laws of returns to a variable input)

“When increasing quantities of a variable input are combined with a given amount of fixed input, there comes a point beyond which extra output from additional units of the variable input diminishes, *ceteris paribus*.”

Adding increasing quantities of a variable input to a given quantity of fixed input changes the proportion in which these inputs are hired. Thus, the law of diminishing returns is also known as law of variable proportion as it examines the effects on output of varying the proportion in which fixed and variable inputs are employed.

Consider the following example. A farmer’s productivity is expected to be low when working on a large piece of land since he would not be able to cultivate the whole of it. Hiring another farmer therefore, may increase the output more than proportionately since work is sensibly split up between the two. Eventually however, additional farmers have lesser space to work with so their contribution to output diminishes i.e. the process of combining increasing quantities of variable input (labour) with a given quantity of fixed input (land) does not increase output at an increasing rate forever.

Total Product (TP) measures output obtained per period of time using a given amount of inputs. Marginal product of labour ( $MP_L$ ) shows number of units of output made by hiring an additional unit of labour.  $MP_L$  is the rate of change of total product with respect to labour. For a production function exhibiting law of variable proportion,  $MP_L$  initially increases and eventually starts to diminish.

The following table shows how total product increases (see column 3), but at different rates. The production function yields increasing returns till four workers are employed. Diminishing returns start i.e.  $MP_L$  starts to decrease after the fifth worker is employed (see column 4).

**Table 4.1**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
K	L	TP	MP	AP	w	r	FC	VC	TC	MC	AFC	AVC	AC
number of hours		number of units			(£)								
1	0	0	-	-	10	10	10	0	10	-	-	-	-
1	1	10	10	10	10	10	10	10	20	1	1	1	2
1	2	22	12	11	10	10	10	20	30	0.83	0.45	0.91	1.36
1	3	36	14	12	10	10	10	30	40	0.71	0.28	0.83	1.11
1	4	52	16	13	10	10	10	40	50	0.625	0.19	0.77	0.96
1	5	66	14	13.2	10	10	10	50	60	0.71	0.15	0.76	0.91
1	6	78	12	13	10	10	10	60	70	0.83	0.13	0.77	0.90
1	7	88	10	12.57	10	10	10	70	80	1.0	0.11	0.80	0.91
1	8	96	8	12	10	10	10	80	90	1.25	0.10	0.83	0.93

K = Machine hours	FC = Fixed Cost	$MP = \frac{dTP}{dL}$
L = Labour hours	VC = Variable Cost	$AP = \frac{TP}{L}$
TP = Total Product i.e total output	TC = Total Cost	$TC = FC + VC$
MP= Marginal Product	MC = Marginal Cost	$MC = \frac{dTC}{dTP}$
AP= Average Product	AFC = Average Fixed Cost	$AFC = \frac{FC}{TP}$
w = wage rate/hour	AVC = Average Variable Cost	$AVC = \frac{VC}{TP}$
r = interest rate i.e. cost of capital/hour	AC = Average Cost	$AC = \frac{TC}{TP} = AVC + AFC$

**Relationship between Marginal Product (MP) and Total Product (TP)**

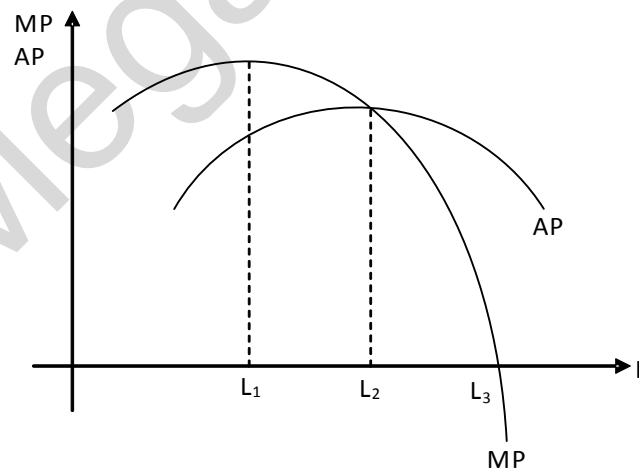
Marginal Product (MP) represents the slope of the Total Product function (*the slope of every total is its marginal!*) i.e. the ratio of change in TP and change in quantity of labour.

$$\text{Slope of Total Product} = \frac{dY}{dX} = \frac{dTP}{dL} = MP_L$$

**Relationship between Marginal Product (MP) and Average Product (AP)**

Consider your class, where the average age is say, 18 years. Supposing that a new student decides to join your class, the average age of the class increases if his age exceeds 18 years and decreases if it is less than that. The same rule applies to Average Product (AP) i.e. the ratio of Total Product (TP) and quantity of labour (L) and Marginal Product (MP). Observing columns 4 and 5 simultaneously we notice that AP rises as long as MP is higher than AP and falls when MP is less than AP, as shown in the diagram below. Direction of the change in MP does not determine the direction of the change in AP. AP increases as long as MP is above AP, irrespective of the direction of the change in MP.

Diagram 4.1



The diagram shows that AP rises as long as MP is above AP and falls when MP is below AP. MP cuts AP from above and at its maximum point. Thus, AP is maximized when MP equals AP.

Marginal Product (MP) is maximized when  $L_1$  labour hours are employed and diminishing returns set in beyond this point so that total product rises but at a falling rate. As table 4.1 shows, diminishing returns set in between the 4<sup>th</sup> and 5<sup>th</sup> labour hour.

Average Product (AP) is maximized when  $L_2$  labour hours are hired, beyond which AP begins to fall as MP lies below AP.

Total Product (TP) is maximized when  $L_3$  labour hours are hired, beyond which MP becomes negative and Total Product falls.

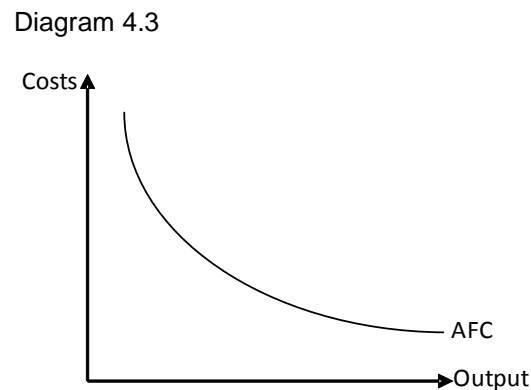
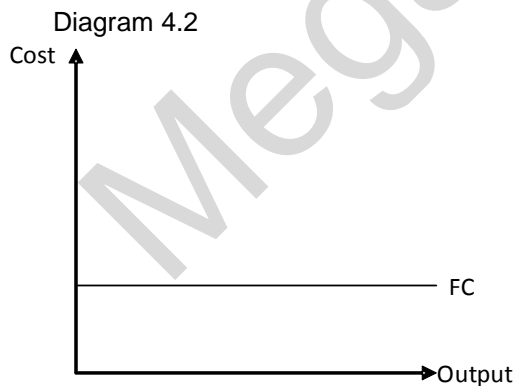
Thus along a Total Product curve, which is steep to start with but becomes increasingly flatter later on (rising MP i.e. increasing returns followed by falling MP i.e. decreasing returns), MP is the first to decrease, followed by AP and then Total Product.  
(try J/07/3/04)

In order to examine the effects of law of variable proportion on a firm's costs, we need to define the nature of costs. In the short run, total cost can be divided into two categories: fixed cost and variable cost.

### Fixed cost

Fixed cost is that portion of total cost which does not vary with the number of units made. It may change due to other factors like inflation but not the units of output produced. Examples include rent of building, depreciation, interest payments made to bank, royalties and salaries.

Our initial example (table 4.1) assumes price of labour and capital to be £10 per hour (see columns 6 & 7). Column 8 shows Fixed Cost (FC), the product of amount of capital (K) and the price of 1 machine hour (or r). Fixed Cost curve is a straight horizontal line as shown in diagram 4.2. Since Fixed Cost does not change with output, Average Fixed Cost (AFC) decreases with each additional unit produced as greater output spreads fixed costs over a larger volume- hence Average Fixed Cost is downward sloping, as shown in diagram 4.3 (try J/08/3/07 and N/02/3/07).





### Variable Cost

Variable cost is that portion of total cost which varies directly with the number of units produced e.g. the cost of raw materials and piece rate wages.

Variable Cost (VC) (see column 9) is the product of the quantity of variable input i.e. labour and the price of one labour hour (or  $w$ ). Variable Cost very obviously increases with additional units of output; however Average Variable Cost (AVC), the ratio of Variable Cost and Total Product may increase, decrease or stay the same. In the given example, it initially decreases but eventually increases with output (see column 13).

The following example should make the distinction between fixed and variable costs clearer. Consider the rent of a building that a tenant must pay- it is fixed for the period of lease agreement. The rent must be paid to the landlord through out the lease period, irrespective of the sales revenues or profits made. Thus, rent is a fixed cost. However, rent becomes variable once the lease period expires. It is then upto the tenant to either vacate the building and avoid paying the rent or renew the agreement with the landlord for another lease period. Rent becomes fixed once again when the lease agreement is renewed.

Following is a Short Run Total Cost function derived from a short run production function.

$$X = f(L, \bar{K})$$

$$\text{SRTC} = \text{VC} + \text{FC}$$

$$\text{SRTC} = L \cdot w + K \cdot r$$

In the equation above:

SRTC = Short Run Total Cost (Assuming that capital is fixed)

L= Number of labour hours

w = Wage rate per hour

K = Number of machine hours

r = Cost of capital per hour

VC= Total variable cost

FC= (total) fixed cost.

### Marginal Cost

Marginal cost is the cost incurred on producing an additional unit of output. It is the change in total cost due to a change in the number of units produced. The following formula is used to calculate marginal cost:

$$\text{Marginal cost} = \frac{\text{Change in total cost}}{\text{Change in output}}$$

$$\text{MC} = \frac{d\text{TC}}{dX}$$

As capital is fixed and prices of labour and capital i.e.  $w$  &  $r$  are beyond the control of an ordinary firm, any change in total cost is precisely because of the change in the quantity of variable input i.e. labour hours. Thus,

$$d\text{TC} = w \cdot dL$$

where  $d\text{TC}$  is change in TC,  $w$  is the wage rater per hour and  $dL$  is the change in the quantity of labour.

The relationship between Law of Returns and Marginal Cost is very interesting. Increasing returns occur when additional quantities of variable input combined with a fixed input increase output at an increasing rate. In other words, firms experiencing increasing returns face diminishing costs as they have to hire fewer labour hours to increase output at a constant rate. The following table helps understand the relationship between law of returns and law of costs.

**Table 4.2**

TP	L	$MP = \frac{dTP}{dL}$	K	W	R	$TC = w.L + r.K$	$MC = \frac{dTC}{dTP} = \frac{dTC}{MP}$
0	0	-	5	10	10	50	-
100	5	20	5	10	10	100	0.5
200	9	25	5	10	10	140	0.4
300	12	33.3	5	10	10	170	0.3
400	15	33.3	5	10	10	200	0.3
500	19	25	5	10	10	240	0.4
600	24	20	5	10	10	290	0.5
700	30	16.67	5	10	10	350	0.6

The production function above initially shows increasing returns and then decreasing returns. 5 labour hours are required to produce the first 100 units but only 4 are needed to make an additional 100. Increasing returns continue till 12 labour hours. Constant returns occur i.e. total product rises at a constant rate between 9 and 15 labour hours. Diminishing returns set in beyond 15 labour hours since increasing output by the same quantity i.e. 100 units requires ever increasing quantities of labour hours. The last column shows Marginal Cost and it is interesting to note that there are diminishing (marginal) costs whenever there are increasing returns. Total Cost starts to increase at an increasing rate i.e. MC begins to rise when diminishing returns set in.

Alternatively,

$$MC = \frac{dTC}{dTP} = \frac{dTC}{MP} = w \cdot \frac{dL}{MP}$$

Note: As discussed earlier,  $dTC$  equals  $w \cdot dL$ , the product of wage rate and change in the quantity of labour.

Thus, it is clear that whenever MP rises (increasing returns to variable input) MC falls (diminishing cost) and there are increasing costs (MC rises) when there are diminishing returns (MP falls).

Table 4.1 also proves this relationship (see column 4 and 11). It is also shown that MC is lowest when MP is at its maximum (try N/06/3/03).

**Average Cost**

Average Cost (column 14) is the ratio of Total Cost and Total Product (output). Average Cost may also be computed by summing Average Variable Cost (AVC) and Average Fixed Cost (AFC).

$$TC = FC + VC$$

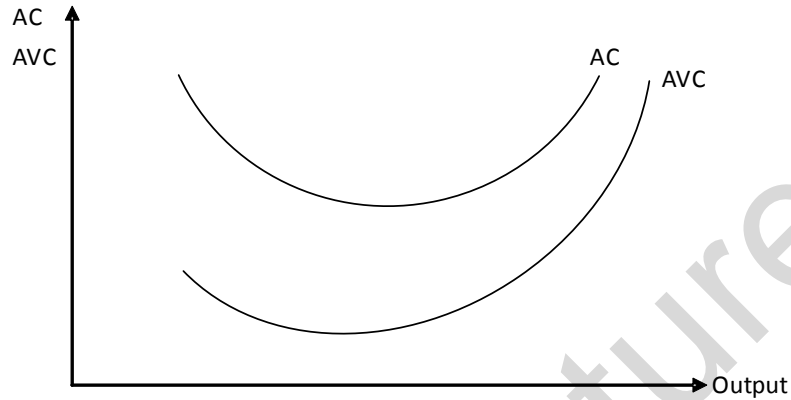
Dividing both sides by X i.e. output:

$$\frac{TC}{X} = \frac{FC}{X} + \frac{VC}{X}$$

$$AC = AFC + AVC$$

The following diagram helps understand the relationship between AC and AVC. Costs are shown along Y axis and output along X axis.

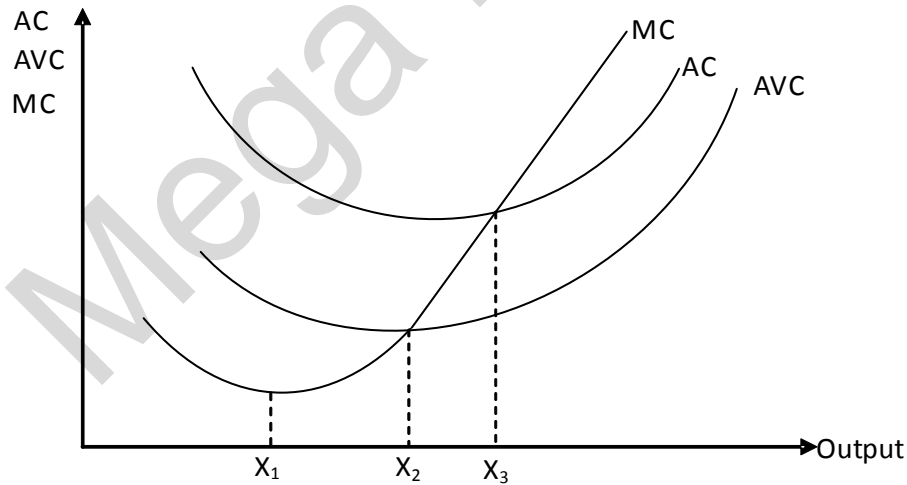
Diagram 4.4



AC and AVC are both U shaped but are not parallel. The vertical distance between AC and AVC i.e.  $(AC - AVC)$  equals AFC and since AFC always decreases with output, the vertical distance between AC and AVC always decreases with increases in output. As AFC never becomes zero, AVC always lies below AC.

**Marginal Cost, Average Cost and Average Variable Cost**

Diagram 4.5



The Marginal Cost curve is somewhat hockey shaped as MC falls initially (increasing returns) and then rises (decreasing returns). AC and AVC fall as long as MC is below AC and AVC. MC cuts AVC and AC from below and at their respective minimum points. Diminishing returns set in at output  $X_1$ . AVC and AC continue to fall till output  $X_2$  since MC is still below them. AVC starts to increase at  $X_2$  but AC continues to fall till  $X_3$ . Between  $X_2$  and  $X_3$ , the decrease in AFC outweighs the increase in AVC. AC increases beyond  $X_3$  as decreasing AFC no longer outweighs increasing AVC.

Viewing from origin, MC increases first, followed by AVC and AC respectively.

There is no relationship between Marginal Cost and Average Fixed Cost curve. MC can cut AFC at any point.

### **Total Cost (TC), Variable Cost (VC) and Fixed Cost (FC)**

In the panel of output and costs, Fixed Cost shows as a straight horizontal as it does not change with the number of units made. Total Cost and Variable Cost are parallel curves, the constant difference between them measuring Fixed Cost. Total Cost and Fixed Cost share the same vertical intercept as Total Cost equals Fixed Cost at zero output. Put another way, variable costs are zero when no output is generated and TVC therefore begins from the origin.

The slope of both TC and TVC measures Marginal Cost. In the diagram, Total and Variable Cost Curves initially become flatter showing decreasing Marginal Cost and increasing returns to a variable input. Then roughly around output  $X_1$ , TC and VC start becoming steeper showing increasing Marginal Cost and diminishing returns to variable input.

The relationship between Marginal Cost, Average Variable Cost and Average Cost can also be verified by looking at the following pair of diagrams:

Diagram 4.6(a)

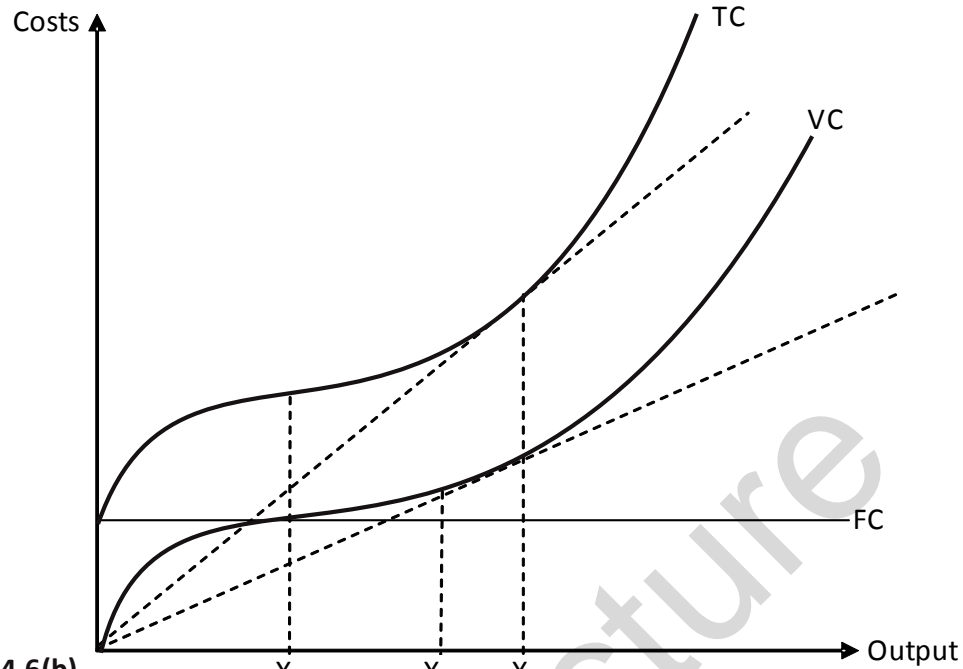
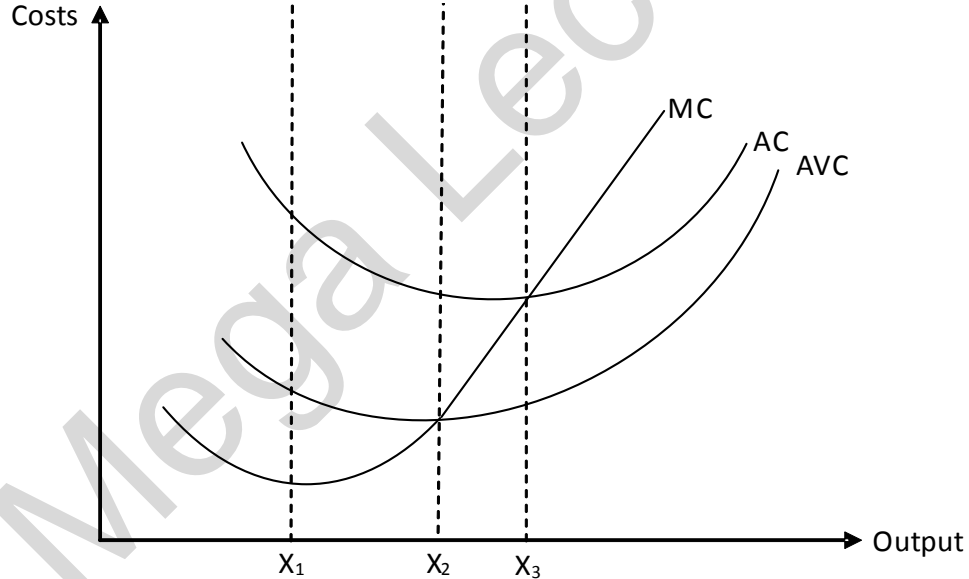


Diagram 4.6(b)



Diagrams 4.6(a) and 4.6(b) are drawn assuming initial increasing returns followed by diminishing returns later on. Marginal cost is represented by the slope of TC in diagram 4.6(a) whereas the slope of a straight line drawn from origin to certain point on Total Cost measures Average Cost i.e. the ratio of Total Cost and output.

At output  $X_3$ , the straight line drawn from origin not only measures AC but also MC- thus MC equals AC at this point. Average Cost is minimized at an output level where a straight line drawn from origin (the slope of which measures AC) becomes tangent to the Total Cost Curve (the slope of which measures MC). MC equals AC at this level of output, is less than AC at output levels below it and higher than AC at output levels beyond it. AC decreases till  $X_3$  and increases beyond it since the straight lines drawn from origin towards Total Cost Curve become increasingly flatter till  $X_3$  and increasingly steeper beyond it.

At output  $X_2$ , AVC equals MC since the straight line drawn from origin not only calculates AVC but also MC at this point. Average Variable Cost is minimized at the output level where a straight line drawn from origin becomes tangent to the Variable Cost Curve. MC equals AVC at this output. MC is lesser than AVC at output levels below this quantity and higher than AVC beyond it. Thus, AVC decreases till  $X_2$  and increases beyond it.

The vertical distance between AC and AVC measures AFC. Average Fixed Cost (AFC) decreases whenever output increases so the vertical distance between AC and AVC decreases throughout.

Total Cost and Variable Cost curves are always parallel whereas Average Cost and Average Variable Cost curves can never be parallel.

### Linear Total Cost Curve

Total Cost Curve can be straight line if we assume constant returns to a variable input. Constant returns mean that Total Product and Total Cost rise at a constant rate i.e. MP and MC are constant. The following table is constructed assuming constant returns to scale and represents the pair of diagrams 4.7 (a) & (b).

Output	Total Cost	Fixed Cost	Variable Cost	Marginal Cost	Average Cost	Average Variable Cost	Average Fixed Cost
0	10	10	0	-	-	-	-
1	20	10	10	10	20	10	10
2	30	10	20	10	15	10	5
3	40	10	30	10	13.33	10	3.33
4	50	10	40	10	12.5	10	2.5
5	60	10	50	10	12	10	2
6	70	10	60	10	11.67	10	1.67
7	80	10	70	10	11.42	10	1.42

Diagram 4.7(a)

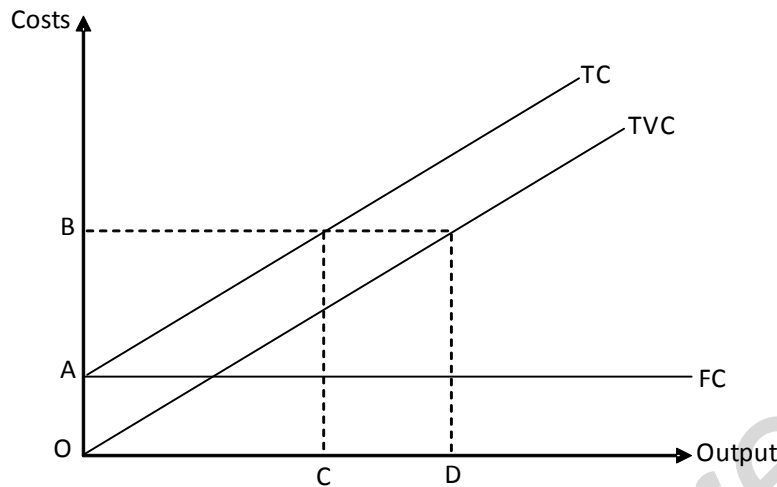
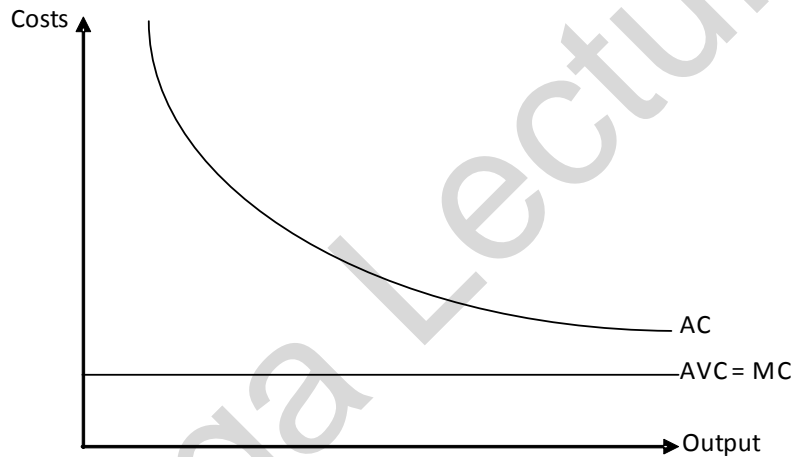


Diagram 4.7(b)



In diagram 4.7(a) Total Cost and Variable Cost are straight line, hence Marginal Cost is constant. Additionally, the slope of the Variable Cost Curve also measures Average Variable Cost i.e.

$$\frac{\text{Variable Cost}}{\text{output}}$$

$$MC = \frac{dVC}{dQ} = \frac{VC}{Q} = \frac{Ob}{Od} = AVC$$

Thus MC and AVC are equal and constant throughout.

The slope of AC can be determined by extending straight lines from the origin to various points on the Total Cost Curve. Average Cost diminishes throughout since these straight lines become flatter and flatter, however, Average Cost always stays higher than Marginal Cost since slope of the straight line i.e. AC is always higher than the slope of Total Cost i.e. MC.

$$MC = \frac{dTC}{dQ} = \frac{AB}{OC}$$

$$AC = \frac{TC}{Q} = \frac{OB}{OC}$$

$$OB > AB$$

Average Cost > Marginal Cost

Alternatively, given the linear Total Cost Curve:

$$TC = a + bQ$$

$a$  equals FC or the vertical intercept of Total Cost Curve and  $b$  is the slope of Total Cost Curve which is Marginal Cost ( $bQ = VC$ ).

$$MC = \frac{dTC}{dQ} = b \quad (\text{first derivative of total cost with respect to output})$$

$$AC = \frac{TC}{Q} = \frac{a}{Q} + \frac{bQ}{Q} = \frac{a}{Q} + b$$

$$AVC = \frac{VC}{Q} = \frac{bQ}{Q} = b$$

The workings above show that AVC and MC are equal and constant whereas AC decreases whenever output i.e.  $Q$  increases ( $a$  and  $b$  are positive and constant). Since  $a$  is positive, AC is always higher than AVC and MC.

Assuming zero fixed costs, Average Cost, Average Variable Cost and Marginal Cost are equal and constant for a straight line Total Cost function. Refer to the following table and diagrams.

Output	Total Cost	Fixed Cost	Variable Cost	Marginal Cost	Average Cost	Average Variable Cost	Average Fixed Cost
0	0	0	0	-	-	-	-
1	10	0	10	10	10	10	10
2	20	0	20	10	10	10	10
3	30	0	30	10	10	10	10
4	40	0	40	10	10	10	10
5	50	0	50	10	10	10	10
6	60	0	60	10	10	10	10
7	70	0	70	10	10	10	10



Diagram 4.8 (a)

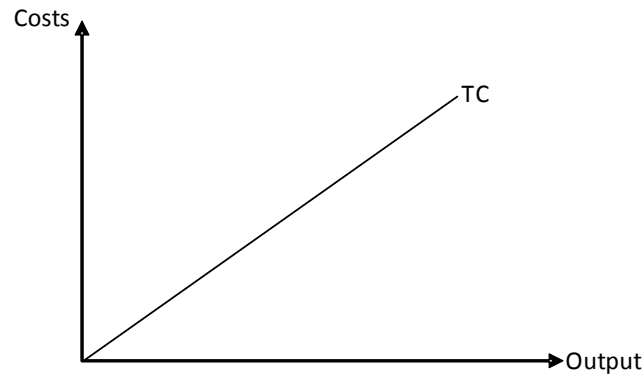


Diagram 4.8 (b)



**For a straight line Total Cost Curve (assuming Fixed Cost > 0)**

- Average Cost decreases throughout and is parallel to Average Fixed Cost
- Average Cost exceeds Marginal Cost at all points
- Marginal Cost equals Average Variable Cost and both are constant throughout

**For a straight line Total Cost Curve (assuming Fixed Cost=zero)**

- Average Cost, Marginal Cost and Average Variable Cost are equal and constant throughout

### Multiple Choice Questions (Section 4)

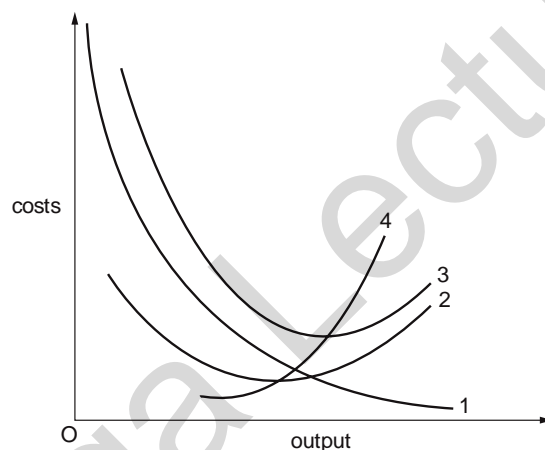
J/02/3/11

- 1 A firm is producing at the level of output at which its average variable cost is equal to its marginal cost.  
 What will happen initially to its average variable cost and to its average total cost if it increases its output?

	Average variable cost	Average total cost
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

N/02/3/07

- 2 The diagram shows the short-run cost curves of a firm.



Which statement is correct?

- A** Curve 1 is the average fixed cost curve.
- B** Curve 2 is the marginal cost curve.
- C** Curve 3 is the average variable cost curve.
- D** Curve 4 is the average total cost curve.

N/03/3/10

- 3 The schedule shows the short-run marginal cost of producing good X.

units of X	1	2	3	4	5	6
marginal cost (\$)	40	30	26	34	50	90

Given that the total fixed cost is \$30 what is the level of output that minimises average total cost?

- A** 2 units
- B** 3 units
- C** 4 units
- D** 5 units

N/04/3/05

- 4 Which statement explains why in the short run labour is subject to the law of diminishing returns?
- A As additional workers are hired, output decreases.
  - B As employment increases, the capital-labour ratio falls.
  - C As employment increases, wage rates will have to be increased.
  - D As output expands, sooner or later diseconomies of scale will set in.

N/04/3/10

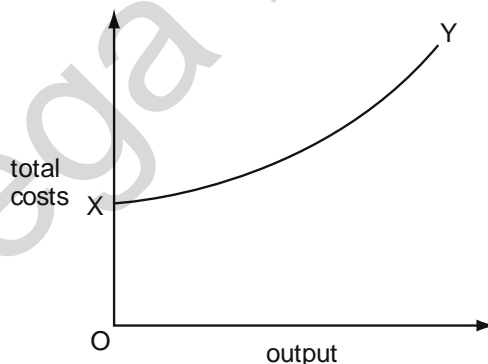
- 5 What is marginal cost?
- A the difference between the total cost of producing  $n$  and  $n - 1$  units of output
  - B the difference between the average variable cost of producing  $n$  units and  $n - 1$  units of output
  - C the difference between the average total cost of producing  $n$  units and  $n - 1$  units of output
  - D the average variable cost of producing one more unit

J/05/3/04

- 6 According to the law of diminishing returns, what happens as more of a variable factor is combined with a fixed factor?
- A An increase in the price of the variable factor will eventually result in an increase in production costs.
  - B A reduction in the quality of the variable factor will eventually result in an increase in production costs.
  - C Fewer units of the variable factor will be needed to produce equal increases in output.
  - D The proportions in which the factors are combined will eventually result in progressively smaller increases in output.

J/05/3/09

- 7 In the diagram, XY is a firm's total cost curve.



What happens to the firm's costs as output is increased?

	average fixed costs	marginal costs
A	decrease	constant
B	decrease	increase
C	constant	constant
D	constant	increase

N/05/3/04

- 8** The table shows the output of chairs at a factory when different numbers of workers are employed.

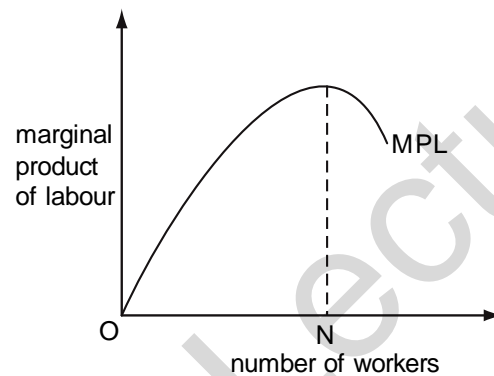
number of workers	0	1	2	3	4	5
number of chairs produced	0	7	17	29	38	42

Diminishing marginal returns to labour will set in when

- A** the second worker is employed.
- B** the third worker is employed.
- C** the fourth worker is employed.
- D** the fifth worker is employed.

N/06/3/03

- 9** The diagram shows the marginal product of labour curve (MPL) for a firm.



Labour is the only variable factor and the firm pays its workers the market wage.

At the level of employment ON, which statement is correct?

- A** The firm is maximising its output.
- B** The firm is minimising its total costs.
- C** The firm is minimising its wage bill.
- D** The firm is minimising its marginal cost of production.

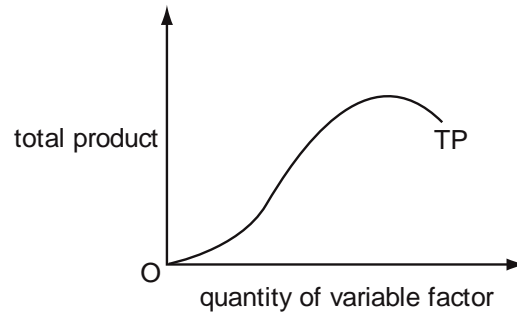
N/06/3/06

- 10** If a firm experiences an increase in its fixed costs, how will its average variable cost and its marginal cost be affected?

	average variable cost	marginal cost
<b>A</b>	rise	rise
<b>B</b>	rise	no change
<b>C</b>	no change	rise
<b>D</b>	no change	no change

J/07/3/04

- 11 The diagram shows the total product curve for a single variable factor, assuming all other factor inputs are held constant.



In which order do the total product (TP), average product (AP) and marginal product (MP) begin to decrease as the input of the variable factor is increased?

	First	Second	Third
<b>A</b>	AP	MP	TP
<b>B</b>	AP	TP	MP
<b>C</b>	MP	AP	TP
<b>D</b>	MP	TP	AP

J/07/3/09

- 12 The short-run total costs of a firm are given by the formula

$$\text{SRTC} = \$ (10\,000 + 5X^2)$$

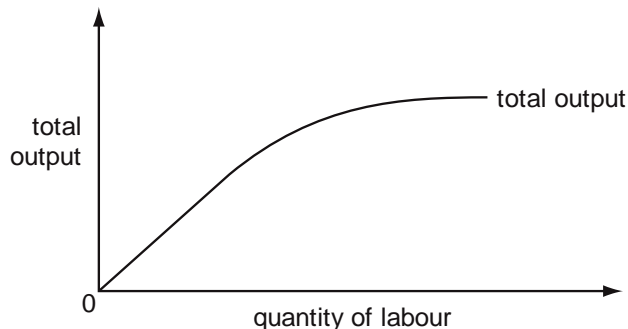
where X is the level of output.

What are the firm's average fixed costs?

- A** \$10 000
- B**  $\frac{\$(10\,000 + 5X^2)}{X}$
- C**  $\frac{\$10\,000}{X}$
- D**  $\frac{\$(5X^2 - 10\,000)}{X}$

N/07/3/04

13 The diagram shows the short-run relationship between the total output of a firm and the quantity of labour.



What can be concluded about the firm?

- A It is experiencing increasing returns to scale.
- B It is experiencing constant returns to scale.
- C The marginal physical product of capital is constant.
- D The marginal physical product of labour eventually diminishes.

N/07/3/07

14 The table shows a firm's total and marginal costs.

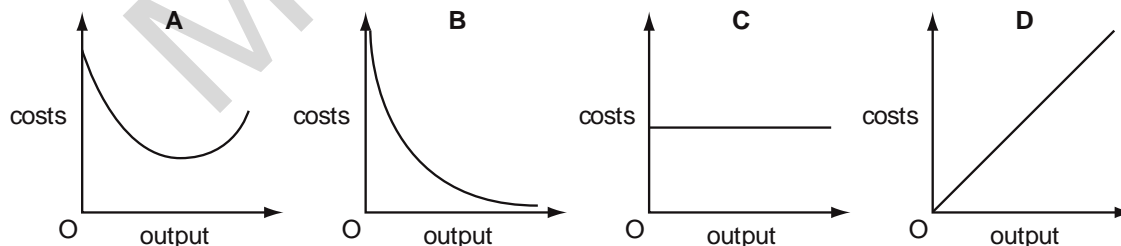
output	total cost (\$)	marginal cost (\$)
1	200	20
2	215	15
3	225	10
4	240	15
5	260	20

What is the average fixed cost of producing 6 units?

- A \$20
- B \$30
- C \$180
- D \$200

J/08/3/07

15 Which diagram shows a firm's total fixed cost curve?



N/08/3/04

- 16** Which statement explains why labour is subject to the law of diminishing returns in the short run?
- A** As additional workers are hired, total output decreases.
  - B** As employment increases, the capital-labour ratio falls.
  - C** As employment increases, wage rates will have to be increased.
  - D** As output increases, eventually diseconomies of scale will occur.

N/08/3/08

- 17** The table shows the production of a firm.

production (tonnes)	total cost (\$)
0	20
1	30
2	35
3	40
4	45
5	50

What is the average variable cost of producing 5 tonnes of output?

- A** \$4.00      **B** \$5.00      **C** \$6.00      **D** \$10.00

N/09/3/03

- 18** Which statement describes a situation in which a rise in input of factor X, all other factors being constant, results in no change in a firm's output?
- A** There are diminishing returns to factor X.
  - B** Returns to scale are constant.
  - C** There are diseconomies of scale.
  - D** The marginal product of X is zero.

J/10/3/06

- 19** The schedule shows the short-run marginal cost of producing good X.

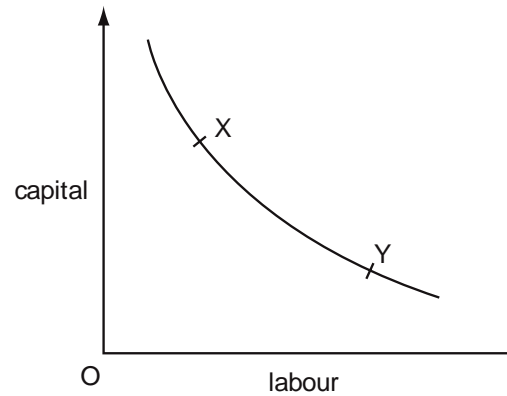
units of X	1	2	3	4	5
marginal cost (\$)	40	30	30	60	120

Given that the total fixed cost is \$20, what level of output minimises average total cost?

- A** 2 units      **B** 3 units      **C** 4 units      **D** 5 units

N/10/3/05

- 20** In the diagram, the curve shows the various combinations of labour and capital that can be employed to produce a given level of output.  
A firm chooses the combination of labour and capital shown by point X on the curve.

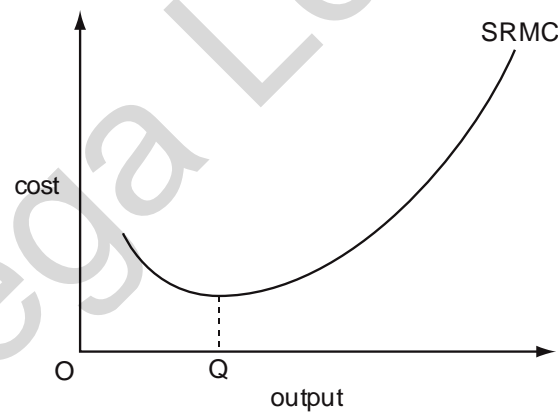


What could explain why the firm later chooses the combination of labour and capital shown by point Y?

- A** an increase in capital productivity
- B** an increase in interest rates
- C** an increase in labour productivity
- D** an increase in wage rates

N/10/3/08

- 21** The diagram shows a firm's short-run marginal cost curve.



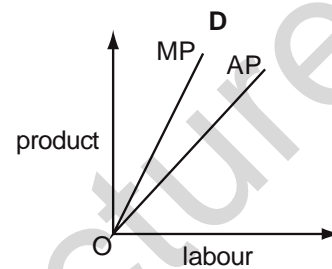
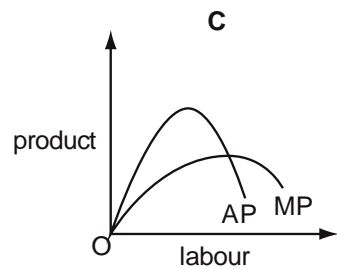
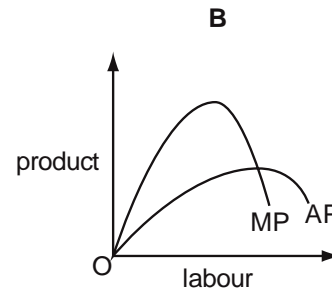
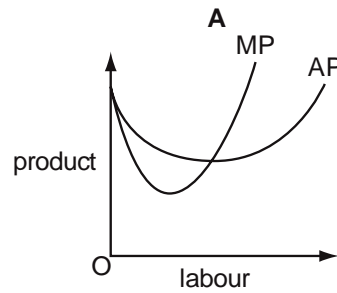
What explains why the curve is upward sloping at output levels above OQ?

- A** diseconomies of scale
- B** inelasticity of supply
- C** rising fixed costs
- D** the law of variable proportions



J/11/32/04

- 22 Which diagram correctly shows the relationship between the average product (AP) and the marginal product (MP) of labour given that the quantities of other factor inputs remain constant?



N/11/32/08

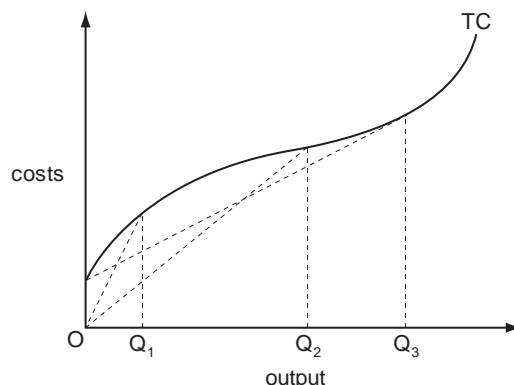
- 23 The short-run total costs (SRTC) of a firm are given by the formula  $SRTC = \$10\,000 + 5X^2$  where  $X$  is the level of output.

What are the firm's average fixed costs?

- A  $\$10\,000$   
 B  $\frac{\$(10000 + 5X^2)}{X}$   
 C  $\frac{\$10000}{X}$   
 D  $\frac{\$10000}{5X^2}$

N/13/32/08

24 In the diagram, TC is a firm's short-run total cost curve.



Which statement is correct?

- A Average total cost is minimised at output  $OQ_2$ .
- B Average variable cost is minimised at output  $OQ_1$ .
- C Average variable cost is minimised at output  $OQ_3$ .
- D Marginal cost is minimised at output  $OQ_1$ .

J/14/32/03

25 The table shows the output of chairs at a factory when different numbers of workers are employed.

number of workers	1	2	3	4	5
number of chairs produced	6	17	27	32	30

Diminishing marginal returns to labour will set in when

- A the second worker is employed.
- B the third worker is employed.
- C the fourth worker is employed.
- D the fifth worker is employed.

J/14/32/09

26 The table shows a firm's marginal costs.

output	marginal cost (\$)
1	40
2	30
3	20
4	30
5	40

The average fixed cost of producing 5 units is \$6.  
What is the total cost of producing 5 units?

- A \$46
- B \$70
- C \$190
- D \$230

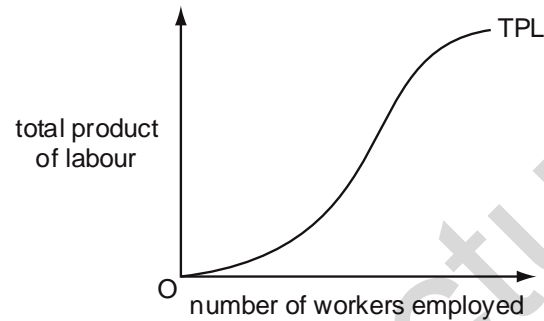
J/14/32/10

**27** What could explain why the proportion of total employment in an economy accounted for by small firms decreases?

- A** a trend towards the use of sub-contractors to produce specialised components
- B** growing technical economies of scale in manufacturing
- C** growth of the service sector and a decline in manufacturing
- D** the opening up of specialist markets as real incomes rise

J/15/32/04

**28** The diagram shows the total product of labour (TPL) curve for a firm whose only variable factor input is labour.



What explains the shape of the curve?

- A** diminishing marginal disutility of work
- B** increasing marginal disutility of work
- C** technical diseconomies of scale
- D** the law of variable proportions

J/15/32/08

**29** The table shows a firm's total and marginal costs.

output	total cost (\$)	marginal cost (\$)
1	340	40
2	375	35
3	400	25
4	435	35
5	475	40

What is the average fixed cost of producing 6 units?

- A** \$50
- B** \$60
- C** \$180
- D** \$300

## Section: 5 Cost Curves in the Long Run

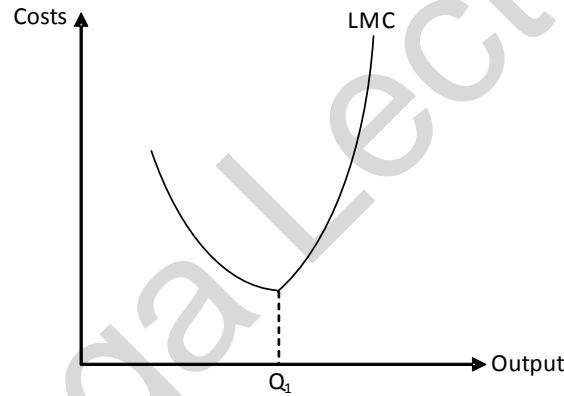
Long run is a period of time where quantity of all factors of production can be changed and consequently, all costs become variable. Long run production function describes the relationship between the output firm produces and quantities of factors of production it hires.

There are no fixed factor constraints in the long run and costs are determined using the concept of returns to scale. Law of returns to scale examines the effects on output of varying the scale or the size of the business. The scale or the size of the business changes only in the long run, since that is when the quantities of all inputs may be changed. This is why it becomes possible for a firm to employ production factors in a *fixed* proportion contrasting with *variable* proportions in the short run.

Increasing returns to scale occur when the percentage increase in output is greater than the percentage increase in the quantities of all inputs whereas diminishing returns to scale mean that doubling all inputs brings a less than 100% increase in output.

The following diagram shows the corresponding Long Run Marginal Cost function. Cost decreases where there are increasing returns to scale and increases when diminishing returns set in i.e. beyond output  $Q_1$ .

Diagram 5.1



### Economies of Scale

Economies of scale are reductions in per unit cost due to increased business size/scale. They can be categorized into internal and external economies. Whereas internal economies of scale are reductions in average cost attributed to business size, external economies arise either due to increased size of the industry or due to the location of the firm.

Internal economies of scale are further divided into the six types given below:

**(i) Commercial economies of scale**

A larger business can win a discount by buying raw materials and other inputs in bulk. Per unit material cost of a meal served in a big restaurant thus may be lower than that of serving the same meal in a smaller restaurant. Bigger stores like Wal Mart can win favourable credit terms and prices from suppliers, leading to reduced Average Variable Cost.

**(ii) Financial economies of scale**

A larger business carries lesser risk of failure and can provide adequate securities to banks. Thus, it can borrow money relatively easily and at lower mark-ups compared to smaller businesses. It may float shares to the general public, the per unit cost of which is less than that of a business which issues only a limited number of shares.

**(iii) Managerial economies of scale**

Firms need not double the number of managers when number of workers is doubled. The same number of managers can effectively manage a larger group of employees, thus per unit cost of managers decreases whenever business grows and number of employees increases.

**(iv) Technical economies of scale**

A larger business may better afford and justify the purchase of latest, modern technology to help improve efficiency and reduce per unit cost. For instance, a large furniture factory can employ automated machinery for greater efficiency and lower per unit cost. However, a smaller firm neither affords this technology nor does its small volume lead to a reduction in per unit cost.

**(v) Risk bearing economies of scale**

Larger businesses usually have diversified portfolios, with their risks spread over a range of products and activities. Profits of other products can cross subsidise those that incur losses. This cushion is unavailable to a smaller firm, where losses may easily lead to a complete collapse.

**(vi) Marketing economies of scale**

Per unit cost of reaching customers through marketing is lesser for a larger firm with a huge network. For example, a restaurant with 10 branches spending £100000 on marketing has a lower per branch cost compared to a restaurant with a single branch spending £25000 on marketing annually.

**Diseconomies of scale**

Contrasting economies are diseconomies of scale-increases in per unit cost due to increased size/scale of the business. Managerial diseconomies of scale are the most common where a business becomes too large to coordinate and control, thus, per unit cost increases as pilferage and wastage tend to increase. A firm experiencing higher transportation costs as its market expands incurs a higher per unit cost and hence, internal diseconomies of scale. Likewise, per unit cost rises when it becomes increasingly difficult to motivate workers in a large organization.

**External economies of scale**

External economies of scale are reductions in per unit cost due to increased size of industry or/and location of the firm. The improved infrastructure, availability of skilled labour, supplies of raw materials and other inputs helps firm reduce their production costs. Training sessions at an industry financed technical center, better communication resulting from growth of the local industry and trade information from a new trade journal are examples of external economies of scale.

External diseconomies of scale arise when per unit cost begins to rise due to factors beyond a firm's control e.g. as industry expands, it leads to increased traffic congestion, hence raising firms' transportation costs.

## Least Cost Combination

Profit maximizing firms use least cost combinations of labour and capital, ensuring that production occurs at the lowest possible cost. A least cost combination, as shown below, is where £1 spent on hiring either capital or labour yields the same return.

$$\frac{MP_L}{w} = \frac{MP_K}{r}$$

where  $MP_L$  and  $MP_K$  are the marginal products of labour and capital respectively,  $w$ , the wage rate/hour and  $r$ , capital cost/hour.

The firm must hire more labour and less capital if  $\frac{MP_L}{w} > \frac{MP_K}{r}$  since spending £1 on hiring labour

gives greater output than capital. Likewise, it must substitute labour for capital if  $\frac{MP_L}{w} < \frac{MP_K}{r}$ .

Consider the numerical example where:

$$MP_L = 100 \text{ units}$$

$$w = \text{£}10/\text{hour}$$

$$MP_K = 100 \text{ units}$$

$$r = \text{£}5/\text{hour}$$

$$\frac{MP_L}{w} < \frac{MP_K}{r}$$

$$\frac{100}{10} < \frac{100}{5}$$

$$10 < 20$$

Spending £1 on hiring capital provides 20 units whereas spending the same on hiring labour yields only 10 units. The firm can reduce its cost by employing more capital and less labour.  $MP_K$

diminishes with additional amounts of capital and  $MP_L$  increases. The process continues till  $\frac{MP_L}{w}$

equals  $\frac{MP_K}{r}$ . A least cost combination is obtained where  $\frac{MP_L}{w} = \frac{MP_K}{r}$  - no other combination of

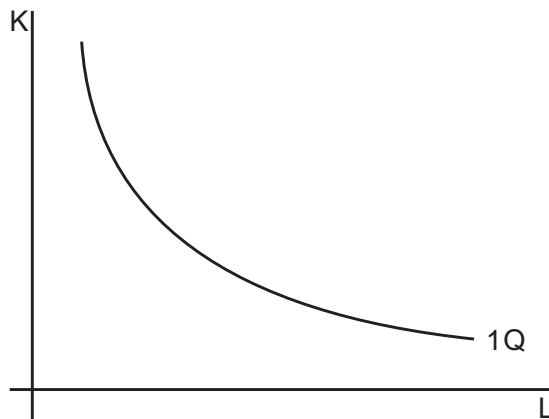
labour and capital decreases total cost of producing output. (Attempt J/04/3/13)

## Isoquant and Isocost Approach

Isoquant shows different combinations of labour and capital, which can be employed to produce a given level of output. All combinations on one isoquant show the same output, and a higher isoquant indicates higher output.

Isoquant is downward sloping, as more quantity of a factor of production (for example, labour) is required to produce the same output if the firm chooses to hire fewer units of the other input e.g. capital. The substitution of capital with labour results in a movement along isoquant, as indicated in diagram 5.2.

Diagram 5.2



An isoquant is not a straight line, rather it is convex if viewed from the origin i.e. its slope decreases throughout. The reason for the convex shape of an isoquant is that the firm is required to give up smaller and smaller quantities of capital (K) to have additional units of labour (L) to produce the same output. This is because of the law of diminishing marginal utility. The following table helps to explain this:

L	1	2	3	4	5
K	20	15	11	8	6

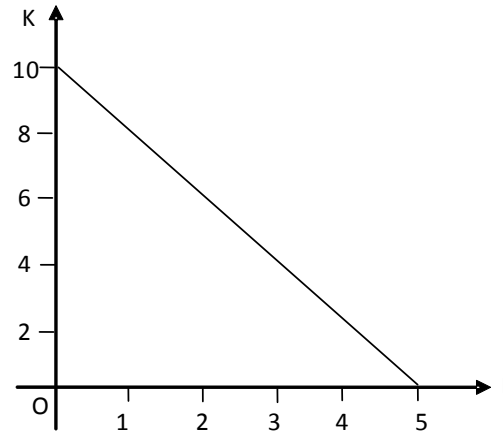
All combinations of K and L shown in this table are on the same isoquant, thus generating the same output. In order to substitute capital for labour i.e. to increase labour quantity from 1 to 2, the firm is required to give up 5 units of capital, as the loss of output by not having 5 units of capital is compensated by having one more unit of labour. However, the marginal product (MP) of the third unit of labour is lesser than the second, so the firm is required to give up a smaller quantity of capital (only 4 K) when it chooses to employ the third unit of labour. Similarly, for the fourth unit of labour, the firm is required to sacrifice an even smaller quantity of capital (3 K). The slope of isoquant is known as Marginal Rate of Factor Substitution (MRS), which decreases throughout, along an isoquant. MRS is the ratio of the change in K to the change in L. It is also the ratio of  $MP_K$  to  $MP_L$ . For example, if  $MP_K$  is 20 units and  $MP_L$  is 10 units, the firm is required to hire 2 more units of labour to compensate for the loss in output for not having 1 unit of capital, so the slope of isoquant is;

$$\frac{dK}{dL} = \frac{MP_L}{MP_K} = \frac{20}{10} = 2K/L$$

An isocost shows all possible combinations of labour and capital that a firm can employ with given resources and fixed factor i.e. wage rate (w) and interest rate (r). Assuming the firm has 10 and w and r are £2 and £1 per unit respectively, any of the following combinations of L and K can be employed.

L	5	4	3	2	1	0
K	0	2	4	6	8	10

Diagram 5.3



The following equation assumes, that all resources being spent on employing labor and capital.

$$R = w \cdot L + r \cdot K$$

Where:

R = Firm's money resources

w = wage rate/ hour

L = Quantity of Labor employed

r = Cost of capital/hour

K = Quantity of capital employed

Dividing both sides by r,

$$\frac{R}{r} = \frac{w}{r} \cdot L + K$$

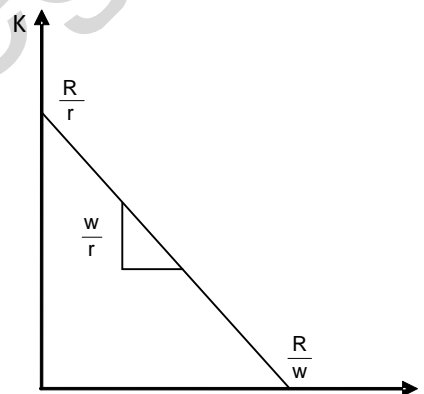
Rearranging,

$$K = \frac{R}{r} - \frac{w}{r} \cdot L$$

This is the linear equation of the isocost where  $\frac{R}{r}$  is the vertical intercept,  $\frac{R}{w}$  is the horizontal

intercept and  $\frac{w}{r}$ , the slope of the isocost. The slope is negative as the isocost is downward sloping. (See diagram 5.4)

Diagram 5.4

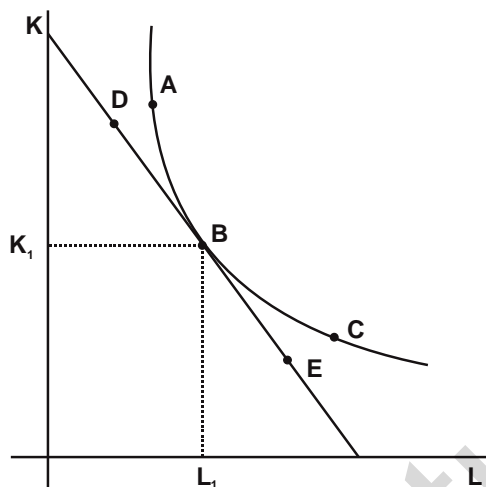




Least Cost Combination of Factors

The least cost combination is given by the intersection of isocost and isoquant as shown in the following diagram.

Diagram 5.5

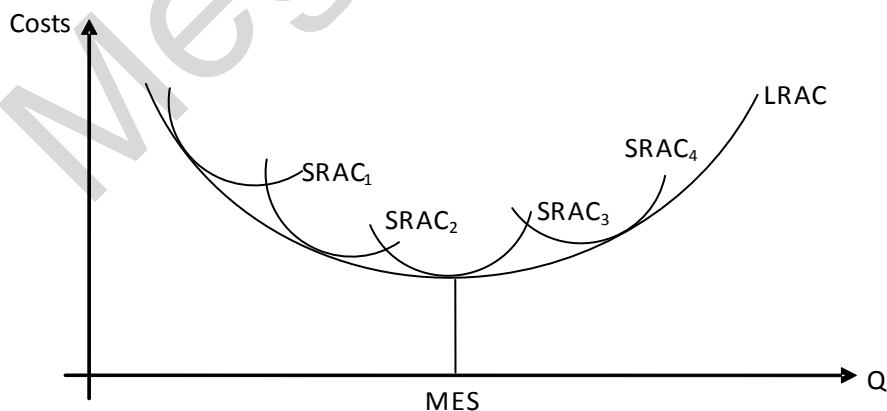


Though factor combinations A, B and C result in the same output, the firm will choose B, as combinations A and C lie outside isocost, and are hence unaffordable. Similarly, combinations D, B and E lie on the same isocost and hence cost the same to the firm, but the firm chooses B, as combinations D and E are on lower isoquants, giving lesser output to the firm. Thus, the combination B minimizes the cost of producing this output, where the firm employs  $L_1$  units of labour and  $K_1$  units of capital. The slope of the isoquant is  $MP_L / MP_K$  and the slope of the isocost is  $w / r$ , so at the point of intersection,  $MP_L / MP_K$  equals  $w / r$ , which is exactly similar to the condition of least cost factor combination established earlier with the help of a numerical example.

**Long run average cost curve**

The relationship between short and long run average cost curves is shown in diagram 5.6. The long run average cost curve is tangential to SRAC curves.

Diagram 5.6

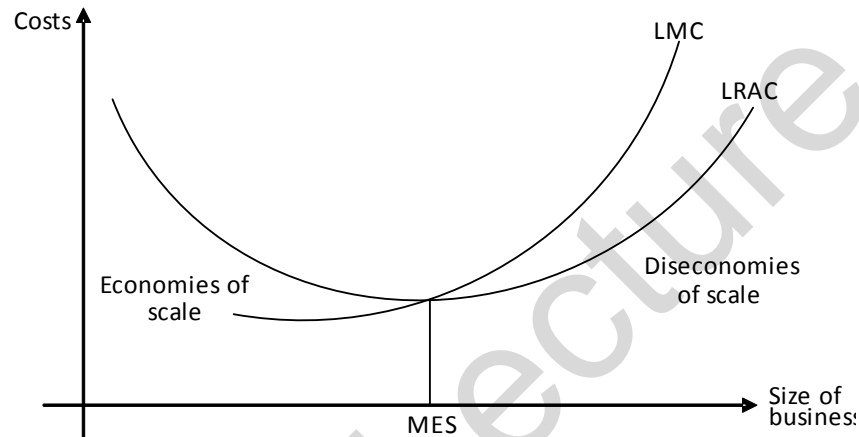


Assume that the firm owns one factory whose short run average cost curve is  $SRAC_1$ . The firm can only increase production by setting up another factory in the long run with  $SRAC_2$ , which is lower than  $SRAC_1$  due to economies of scale. It continues to exploit economies of scale till control and co ordination issues spring up and it reaches a higher average cost curve,  $SRAC_4$ . Long run average cost curve is also known as the envelope curve, as it touches and envelopes all the short run average cost curves. (Attempt N/03/3/11)

### Minimum Efficient Scale (MES)

Minimum Efficient Scale (MES) is the size beyond which no significant economies of scale are observed. In other words, it is the point beyond which long run average cost curve rises or flattens out. Long run marginal cost curve (LMC) cuts LRAC at its minimum point- at MES.

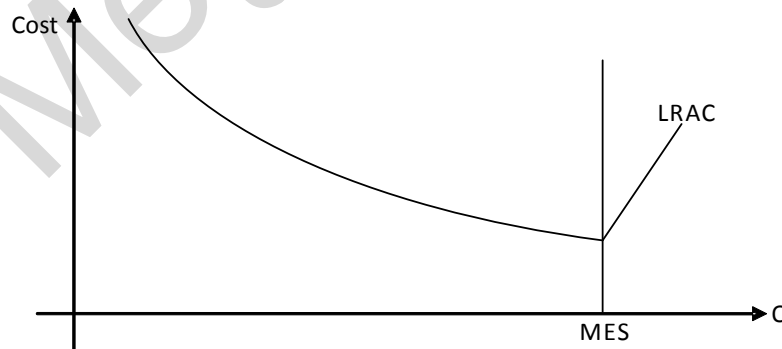
Diagram 5.7



### Minimum Efficient Scale (MES) And The Size Of Firms

MES can be expressed as a percentage of the total size of the market or total domestic production. Few large firms tend to dominate the industry where MES is high, the steel industry for instance. Fixed cost is extremely high and per unit cost is more likely to fall whenever output is increased. The long run average cost for such an industry looks somewhat similar to the one shown in diagram 5.8.

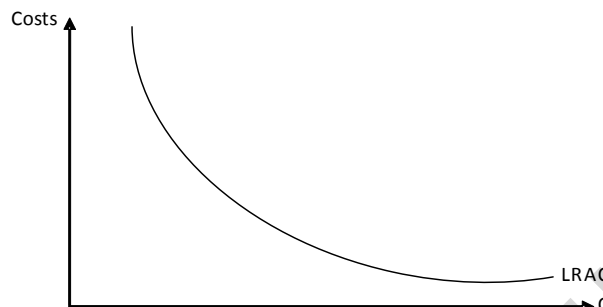
Diagram 5.8



## Natural Monopoly

Consider an extreme case where total costs of a firm almost equal fixed cost. For such firms, increasing output always results in decreased per unit cost. Examples are firms providing utilities whose major cost is that on infrastructure such as laying down pipe lines, poles, transformers, cables etc. The service can be provided to additional customers at an almost zero marginal cost and long run average cost decreases with every increase in output. The corresponding long run cost curve looks like that in diagram 5.9

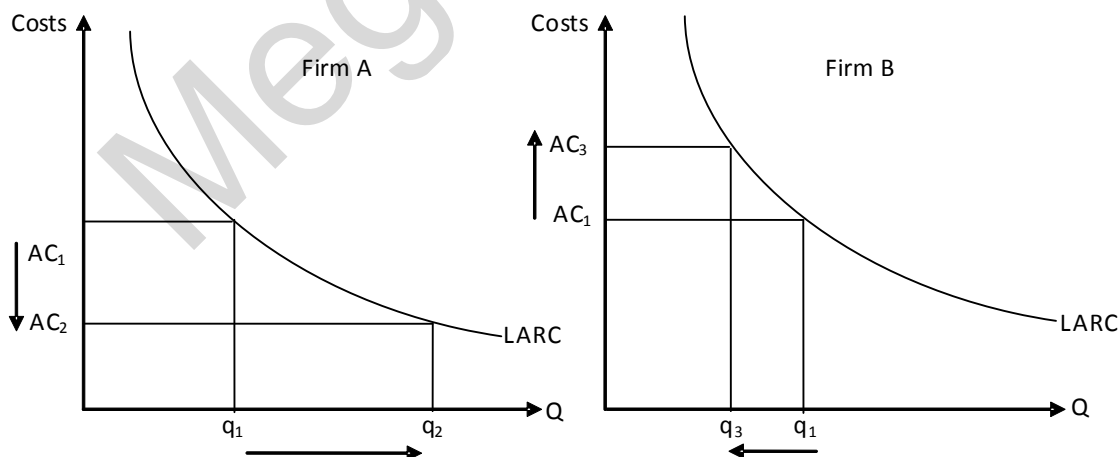
Diagram 5.9



In such industries, firms may attract more customers by lowering prices and still be profitable as average cost decreases with increased output. Such a market situation incentivizes the market leader to act as a monopolist and drive out relatively weaker firms. Since it sells a larger volume at a lower price, its per unit cost is lower than that of firms producing lower quantity and hence, is still profitable.

Consider an industry consisting of just two firms, A and B, each producing quantity  $q_1$  at an average cost  $AC_1$  as shown in diagram 5.10. Assume firm A decides to attract B's customers by lowering price. Whereas B's quantity sold decreases to  $q_3$  and average cost increases to  $AC_3$ , A operates at output  $q_2$  and average cost  $AC_2$ . Despite the lower price it charges, A is still profitable and enjoys monopoly power as B is soon forced to leave the market. This is the case of a natural monopoly which exists when market conditions do not allow the existence of more than one firm. For a natural monopoly, LRAC slopes downward showing that per unit cost decreases throughout. MES is infinite and the size of the market demand determines the output the firm produces.

Diagram 5.10



What does the MC curve of a natural monopoly look like? Try answering this question before proceeding further!

### Natural Monopoly and Allocative Efficiency

Marginal Cost curve always lies below LRAC curve for firms whose Long Run Average Cost (LRAC) decreases with every increase in output.

Allocative efficiency requires a firm to charge a price that equals Marginal Cost. In case of a natural monopoly, charging a price equal to MC means charging below Average Cost. Thus, a natural monopoly can not be profitable and allocatively efficient at the same time (see section 11).

An industry consists of few large sized firms where MES is high and a large number of small sized firms if MES is low. Only 2 efficient firms survive in an industry where MES is 50%. As explained in the case of Natural Monopoly, the two firms can lower prices and still remain profitable since economies of scale are available upto 50% of the market output. Other firms have no option but to incur losses because of lower output and higher per unit cost and eventually leave the industry.

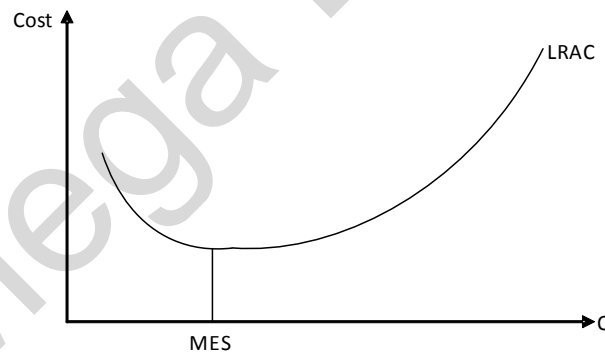
$$\text{Number of firms} \approx \frac{\text{Market size}}{\text{MES}}$$

Number of firms will still be 2 even if MES is higher than 50% but smaller than 100%.

## Reasons For The Existence Of Small Firms

There exist industries where diseconomies of scale set in at very low levels of output. Firms operating in such industries are more likely to be small sized, for example services that have to be provided at an arm's length distance like a hair dresser, a dentist, an architect and a consultant. The major strength of these businesses is to provide direct, one on one service to their customers. This strength is lost if the firm tries to expand its size. Thus, as shown in diagram 5.11, long run average cost begins to increase at fairly low levels of output, implying a low MES.

Diagram 5.11



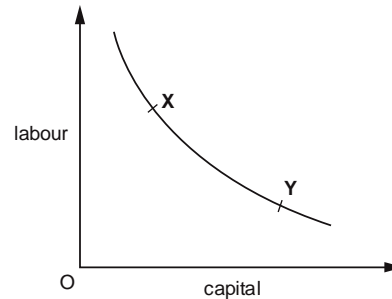
Small firms may better serve market niches. Niches are small segments of markets which large firms often find unprofitable and thus leave un-served. For instance, a large A Level school may ignore the segment of students who wish to complete A Level in one year instead of the regular two year course. A smaller firm is flexible enough to cater to this small segment.

Smaller firm can co exist with larger firms as the latter may not produce all components of products. They can out source few of them, creating opportunities for smaller firms. A car manufacturer for example, can buy seat covers for its cars from an outside firm.

### Multiple Choice Questions (Section 5)

J/02/3/05

- 1 In the diagram, the curve shows the various combinations of labour and capital that can be employed to produce a given volume of output.  
 A firm initially chooses the combination of labour and capital shown by point X on the curve.  
 In a subsequent period the firm chooses the combination of labour and capital shown by point Y.



What could explain this change?

- A a decrease in capital productivity
  - B an increase in labour productivity
  - C an increase in the cost of labour
  - D an increase in the cost of capital
- J/02/3/12
- 2 The table below shows the relationship between total output and total costs of a firm given constant factor prices and fixed factor proportions.

output	costs (\$)
100	80
200	180
300	300
400	440
500	600

It follows that, over this range of output, the firm experiences

- A decreasing returns for output between 100 and 300 and increasing returns for output larger than 300.
  - B increasing returns for output between 100 and 300 and decreasing returns for output larger than 300.
  - C decreasing returns throughout.
  - D increasing returns throughout.
- N/02/3/06
- 3 Which of the following is a financial economy of scale?
- A less risk due to diversification
  - B lower costs in raising capital
  - C lower costs of marketing
  - D lower variable costs of production

J/03/3/04

- 4 A given production process uses both labour and capital.  
 What will be the effect on the quantities of labour and capital employed if the government introduces a subsidy on capital investment?

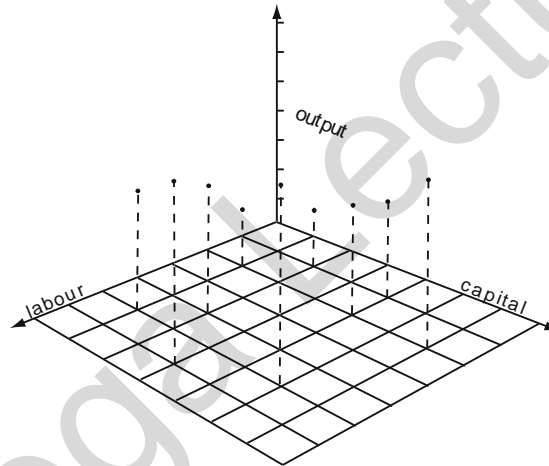
	quantity of labour	quantity of capital
<b>A</b>	decreases	uncertain
<b>B</b>	uncertain	uncertain
<b>C</b>	decreases	increases
<b>D</b>	uncertain	increases

J/03/3/07

- 5 Which of the following is an internal economy of scale?  
**A** improved communications as a result of the growth of local industry  
**B** lower risk associated with supplying a wider range of customers  
**C** the training of skilled labour at a technical college financed by all local firms  
**D** trade information from a new trade journal

N/03/3/08

- 6 In the diagram the heights of the vertical broken lines show levels of output corresponding to different combinations of labour and capital.



What does the diagram show?

- A** a cost function  
**B** a long-run production function  
**C** an input function  
**D** a production possibility function
- N/03/3/11
- 7 Which statement about the long-run average cost curve of a firm is correct?  
**A** It falls continuously because of economies of scale.  
**B** It passes through the minimum points of the firm's short-run average cost curves.  
**C** It assumes that factor input proportions are held constant as output increases.  
**D** It indicates the minimum average cost at which each level of output can be produced.

N/03/3/12

**8** The proportion of total employment in an economy accounted for by small firms increases.

Which explanation for this is **least** likely to be valid?

- A** a trend towards the use of sub-contractors to produce specialised components
- B** growing technical diseconomies of scale in manufacturing
- C** growth of the manufacturing sector and a decline in services
- D** the opening up of market niches as real incomes rise

J/04/3/13

**9** A firm employs three factors of production. The table shows the marginal products of these factors and their respective costs at the current level of output.

	land	labour	capital
Marginal product (units)	1	2	9
Marginal cost per unit of factor(\$)	4	6	3

Which adjustment in factor use would be most likely to bring the firm nearer to the least-cost combination of inputs for its current output level?

	land	labour	capital
<b>A</b>	less	no change	more
<b>B</b>	less	no change	no change
<b>C</b>	more	less	no change
<b>D</b>	more	less	more

N/04/3/09

**10** A firm's long-run production function describes the relationship between

- A** the firm's output and the quantities of factor inputs employed.
- B** the firm's long-run average cost of production and the level of output.
- C** the firm's long-run average cost of production and the quantities of factor inputs employed.
- D** the prices of factor inputs and the quantities of factor inputs employed.

J/05/3/08

**11** What is generally thought to be the main reason why firms might experience decreasing returns to scale when they grow beyond a certain size?

- A** financial diseconomies
- B** managerial diseconomies
- C** marketing diseconomies
- D** technical diseconomies

J/05/3/10

**12** What is the shape of the long run average cost curve for a firm with economies of scale?

- A** It is horizontal.
- B** It is 'U' shaped.
- C** It slopes downwards.
- D** It slopes upwards.

N/05/3/08

- 13** The table below shows the relationship between total output and total costs of a firm given constant factor prices and fixed factor proportions.

output	costs (\$)
100	80
200	180
300	300
400	440
500	600

It follows that, over this range of output, the firm experiences

- A** decreasing returns for output between 100 and 300 and increasing returns for output larger than 300.
- B** increasing returns for output between 100 and 300 and decreasing returns for output larger than 300.
- C** decreasing returns throughout.
- D** increasing returns throughout.

N/05/3/10

- 14** As a firm expands, what is most likely to prevent its long run average costs falling?
- A** increased interest rates on borrowing
  - B** increased labour specialisation
  - C** increased labour supervision costs
  - D** substitution of capital for labour

J/06/3/06

- 15** As firm X grows in size, it specialises in a narrower range of products. Which economies of scale will the firm be less able to benefit from?
- A** financial
  - B** marketing
  - C** risk-bearing
  - D** technical

N/06/3/07

- 16** Which of the following is an example of an external diseconomy?
- A** difficulties in co-ordinating activities in a large organisation
  - B** difficulties in motivating workers in a large organisation
  - C** higher transport costs as a firm's market expands
  - D** increased traffic congestion as industries expand

N/06/3/08

- 17** Which small firms are most likely to survive for only a relatively short period?
- A** those producing components for large firms
  - B** those producing specialised products for small markets
  - C** those engaged in activities with low start-up costs
  - D** those engaged in activities that require flexibility in meeting customer requirements



J/07/3/08

- 18** Which of the following is a financial economy of scale?
- A** lower risk due to diversification
  - B** lower costs in raising capital
  - C** lower costs of marketing
  - D** lower variable costs of production

J/07/3/11

- 19** How might a firm benefit from external economies?
- A** by increasing its expenditure on advertising
  - B** by increasing its scale of production
  - C** by locating in an area in which the industry is already established
  - D** by merging with another domestic firm engaged in the same industry

N/07/3/08

- 20** Which of the following costs of a firm is most likely to rise as it expands?
- A** the rate of interest paid on borrowing
  - B** the price of components
  - C** the cost of monitoring workers' inputs
  - D** energy costs per unit of output

J/08/3/04

- 21** The table shows the current position of a firm in a perfectly competitive industry.

	factor X	factor Y
marginal physical product	2	8
factor price	\$5.00	\$10.00

If the firm sells its product for \$1 and aims to maximise profits, what should it employ?

- A** more of both **X** and **Y**
- B** more of **X** and less of **Y**
- C** more of **Y** and less of **X**
- D** less of both **X** and **Y**

J/08/3/06

- 22** What is the name for the relationship between a firm's output and the quantities of factor inputs that it employs?
- A** a long-run production function
  - B** a long-run average cost function
  - C** productive efficiency
  - D** returns to scale

J/08/3/08

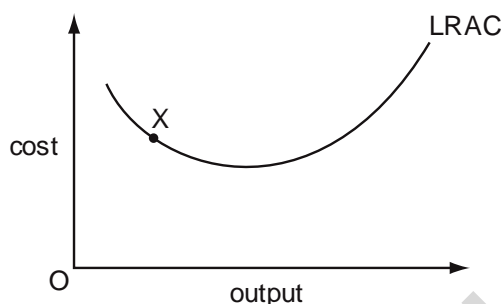
- 23** What explains why both large and small firms are often found within the same industry?
- A** There are significant barriers to the entry of new firms into the industry.
  - B** Firms that assemble the final product buy component parts from other specialist firms.
  - C** Production is subject to diseconomies of scale.
  - D** All firms in the industry produce identical products.

N/08/3/07

- 24** When a firm increases all its inputs by 300 %, its output increases by 200 %.  
What does this illustrate?
- A** the law of diminishing returns
  - B** increasing returns to scale
  - C** diseconomies of scale
  - D** the law of variable proportions

J/09/3/01

- 25** In the diagram, the firm is operating at point X on its long-run average cost curve.



Which statement about the firm is correct?

- A** It is operating at its optimal level of output.
  - B** It is operating below its cost-minimising level of output.
  - C** It is productively inefficient.
  - D** It could produce its current level of output at a lower cost.
- J/09/3/06
- 26** A manufacturing firm has one plant of optimum size.  
The firm builds a second plant identical to its first plant. The firm then finds that its long-run average cost has risen.  
What could account for the change in its long-run average cost?
- A** diminishing returns
  - B** external diseconomies of scale
  - C** managerial diseconomies of scale
  - D** technical diseconomies of scale

N/09/3/08

- 27** The table shows the inputs of the two factors of production, capital and labour, needed to produce varying levels of output.

output	capital	labour
100	5	10
200	8	16
300	14	28
400	20	40
500	26	52

Over which output range do increasing returns to scale occur?

- A** 100 to 200
- B** 200 to 300
- C** 300 to 400
- D** 400 to 500

J/10/3/07

- 28** Which is an example of an external diseconomy?
- A** difficulties in co-ordinating activities in a large organisation
  - B** difficulties in motivating workers in a large organisation
  - C** higher transport costs as a firm's market expands
  - D** increased traffic congestion as industries expand

N/10/3/04

- 29** A firm in a perfectly competitive industry employs two factors of production, X and Y. The table shows the factor price and the current marginal physical product of these two factors.

	factor X	factor Y
factor price	\$2.50	\$6.00
marginal physical product	2	8

If the firm sells its product for \$1 and aims to maximise profits, what should it do?

- A** employ less of both X and Y
- B** employ less of X and more of Y
- C** employ more of both X and Y
- D** employ more of X and less of Y

J/11/32/05

- 30** What is the name for the relationship between a firm's output and the quantities of factor inputs that it employs?
- A** a long-run average cost function
  - B** a long-run production function
  - C** productive efficiency
  - D** returns to scale

N/11/32/07

- 31** The table shows the levels of output of a good which can be produced with different combinations of labour and capital.

capital (number of machines)	Labour (number of workers)	output (units)
2	6	100
2	7	106
2	8	108
4	12	200

Which characteristic of the production function for this good does the table show?

- A** a fixed ratio between capital and labour inputs
- B** constant returns to scale
- C** increasing marginal productivity of labour
- D** technical economies of scale

N/11/32/09

- 32** What would be most likely to constrain a firm's ability to grow?  
**A** the increased difficulty faced by the firm in marketing its product  
**B** the increased risks arising from product diversification  
**C** the increasing costs of distributing goods from a given location  
**D** the increased difficulties faced by the management in coordinating production

J/12/32/5

- 33** A firm experiences diseconomies of scale over its entire range of output. What is the shape of its long-run average cost curve?  
**A** It is horizontal. **B** It is 'U' shaped.  
**C** It slopes downwards. **D** It slopes upwards.

J/12/32/6

- 34** Which is a financial economy of scale?  
**A** lower costs in raising capital **B** lower costs of marketing  
**C** lower risk due to diversification **D** lower variable costs of production

J/12/32/7

- 35** The table shows a firm's total costs of production.

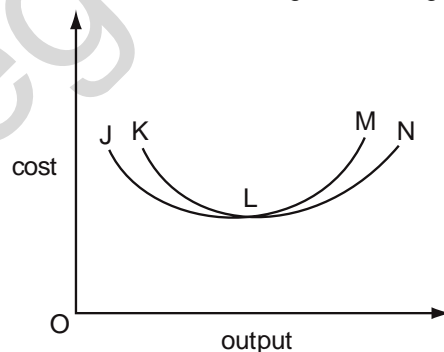
production (tonnes)	total cost (\$)
0	40
1	60
2	70
3	80
4	90
5	100

What is the average variable cost of producing 5 tonnes of output?

- A** \$8.00 **B** \$10.00 **C** \$12.00 **D** \$20.00

J/12/32/9

- 36** The diagram shows a firm's short-run and long-run average cost curves.

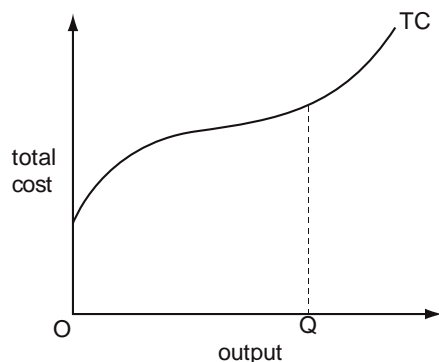


Which curve is the firm's long-run average cost curve?

- A** JLN **B** JLM **C** KLM **D** KLN

J/12/32/13

37 The diagram shows a firm's short-run total cost curve (TC).



What is minimised at output OQ?

- A** average fixed cost                      **B** average total cost  
**C** average variable cost                **D** marginal cost

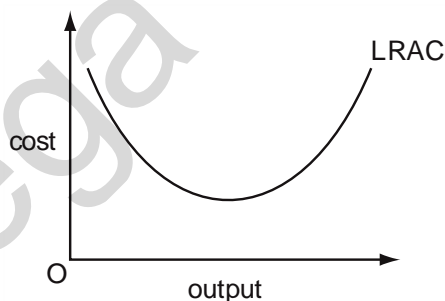
N/12/32/09

38 A manufacturing firm has one plant of optimum size. The firm builds a second plant identical to its first plant. The firm then finds that its long-run average cost has risen. What could account for the change in its long-run average cost?

- A** diminishing returns                      **B** external diseconomies of scale  
**C** managerial diseconomies of scale    **D** technical diseconomies of scale

J/13/32/08

39 The diagram shows the long-run average cost curve of a firm which faces constant factor prices.



Which economic concepts in the table explain the shape of the LRAC curve?

	economies and diseconomies of scale	the law of diminishing returns	the law of variable proportions
<b>A</b>	✓	✓	✗
<b>B</b>	✓	✗	✗
<b>C</b>	✗	✓	✓
<b>D</b>	✗	✗	✓

J/13/32/09

40 Which feature of an economy would be most favourable for the survival of small firms?

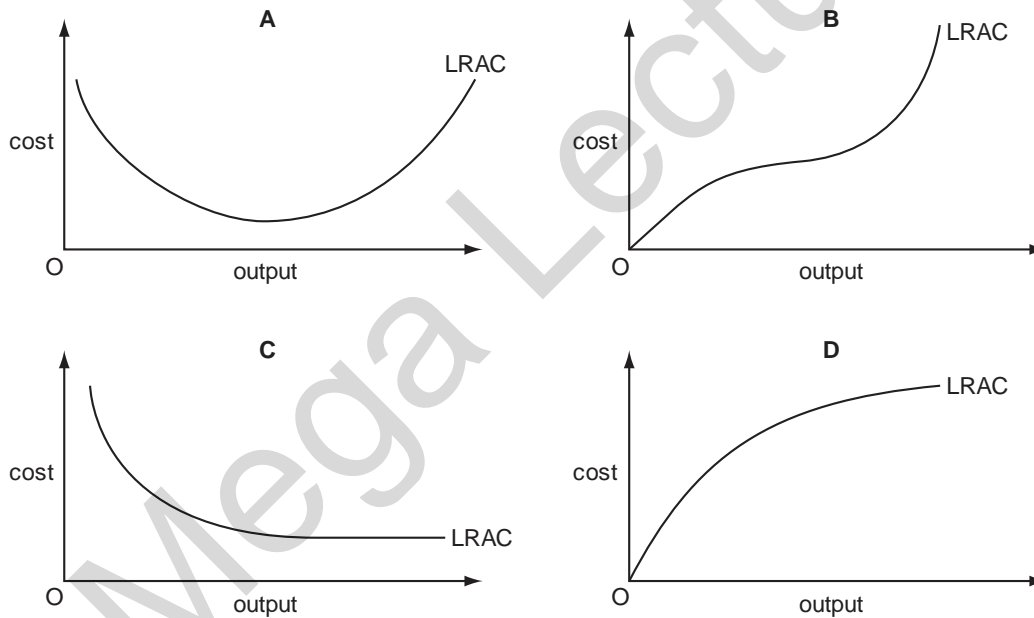
- A capital intensive production
- B economies of scale in production
- C the presence of a stock exchange
- D the widespread availability of bank lending

N/13/32/07

41 The table shows a firm's long-run total cost schedule.

output of goods per month	total cost (US\$)
100	100
200	120
300	150
400	200

Which graph shows the shape of the firm's long-run average cost curve?



N/13/32/09

42 What is an internal diseconomy of scale that often arises as a firm becomes larger?

- A a more complex decision-making process
- B an increase in the cost of raising finance for investment
- C an increase in traffic congestion
- D upward pressure on wages in the local labour market

J/14/32/07

- 43** The table gives information about a firm's costs over a given range of output in the short run and in the long run.

<b>output (thousand)</b>	21	22	23	24	25
<b>short-run average cost (\$)</b>	20	19	18	17	16
<b>long-run average cost (\$)</b>	12	13	14	15	16

Which conclusions can be drawn about the characteristics of production over this output range in the short run and in the long run?

	<b>short run</b>	<b>long run</b>
<b>A</b>	decreasing returns to scale	diminishing returns
<b>B</b>	economies of scale	diminishing returns
<b>C</b>	increasing returns	decreasing returns to scale
<b>D</b>	increasing returns	economies of scale

N/14/32/08

- 44** The table below shows the relationship between total output and total costs of a firm given constant factor prices and fixed factor proportions.

output	costs (\$)
100	100
200	160
300	180
400	320
500	500

It follows that, over this range of output, the firm experiences

- A** decreasing returns for output between 100 and 300 and increasing returns for output larger than 300.
- B** increasing returns for output between 100 and 300 and decreasing returns for output larger than 300.
- C** decreasing returns throughout.
- D** increasing returns throughout.

J/15/32/07

- 45** What relationship does a firm's long-run production function describe?

- A** the firm's output and the quantities of factor inputs employed
- B** the firm's long-run average cost of production and the level of output
- C** the firm's long-run average cost of production and the quantities of factor inputs employed
- D** the prices of factor inputs and the quantities of factor inputs employed

J/15/32/09

- 46** A firm experiences external diseconomies of scale and decreasing returns to scale. How would these changes be illustrated on a cost curve diagram?

	shift in long-run average cost curve	movement along longrun average cost curve
<b>A</b>	downward	downward
<b>B</b>	downward	upward
<b>C</b>	upward	downward
<b>D</b>	upward	upward

N/15/32/08

- 47** A fourfold increase in all of a firm's inputs results in a threefold increase in its output. What does this illustrate?

- A** decreasing returns to scale
- B** economies of scale
- C** the law of diminishing returns
- D** the law of variable proportions

N/15/32/09

- 48** A firm employs two factors of production. The table shows the marginal products of these factors and their respective costs at the current level of output.

	land	labour
marginal product (units)	1	5
marginal cost per unit of factor (\$)	4	3

Which adjustment in factor use would be most likely to bring the firm nearer to the least-cost combination of inputs for its current output level?

	land	labour
<b>A</b>	less	less
<b>B</b>	less	more
<b>C</b>	more	less
<b>D</b>	more	more

J/16/32/10

- 49** Which is a risk-bearing economy of scale?

- A** greater bargaining power in purchasing from suppliers
- B** greater diversification of the product range
- C** lower costs in raising capital
- D** lower distribution costs by increasing market share



J/16/32/12

**50** In many developed economies, clothes are designed by small firms and retailed by large firms.

What is the most likely explanation for this pattern?

	clothes design firms	clothes retail firms
<b>A</b>	need to be flexible to cope with frequent fashion changes	need to exploit marketing economies of scale
<b>B</b>	need to employ highly specialised and skilled workers	need to operate at a low minimum efficient scale
<b>C</b>	need to operate at a high minimum efficient scale	need to offer a wide range of products to survive
<b>D</b>	need to overcome high barriers to entry into the industry	need to take advantage of technical economies of scale

Mega Lecture

## Section: 6 Economist's Versus Accountant's Definition of Costs

It may seem nonsensical at first glance, to differentiate between an economist's and an accountant's definition of costs. Why would the numbers differ in the eyes of either after all, when the price and quantity of inputs employed by any particular producer remains the same for both? However, an economist needs to account for another type of costs- opportunity cost. Whereas an accountant only considers explicit payments made to factors of production (e.g. rent of the building, salaries to workers etc), what matters to an economist in addition is the concept of implicit costs, i.e. the foregone earnings or opportunity cost involved in providing any particular product (e.g. foregone interest on owners' equity and the opportunity cost of owners' time). This difference in costs is what explains the difference in profits calculated by accountants and economists.

Profits are the excess of sales revenues over total cost. Sales revenues are a product of sale price and quantity sold whereas Total Cost equals the sum of fixed costs and variable costs.

The following example helps understand the difference in profits calculated by accountants and economists.

The monthly sales revenue of a small businessman equals £10000. He pays £2000 per month as salaries, £1000 as mark-up on the amount borrowed from the bank and £1000 for raw material purchases. He works full time for his business and conducts it in his own premises. He estimates that he can earn a monthly salary of £1500 and a monthly rent of £800 if he decides to shut down the business.

His explicit costs are £4000 (salaries to employees + markup on bank loan + cost of raw materials) and according to accountants, his monthly profit is £6000.

$$\begin{aligned}\text{Accountant profit} &= \text{sales revenue} - \text{explicit cost} \\ &= £10000 - £4000 = £6000\end{aligned}$$

Economists on the other hand, account for implicit costs too which in this case are £2300 (forgone salary + forgone rent). Total Costs are thus £6300 (explicit cost + implicit cost) and profits, £3700.

$$\begin{aligned}\text{Economist profit} &= \text{sales revenue} - (\text{explicit cost} + \text{implicit cost}) \\ &= £10000 - (£4000 + £2300) = £3700\end{aligned}$$

The owner is better off shutting down if his monthly accountant profit is less than £2300. Thus, £2300 is the minimum acceptable profit for this owner to continue his business-it is the normal profit.

Normal profit is the earning possible from next best alternative use of resources i.e. if the business is closed and resources owned are released and invested elsewhere. A firm earns normal profit when its economic profit is zero and accountant profit equals implicit cost. Super normal profits occur when economic profit exceeds zero.

**Business Objective: Profit Maximization or Loss Minimization**

Though some firms may pursue different objectives, others typically aim at profit maximization. How firms determine the profit maximizing output is explained with the aid of an example below. For simplicity, sale price is assumed to be constant at \$10 per unit. Marginal Revenue (MR), the revenue generated from the sale of an additional unit thus equals sale price. Diminishing returns occur with MC falling initially and rising later on.

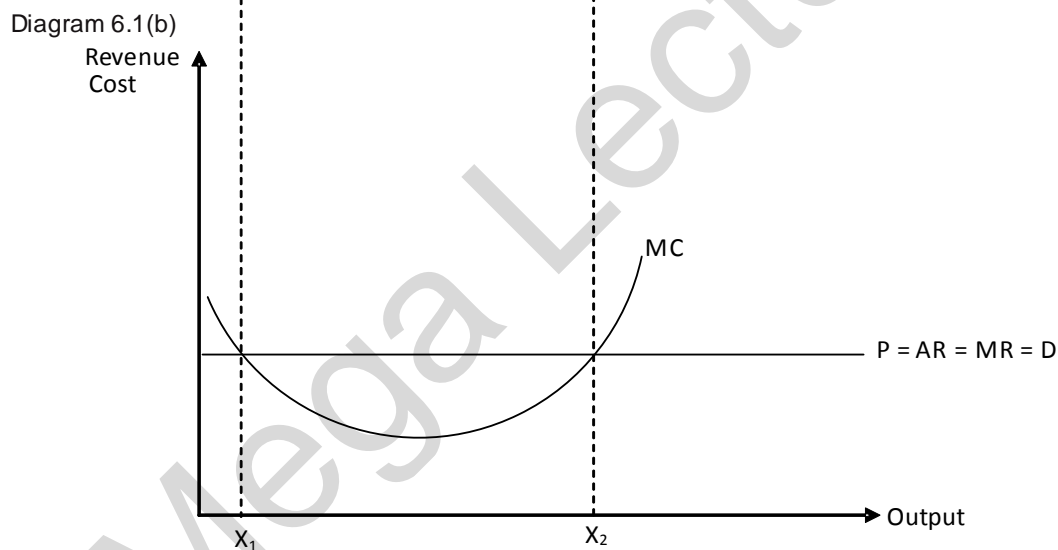
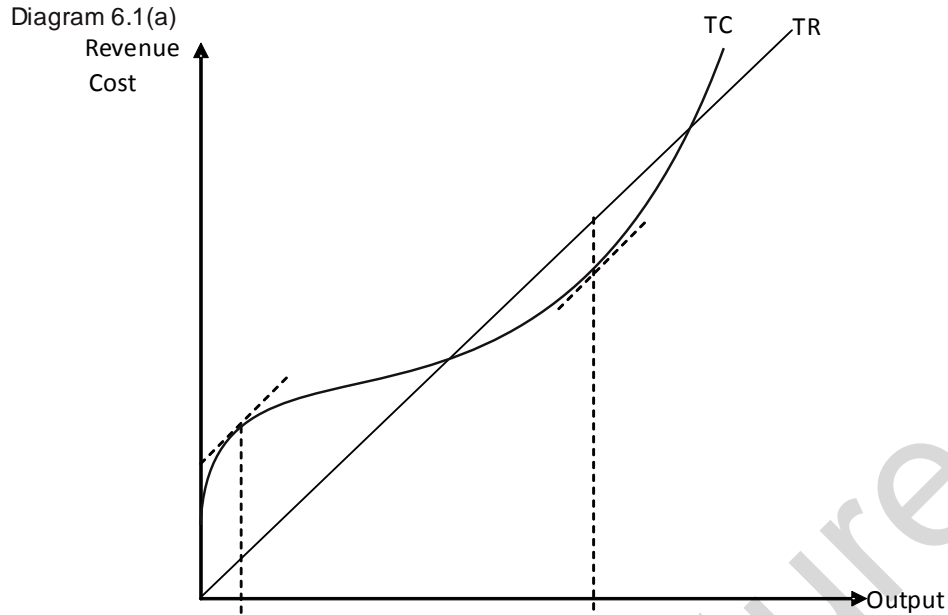
Table 6.1

Quantity	Sale Price	Total Revenue	Marginal Revenue	Total Cost	Fixed Cost	Marginal Cost	Profits (losses)
0	10	0	-	2	2	-	(2)
1	10	10	10	14	2	12	(4)
2	10	20	10	24	2	10	(4)
3	10	30	10	32	2	8	(2)
4	10	40	10	38	2	6	2
5	10	50	10	46	2	8	4
6	10	60	10	56	2	10	4
7	10	70	10	68	2	12	2

Producing units contributing more to revenue and less to cost increases firm's profits, hence a profit maximizing firm must produce all units whose MR exceeds MC. Likewise, production must not exceed the level where additional units contribute more to cost and less to revenue i.e. where MC is exceeding MR. Profits are thus maximized where cost of making an extra unit i.e. MC exactly equals the revenue generated from the sale of that unit i.e. MR. The Marginal Profit i.e. the profit from an additional unit is zero for the last unit (unit no 6 in above table).

(Try N/03/3/15)

In the table above, MC equals MR at two output levels: 2 and 6. Losses are maximized where falling MC equals MR i.e. at 2 units of output and profits, where MR equals rising MC, i.e. at 6 units. Thus, the intersection of rising Marginal Cost and Marginal Revenue determines the profit maximizing (or loss minimizing) output. As stated earlier, profit maximizing firms should increase output if MR exceeds MC and decrease output if MR falls short of MC. The following pair of diagrams illustrates this concept.

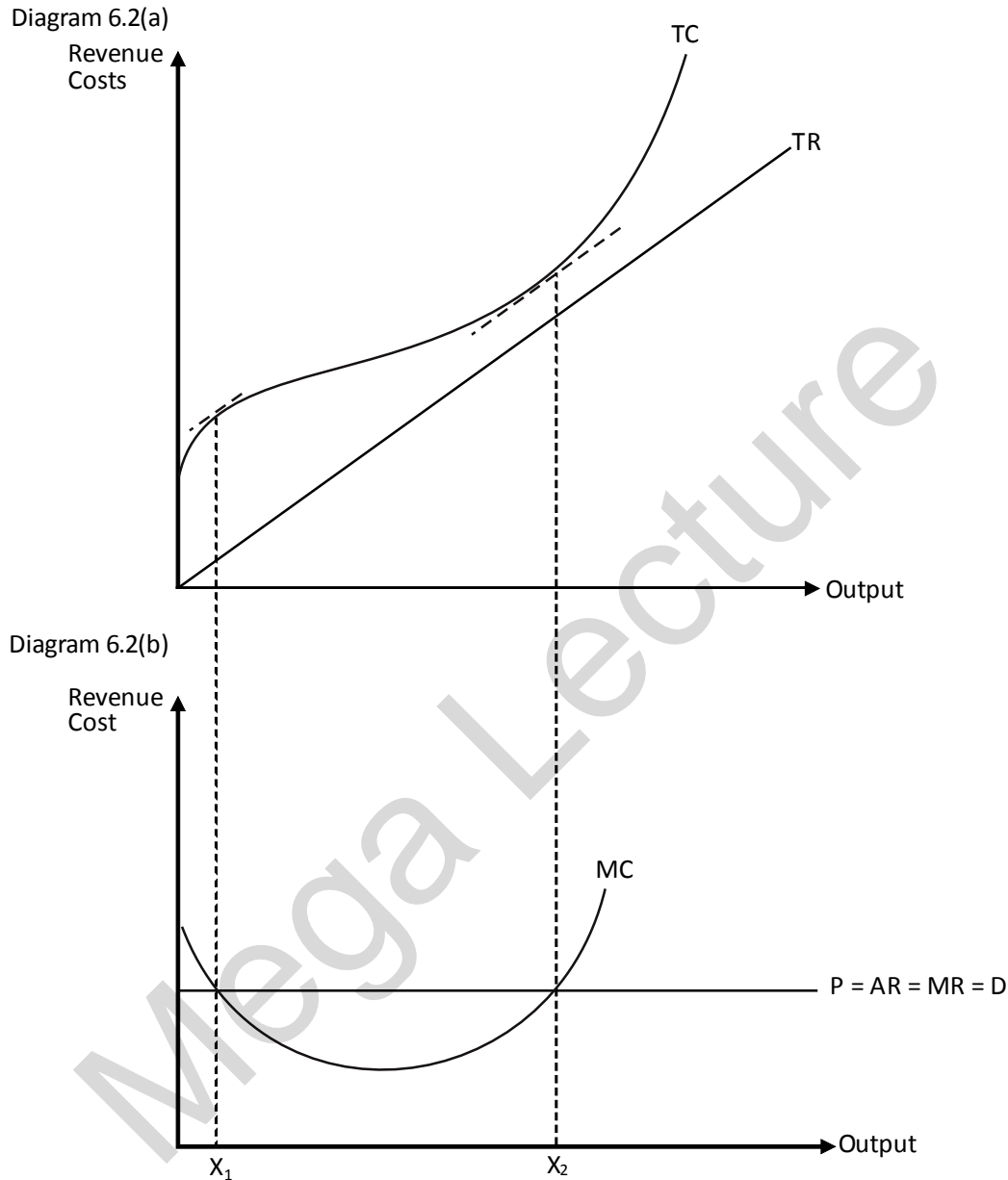


In the diagrams 6.1 (a & b), profits are maximized at  $X_2$  units of output and total revenue and total cost curves become parallel here. The lower panel shows that the slope of Total Revenue i.e. MR equals the slope of Total Cost i.e. MC at this output.

Total Cost and Total Revenue are also parallel when  $X_1$  units are produced. However, that is where losses are maximized.

A situation may sometimes arise when a business can not be run except at a loss. A firm making losses should consider closing down but may continue to operate in the short run if its losses are less than Fixed Cost (this concept is explained later in the section). However in the short run,

such a business should only produce output where rising Marginal Cost equals Marginal Revenue, minimizing losses. The loss minimizing output in the following pair of diagrams is  $X_2$ .



### Decisions to Continue or Shutdown Businesses

The following table shows five hypothetical firms which operate at profit maximizing (or loss minimizing) output levels. Whereas revenues differ for all five, Fixed and Variable Costs are assumed to be 500 and 1500 respectively for each.

Table 6.2

	A		B		C		D		E	
Total Revenues		3000		2000		1800		1500		1200
Fixed Cost	500		500		500		500		500	
Variable Cost	1500		1500		1500		1500		1500	
Total Cost		2000		2000		2000		2000		2000
Profit (Loss)		1000		0		(200)		(500)		(800)

Firms A and B earn super normal and normal profits respectively and should thus, continue in both the short and long run. Firms C, D and E incur losses and exactly when do they shut down is determined by comparing their respective sales revenues and variable costs.

Continuing business in the short run requires a firm's revenues to exceed variable cost and contribute positively towards Fixed Cost. Firm C incurs a loss ( $TR < TC$ ), but it should continue in the short run since  $TR$  exceeds  $VC$ . The excess of Total Revenue over Variable Cost i.e. £300 contributes to Fixed Cost of £500 which would otherwise have to be paid in full by the owner. The losses of shutting down in the short run equal Fixed Cost. This business should continue in the short run since its losses are less than fixed cost. However, it should shut down in the long run.

Firm D incurs a loss of £500 and its losses in the short run stay the same, regardless of its decision to shut down. The contribution towards Fixed Cost is zero. This firm operates exactly at the shut down point and is indifferent between continuing and shutting down in the short run. However, the choice is clear in the long run- the firm must shut down.

Firm E incurs a loss of £800 and should cease business activity immediately since contribution towards Fixed Cost ( $TR - VC$ ) is negative. By closing down immediately, the losses of firm E decrease to £500 in the short run and zero in the long run.

Continuing business in the long run requires sales revenue to equal total cost at least. In the table above, only firms A & B should continue to operate in the long run.

A firm must be charging a price higher than Average Cost (AC) when Total Revenue (TR) exceeds Total Cost (TC).

$$TR > TC$$

$$P \cdot Q > AC \cdot Q$$

$$P > AC$$

Therefore, firms make supernormal profit when Total Revenue exceeds Total Cost (Price > AC), normal profit when Total Revenue equals Total Cost (Price = AC), losses but continue in the short run if Total Revenue falls below Total Cost but exceeds Variable Cost ( $AVC < Price < AC$ ) and shutdown immediately when Total Revenue is less than Variable Cost (Price < AVC).

AVC is the minimum acceptable price to continue business in the short run whereas minimum acceptable price to continue in the long run is AC.

## Multiple Choice Questions (Section 6)

J/02/3/10

1 A firm earns supernormal profit when its profit is above that

- A earned by competing firms.
- B needed to cover its fixed costs.
- C needed to keep the firm in production in the short run.
- D required to keep its resources in their present use.

N/02/3/10

2 Which of the following items would **not** appear in a firm's financial accounts but would be included in an economist's calculation of the cost incurred by the firm?

- A interest on bank loans used to purchase assets that have no alternative uses
- B interest forgone on finance provided by the firm's owner
- C depreciation
- D rent

J/03/3/08

3 An economist calculates that a firm has incurred the following costs over the course of a year.

	\$(000)
wages and salaries	150
opportunity cost of owner's time	40
materials	80
rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15
depreciation	20

What would an accountant calculate to be the total cost incurred by the firm?

- A \$275 000      B \$305 000      C \$325 000      D \$340 000

J/03/3/13

4 A firm produces both X and Y in fixed proportions. A permanent increase in demand for X occurs.

The entrepreneur will increase output of X as long as

- A the addition to revenue in the X and Y markets combined is greater than the addition to costs.
- B the cost of producing more X is offset by a decrease in the cost of producing Y.
- C the marginal cost of X is less than the marginal cost of Y.
- D there is a fall in average costs of production.

N/03/3/09

- 5 An entrepreneur takes out a \$500 000 loan at a rate of interest of 10 %, and invests a further \$500 000 of his own funds to set up a new firm.  
In the first year he pays himself a salary of \$40 000.

The rate of interest he could have obtained by investing his funds elsewhere is 8%, and the wage he could have earned in alternative employment is \$30 000.

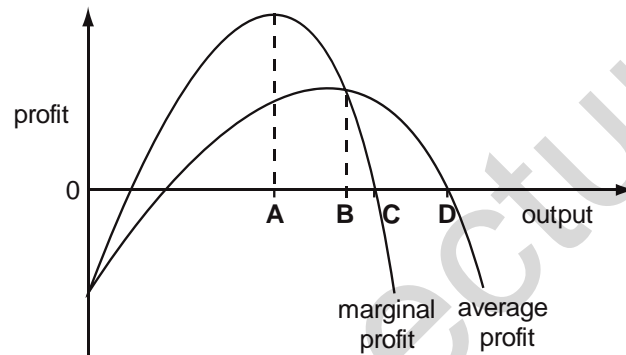
By how much will an economist's calculation of the firm's first year costs exceed an accountant's calculation?

- A \$20 000      B \$30 000      C \$40 000      D \$50 000

N/03/3/15

- 6 The diagram shows how a firm's average profit and marginal profit vary at differing levels of output.

At which level of output does the firm maximise total profit?



N/03/3/16

- 7 When will a firm in a perfectly competitive industry cease to produce in the short run?

- A if it earns less than normal profits  
B if total revenue is less than the total cost of production  
C if marginal revenue is less than the average total cost of production  
D if total revenue is less than the total variable cost of production

N/05/3/09

- 8 Which item would not appear in a firm's financial accounts but would be included in an economist's calculation of the costs incurred by the firm?

- A interest on bank loans used to purchase assets that have no alternative uses  
B interest forgone on finance provided by the firm's owner  
C depreciation  
D rent

J/06/3/07

- 9 What is included in an economist's definition of costs but not an accountant's?

- A advertising expenditure  
B depreciation  
C insurance  
D normal profit



J/07/3/10

10 The table shows data for an owner-managed firm for a particular year.

	\$
total revenue	250 000
raw material costs	30 000
wages and salaries	110 000
salary that the owner could have earned elsewhere	40 000
interest paid on bank loan	30 000
interest forgone on owner's capital	50 000

What is the firm's profit according to an economist?

- A -\$10 000      B \$40 000      C \$80 000      D \$100 000

J/07/3/12

- 11 A firm earns supernormal profit when its profit is  
**A** above that earned by competing firms.  
**B** above that needed to cover its fixed costs.  
**C** above that needed to keep the firm in production in the short run.  
**D** above that required to keep its resources in their present use in the long run.

J/09/3/05

12 An economist calculates that a firm has incurred the following costs over the course of a year.

	\$(000)
wages and salaries	150
opportunity cost of owner's time	40
materials	80
rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15

By how much does total cost as defined by an economist exceed the total cost as defined by an accountant?

- A \$15 000      B \$40 000      C \$55 000      D \$85 000

J/09/3/12

- 13 In which circumstance will a firm cease production in the short run?  
**A** It makes a profit that is less than its total variable costs.  
**B** It makes a profit that is less than its total fixed costs.  
**C** Its average revenue is less than its average cost.  
**D** Its average revenue is less than its average variable cost.

J/10/3/10

14 The table shows information about a profit-maximising firm.

output	17 000 units
price per unit	\$1.75
fixed costs	\$10 000
variable costs per unit	\$1.70

What should the firm do?

- A close down immediately because it is not covering its fixed costs
- B close down immediately because it is not covering its average costs
- C close down immediately because it is not covering its total costs
- D continue production in the short run because it is covering its variable costs

J/12/32/8

15 An economist calculates that a firm has incurred the following costs over the course of a year.

	\$(000)
wages and salaries	150
opportunity cost of owner's time	35
materials	80
rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	10

By how much does total cost as defined by an economist exceed the total cost as defined by an accountant?

- A \$75 000
- B \$45 000
- C \$35 000
- D \$10 000

N/12/32/08

16 An economist calculates that an owner-managed firm has incurred the following costs over the course of a year.

	\$(000)
wages of two employees	150
fee paid to wife for secretarial services	20
opportunity cost of owner's time	30
Materials	80
Rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15

By how much does total cost as defined by an economist exceed the total cost as defined by an accountant?

- A \$15 000
- B \$30 000
- C \$45 000
- D \$65 000

J/13/32/06

- 17** A fashion model is paid \$100 000 a year.  
 The next best paid job she could get is as a teacher at \$60 000 a year.  
 What are her transfer earnings and her economic rent?

	transfer earnings \$	economic rent \$
<b>A</b>	60 000	zero
<b>B</b>	60 000	40 000
<b>C</b>	100 000	zero
<b>D</b>	100 000	40 000

J/13/32/07

- 18** An economist calculates that a firm has incurred the following costs over the course of the year.

	\$(000)
wages and salaries	150
opportunity cost of owner's time	40
materials	80
rent of buildings	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15
depreciation of equipment	20

By how much would the economist's calculation of the total cost incurred by the firm exceed an accountant's calculation of the firm's total cost?

- A** \$15 000      **B** \$40 000      **C** \$55 000      **D** \$75 000

N/14/32/04

- 19** A worker is considering accepting a job she has been offered. She draws up a list of the annual monetary values she places on the advantages and disadvantages of the job.

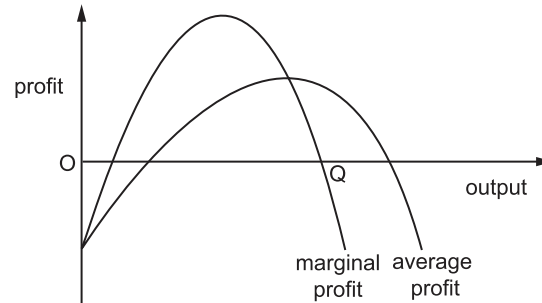
advantages and disadvantages of the job	value (\$)
income	750
dangerous working conditions	500
long working hours	250
high prestige of the job	200
cost of providing own uniform	150
opportunity for travel	100
short holidays	50

What can be concluded from the table?

- A** She values the pecuniary advantages more highly than the non-pecuniary advantages.  
**B** She would take the job even if it had none of the non-pecuniary advantages.  
**C** The job has no pecuniary disadvantages.  
**D** The non-pecuniary advantages outweigh the non-pecuniary disadvantages.

N/14/32/13

**20** The diagram shows how a firm's average profit and marginal profit vary at differing levels of output.



If the firm produces output OQ, which statement is correct?

- A** The firm is earning a zero profit.
- B** The firm is making a normal profit.
- C** The firm is maximising its profit.
- D** The firm is producing above its profit-maximising output.

J/15/32/13

**21** The table shows information about a profit-maximising firm.

price per unit	\$1.70
fixed costs	\$10 000
variable costs per unit	\$1.75

What can be concluded about the firm's behaviour?

- A** It should close down immediately because it is not covering its average costs.
- B** It should close down immediately because it is not covering its variable costs.
- C** It should continue production in the long-run because it is covering its total costs.
- D** It should continue production in the short-run because it is covering its fixed costs.

## Section: 7 Market Structures

It is hard to imagine a firm that operates successfully without having any clue as to who its customers and competitors are, their relative size and the decisions they undertake. A successful firm ought to be well informed about the market environment it functions in. This is exactly why studying market structures is important. The motivation to study them stems from three important sources: their usefulness in depicting firm behavior, in revealing pricing and output decisions and lastly, in functioning as an evaluative space, allowing firms to know where they stand in terms of profits and efficiency.

It is needless to mention that firms operate differently in different market situations. The structure of a market is explained by many factors, such as the number of buyers and sellers, nature of the product, the degree of freedom of entry and exit, and the nature of information. The four market structures are Perfect Competition, Monopolistic Competition, Oligopoly and Monopoly. The characteristics of these market structures are briefly given in the following table:

Table 7.1

Type	No. of firms	Size of firms	Nature of the product	Entry & Exit	Price Control of a firm	Nature of information
Perfect Competition	Very large	Very small	Homogenous	Very easy	No price control	Perfect knowledge
Monopolistic Competition	Very large	Very small	Differentiated	Very easy	Little price control	Imperfect knowledge
Oligopoly	Few	Large	Homogenous/ Differentiated	Difficult	Interdependent	Imperfect knowledge
Monopoly	One	Very large	Unique	Impossible	Considerable	Imperfect knowledge

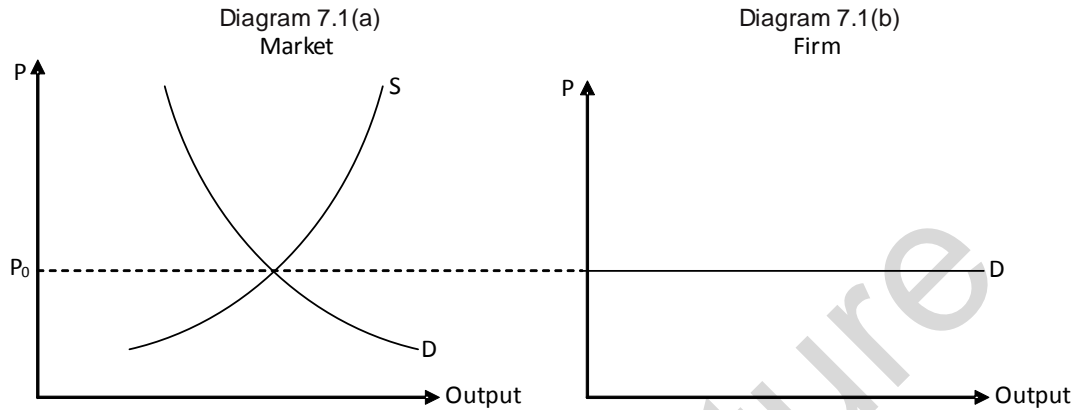
### Perfect Competition

A perfectly competitive market structure comprises a very large number of buyers and sellers trading small quantities. Products sold by a perfectly competitive firm are exactly identical and similar to products made by other firms- they are homogenous and thus, perfect substitutes. Entry barriers are non-existent, allowing new firms to enter a perfectly competitive industry fairly easily. All consumers and producers are assumed to have perfect information about market conditions.

An individual perfectly competitive firm is so small relative to the size of the industry that its decisions to supply more or less don't affect market supply. A perfectly competitive firm finds it impossible to influence market demand since there is no scope for advertising or marketing- all products are exact replicas of each other. It is therefore a price taker and accepts the market price determined by market forces.

Market price is determined by the intersection of downward sloping market demand curve and upward rising market supply curve. Market demand and supply reflect the independent choices

and decisions of countless number of buyers and sellers. A perfectly competitive firm faces a straight horizontal demand curve showing that the firm can sell infinite quantities at the prevailing market price. Since buyers have perfect knowledge and products are homogenous, a firm's decision to charge a price higher than the market price results in zero sales. Charging anything below market price attracts the entire market demand but the firm's small size doesn't allow it to cater to such a large customer base. Consider the following pair of diagrams:



The panel on the left shows how equilibrium price is determined by the intersection of demand and supply curves at  $P_0$ . The demand curve faced by any particular firm is a straight horizontal line at the market price. The price elasticity of demand is infinity because of the existence of perfect substitutes.

**Revenue curves of a perfectly competitive firm**

The demand and revenue schedule for a hypothetical firm operating in the conditions of perfect competition is given below.

Table 7.2

Price (P) = Average Revenue (AR)	Quantity (Q)	Total Revenue (TR)	Marginal Revenue (MR)
10	0	0	-
10	1	10	10
10	2	20	10
10	3	30	10
10	4	40	10
10	5	50	10
10	6	60	10

To verify that Average Revenue (AR) always equals sale price, consider the following set of equations:

Total Revenue = Sale Price  $\times$  Quantity

$$\text{Average Revenue} = \frac{\text{Total Revenue}}{\text{Quantity}} = \frac{\text{Sale Price} \times \text{Quantity}}{\text{Quantity}} = \text{Sale Price}$$

Thus AR  $\equiv$  Price

Since a perfectly competitive firm can sell infinite amounts at the prevailing market price, revenue generated from the sale of an additional unit (MR) equals sale price.

Diagram 7.2 shows the revenue curves of a perfectly competitive firm.

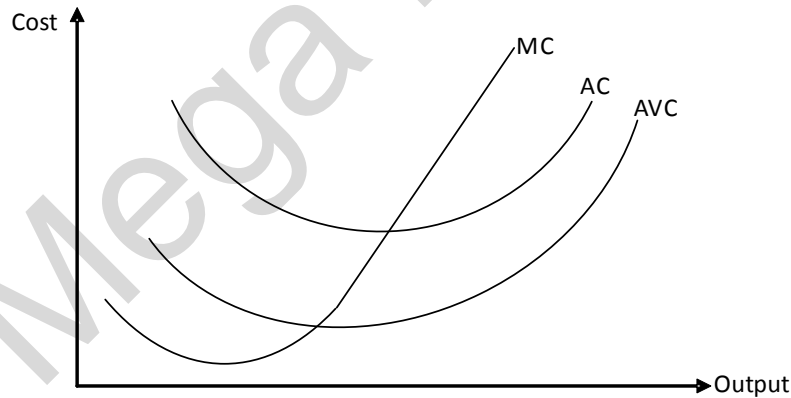
Diagram 7.2



### Cost curves of a perfectly competitive firm

Diagram 7.3 shows cost curves assuming law of variable proportions.

Diagram 7.3



**Price and output determination in perfect competition**

The intersection of MC and MR determines the equilibrium output for a perfectly competitive firm. The following set of diagrams show the five possible short run equilibria for a perfectly competitive firm. In each case, firms choose to produce the profit maximizing (or loss minimizing) output,  $Q_*$ , determined by the intersection of upward rising MC and MR.

Diagram 7.4(a)

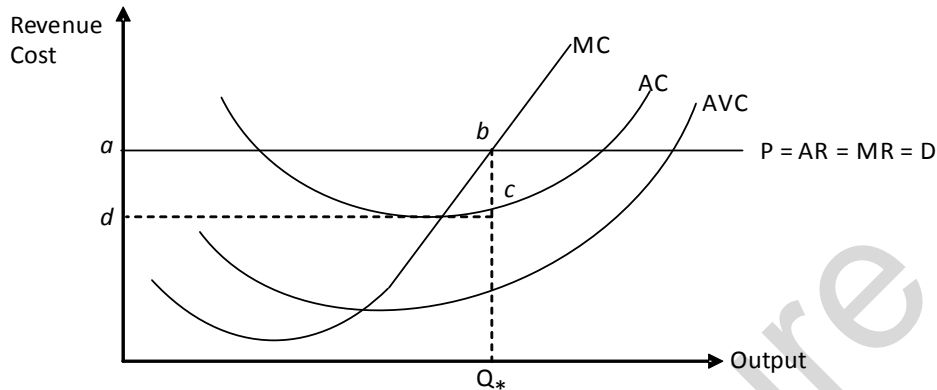


Diagram 7.4(b)

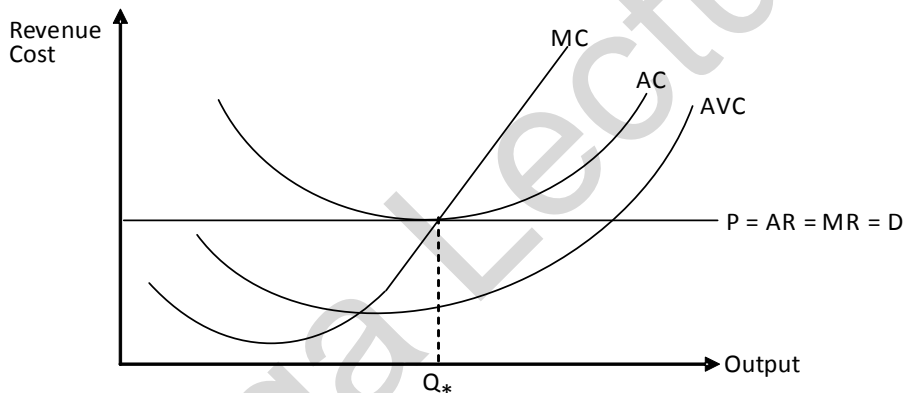


Diagram 7.4(c)

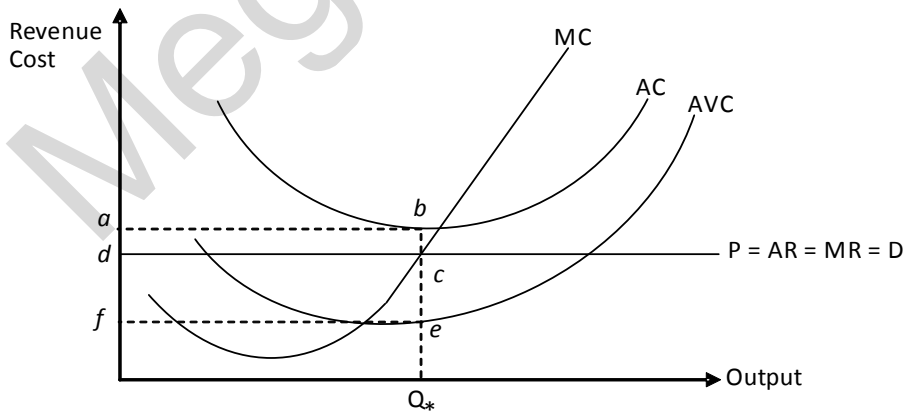




Diagram 7.4(d)

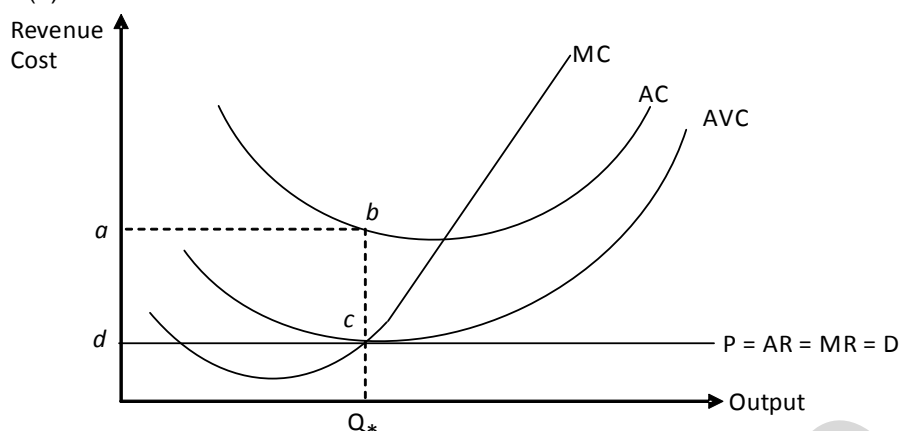


Diagram 7.4(e)

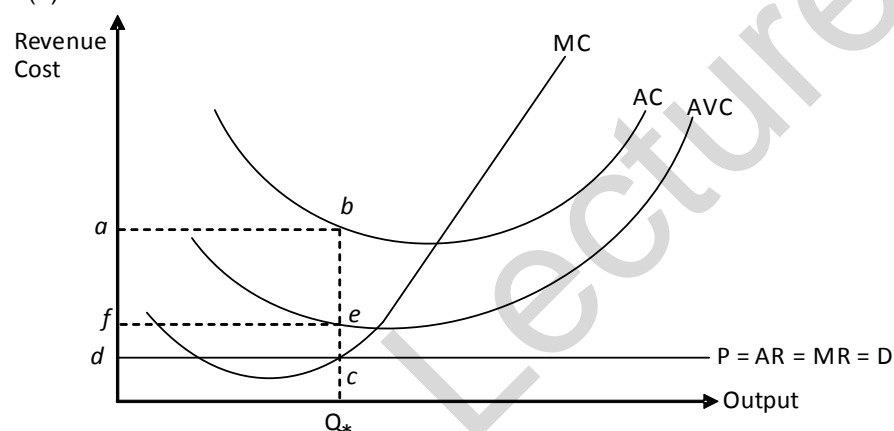


Diagram 7.4(a) shows equilibrium where sale price exceeds average cost, resulting in supernormal profit. It is measured by the area *abcd*, the product of per unit profit i.e. the vertical distance between sale price and average cost and the profit maximizing quantity.

The firm shown in diagram 7.4(b) earns normal profit as sale price exactly equals average cost. Firms shown in diagram 7.4(a) & 7.4(b) continue to operate in the long run.

Diagram 7.4(c) shows losses for the firm (*abcd*) but sale price exceeds per unit variable cost. The excess of sale price over per unit variable cost (*ce* or *df*) is contribution margin and area *dcef* is total contribution towards fixed cost. This firm should continue in the short run but shut down in the long run.

Diagram 7.4(d) shows a firm at the shut down point. A small increase in price allows it to continue in the short run and a marginal decrease necessitates immediate shut down.

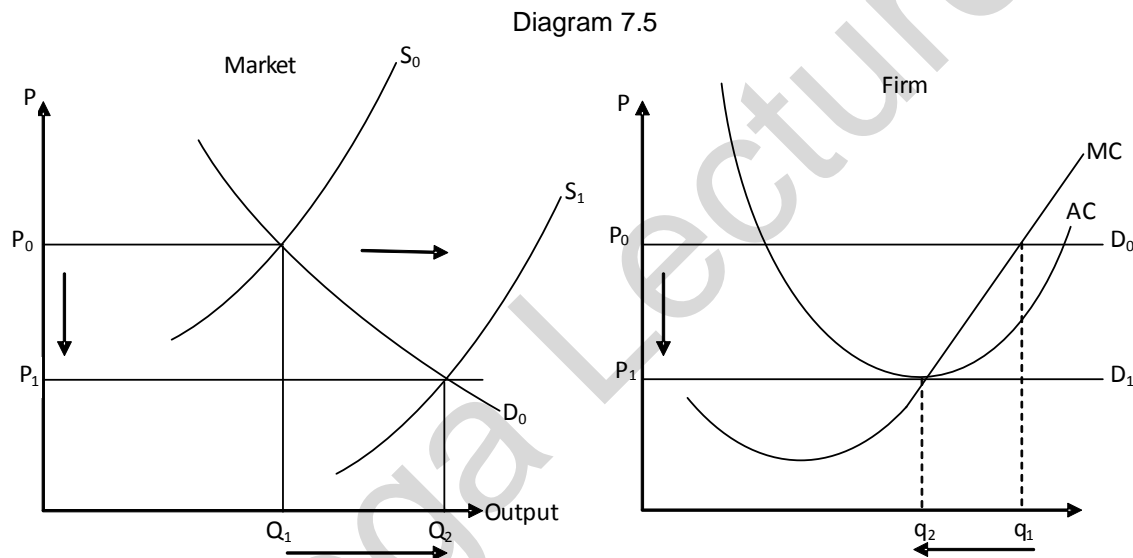
The firm shown in diagram 7.4(e) should shut down immediately as the price it charges is below per unit variable cost. The firm's losses, *abcd*, reduce to fixed cost, *abef*, if the business shuts down. Fixed cost is the product of the vertical distance between AC and AVC (i.e. per unit fixed cost) and

the quantity produced. In the given situation, losses are minimized at zero output level and not where rising MC equals MR.

Put briefly, the intersection of rising MC and MR determines loss minimizing quantity provided sale price exceeds per unit variable cost. Businesses should shut down immediately to minimize losses where sale price is below average variable cost.

### Long run equilibrium of a perfectly competitive firm

Unlike the short run, there exists only a single equilibrium for a perfectly competitive firm in the long run- where it earns normal profits. When firms making short run losses exit the industry in the long run, the remaining firms get to charge higher prices and start earning normal profits. On the other hand, firms earning supernormal profits in the short run attract new firms into the industry, increasing market supply, lowering prices and diluting profits. Ease of entry and exit makes it impossible for a perfectly competitive firm to charge a price higher than average cost in the long run. The maximum price it may charge is minimum average cost, thus only normal profits can be earned. The following pair of diagrams explains the conversion of supernormal profits earned in the short run to just normal profits in the long run.

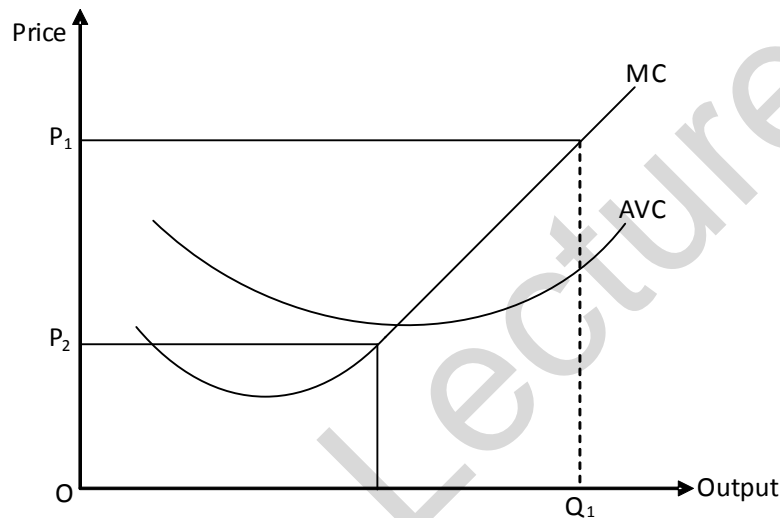


In the panel on the left,  $D_0$  and  $S_0$  show the initial demand and supply curves of the perfectly competitive industry. Equilibrium price is  $P_0$  and market output,  $Q_1$ . The perfectly competitive firm shown on the right chooses to produce the profit maximizing output  $q_1$ . The firm makes supernormal profit in the short run which attracts new firms into the industry. Due to ease of entry/exit, the market supply curve shifts towards right and the industry moves downwards along its demand curve, lowering market price. Entrants enter till price becomes equal to average cost at  $P_1$  and allows firms to make only normal profits. The output made by the industry increases to  $Q_2$  and that made by an individual firm reduces to  $q_2$ . Firms produce a smaller output but overall industry's output stands increased due to the increased number of firms.

### Short run supply curve of a perfectly competitive firm

The supply curve of a firm shows the relationship between price and the quantity it chooses to supply. For a profit maximizing perfectly competitive firm, quantity supplied is determined by the intersection of rising MC and MR. As price equals MR in a perfectly competitive setting, the intersection of price and MC determines the output firm supplies. Thus, the MC curve becomes the supply curve of a perfectly competitive firm. However, Marginal Cost Curve fails to determine output if price is below Average Variable Cost. In such a case, the business shuts down immediately. Thus the short run supply curve of a perfectly competitive firm is the rising portion of MC over and above AVC. Refer to the following diagram which shows the supply curve for a perfectly competitive firm. The firm chooses to produce  $Q_1$  if the price is  $P_1$ . However, no quantity is supplied at  $P_2$  as this price is below AVC.

Diagram 7.6



### Industry's supply curve

The supply curve of a perfectly competitive industry is the horizontal summation of firms' individual supply curves i.e. the summation of rising portions of all individual Marginal Cost Curves over and above the minimum Average Variable Cost.

### Output determination in perfect competition (Total Revenue and Total Cost approach)

The following four diagrams show short run equilibrium positions of a perfectly competitive industry. In the first three cases (diagrams 7.7 (a, b and c)) firm produces  $X_1$ . At this output Total Revenue and Total Cost are parallel meaning MR equals MC. In diagram 7.7 (a) firm makes supernormal profit i.e.  $ab$ . In diagram 7.7 (b) firm is making only normal profit. This is the long run equilibrium of a perfectly competitive firm. In diagram 7.7 (c) firm is incurring losses ( $a - b$ ) but it should continue in the short run as losses are less than Fixed Cost ( $c - a$ ). The vertical distance between the hypothetical line drawn from the vertical intercept of Total Cost curve and the Total Revenue curve measures Fixed Cost. In diagram 7.7 (d) the firm should immediately shut down since losses are higher than Fixed Cost.

Diagram 7.7 (a)

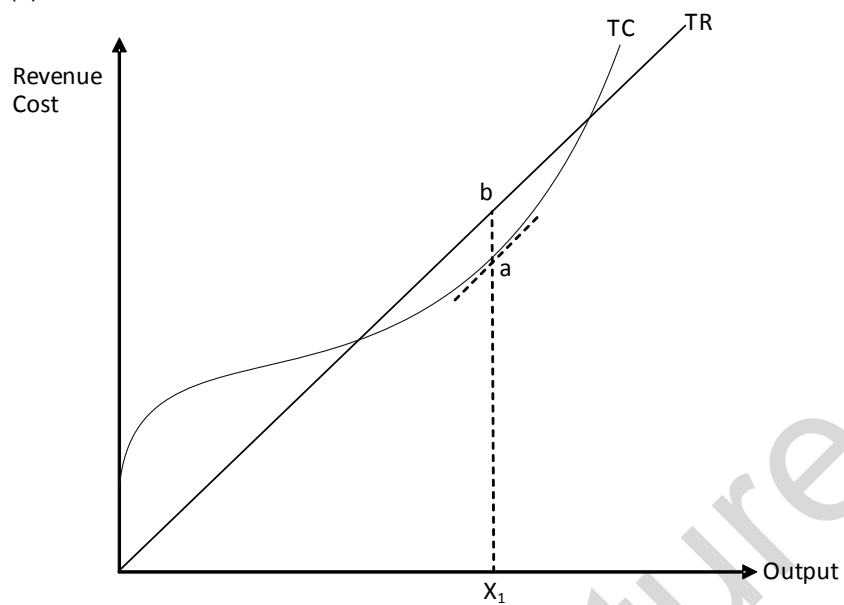


Diagram 7.7 (b)

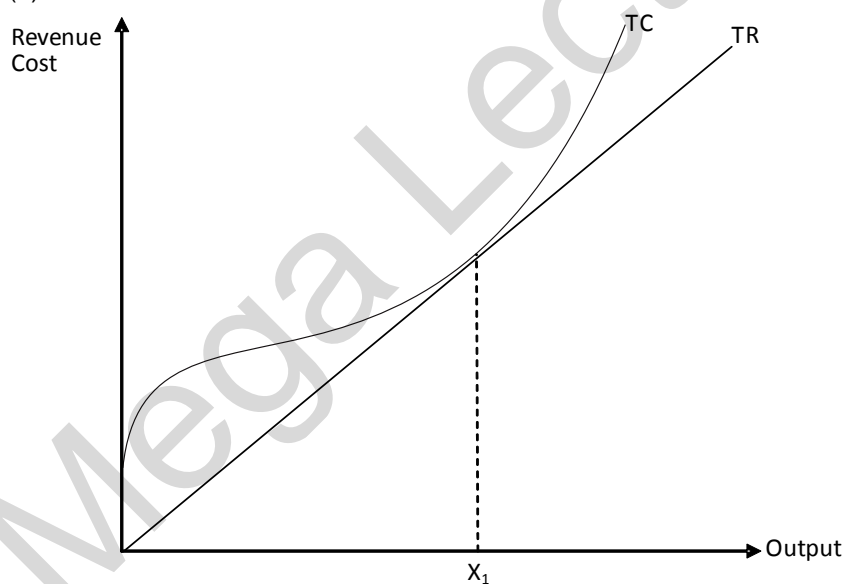


Diagram 7.7 (c)

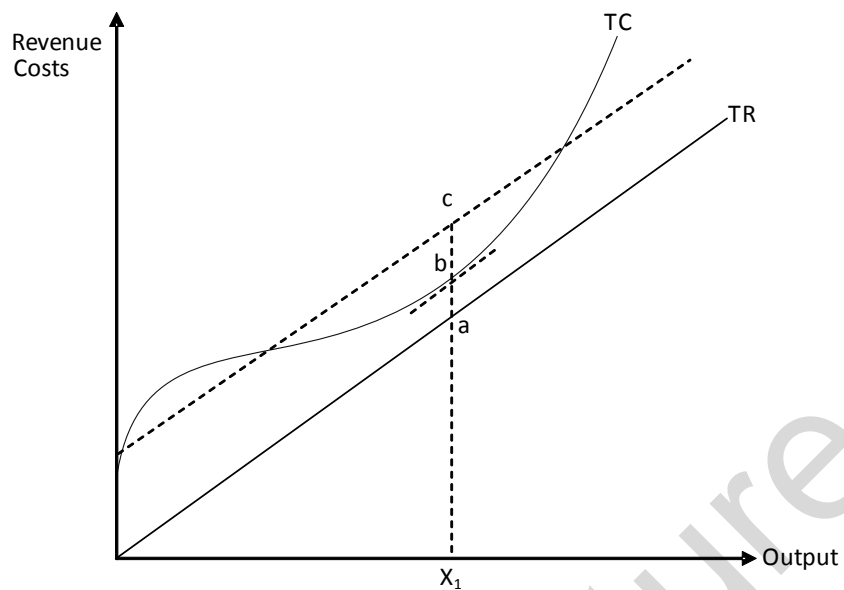
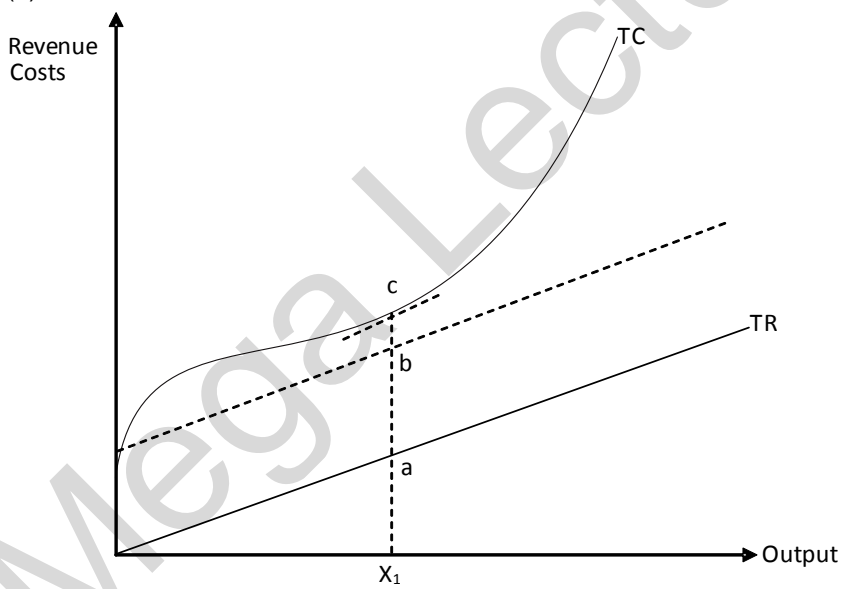


Diagram 7.7 (d)



## Multiple Choice Questions (Section 7)

N/02/3/01

- 1 New technology makes it possible to produce more of a good at every given price. What effect will this have on equilibrium price and output in a competitive industry?

	price	output
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

N/02/3/09

- 2 If a profit-maximising company believes that the market price of a good will not be affected by its own output, it will
- A** produce until marginal cost equals price.
  - B** produce until average cost equals price.
  - C** produce until marginal revenue is zero.
  - D** sell as much as it can produce.

J/04/3/12

- 3 A perfectly competitive firm is producing 2000 boxes of biscuits per week, which it sells for \$2.50 per box. The table shows the firm's costs.

total fixed cost	\$2000
total variable cost	\$4000
marginal cost	\$2.50

In the short run, what should the firm do to maximise its profits or minimise its losses?

- A** cease production altogether
- B** increase its output
- C** lower its price
- D** maintain its output at the present level

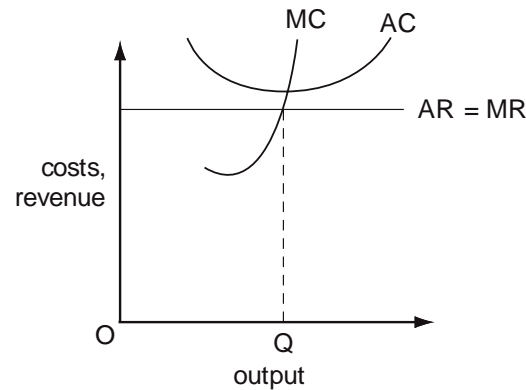
N/04/3/13

- 4 A perfectly competitive firm is currently producing at a level of output where its marginal cost is above its average total cost but below the market price. What would be the effect on price and output if the firm were to maximise its profit?

	effect on output	effect on price
<b>A</b>	decrease	increase
<b>B</b>	decrease	unchanged
<b>C</b>	increase	decrease
<b>D</b>	increase	unchanged

N/05/3/11

5 The diagram shows the position of a firm in a perfectly competitive industry.



What describes the position of the firm and the industry at output QQ?

	firm	industry
<b>A</b>	disequilibrium	disequilibrium
<b>B</b>	disequilibrium	equilibrium
<b>C</b>	equilibrium	disequilibrium
<b>D</b>	equilibrium	equilibrium

J/06/3/09

6 A firm in perfect competition currently sells 100 units at \$5 each.

What will be the revenue obtained by the firm if it increases its price to \$6?

- A** zero                      **B** \$100                      **C** \$500                      **D** \$600

N/06/3/13

7 The price that a firm obtains for its product is not affected by the volume of goods that it produces.

What should it do to maximise profits?

- A** produce until marginal cost equals price  
**B** produce until average cost equals price  
**C** produce until marginal revenue is zero  
**D** sell as much as it can produce

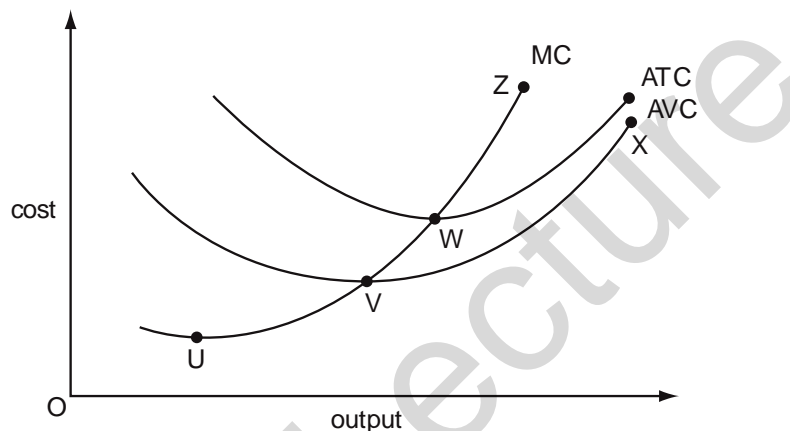
N/10/3/11

- 8** A perfectly competitive firm finds that at its current level of output, marginal revenue is \$2.00 and marginal cost is \$2.50.  
If the firm is a profit maximiser, what will happen to its price and output?

	price	output
<b>A</b>	increases	decreases
<b>B</b>	increases	unchanged
<b>C</b>	unchanged	decreases
<b>D</b>	unchanged	unchanged

J/12/32/11

- 9** The diagram shows the cost curves of a firm in a perfectly competitive market.



Which segment of a curve shows the quantity that the firm would be willing to supply to the market in the short-run?

- A** VX                      **B** UZ                      **C** VZ                      **D** WZ

J/12/32/12

- 10** A perfectly competitive firm is currently producing at a level of output where its marginal cost is above both its average total cost and the market price.  
What will be the effect on price and output if the firm were to maximise its profit?

	effect on output	effect on price
<b>A</b>	decrease	increase
<b>B</b>	decrease	unchanged
<b>C</b>	increase	decrease
<b>D</b>	increase	unchanged



J/13/32/04

11 The table shows the current position of a firm in a perfectly competitive industry.

	factor X	factor Y
marginal physical product	3	12
factor price	\$5.00	\$10.00

If the firm sells its product for \$1 and aims to maximise profits, what should it employ?

- A more of both X and Y
- B more of X and less of Y
- C more of Y and less of X
- D less of both X and Y

Mega Lecture

## Section: 8

## Monopoly

As one may notice, the conditions of perfect competition are rather exhaustive and difficult to meet in the real world. When any of these conditions breaks down, we have a situation of what is known as imperfect competition. Monopoly, typically placed on the contrasting end of perfect competition along the continuum of market structures, is the most popular form of imperfect competition and studied in detail below. Others i.e. monopolistic competition and oligopoly are discussed later, under section 12.

Monopoly is an extremely large firm serving the entire market single handedly. The products made by a pure monopoly have no substitutes finding a real life example of which is almost impossible. Utilities such as electricity, water, gas and telephone are usually provided by monopolies in most of the countries. Note that these still can not be regarded as pure monopolies as weaker substitutes usually exist.

As the Monopoly and Merger Commission (MMC) of UK defines it, any firm or group of firms is a monopoly if it produces more than 25% of the total market output.

### Revenue Curves of Monopoly

Being a single seller, a monopoly can either raise price or sell more but can not do both simultaneously. Quantity demanded decreases when it decides to charge a higher price and likewise, selling more requires a cut in price. Although substitutes are unavailable, consumers still demand less at higher prices since they reduce either the frequency or quantity of use. A monopolist thus faces a downward sloping demand curve showing a trade off between higher prices and more sales.

Monopoly demand curve need not be linear but for simplicity, we assume a linear demand curve throughout our discussion on monopoly.

Sale price (P) = Average Revenue (AR)	11	10	9	8	7	6	5	4	3	2	1
Quantity	0	1	2	3	4	5	6	7	8	9	10
Total Revenue (TR)	0	10	18	24	28	30	30	28	24	18	10
Marginal Revenue (MR)	-	10	8	6	4	2	0	(2)	(4)	(6)	(8)

Shown above is a hypothetical demand schedule for a non-discriminating monopoly, one which charges the same price for all the units it sells. For instance, if price is reduced to £9 to sell the second unit, price is lowered on both the first and second units. Thus total revenue generated from selling two units is £18 i.e. £9 × 2. Similarly, Total Revenue from selling three units equals £24 i.e. £8 for each of the three units. Had it been a discriminating monopoly, total revenue from selling 2 units would have been £19 i.e. £10 from the sale of the first unit plus £9 from the sale of the second.

Marginal Revenue (MR) is less than Sale Price as lowering price to £9 to sell second unit means additional revenue generated is £9 less £1, the loss from selling first unit at a lower price.

The demand, MR and TR curves corresponding to the given schedule are shown in diagram 8.1(a) & (b).

Diagram 8.1(a)

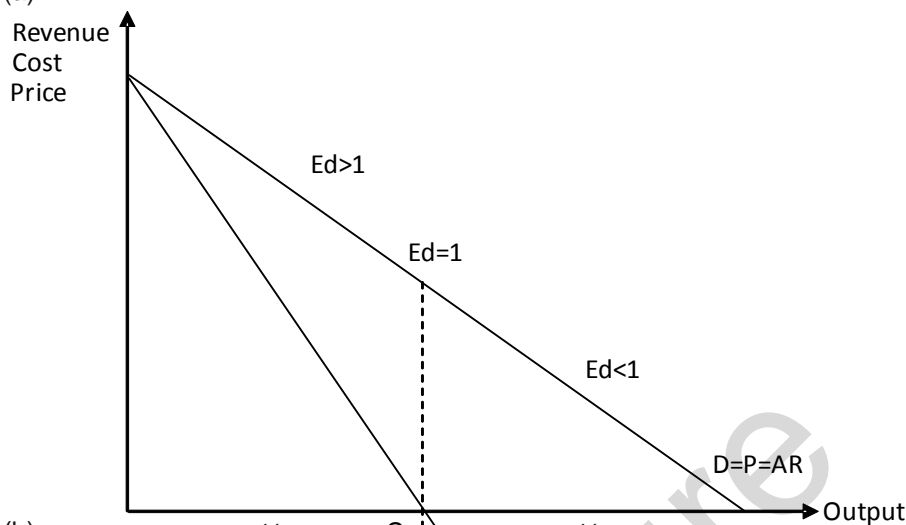


Diagram 8.1(b)

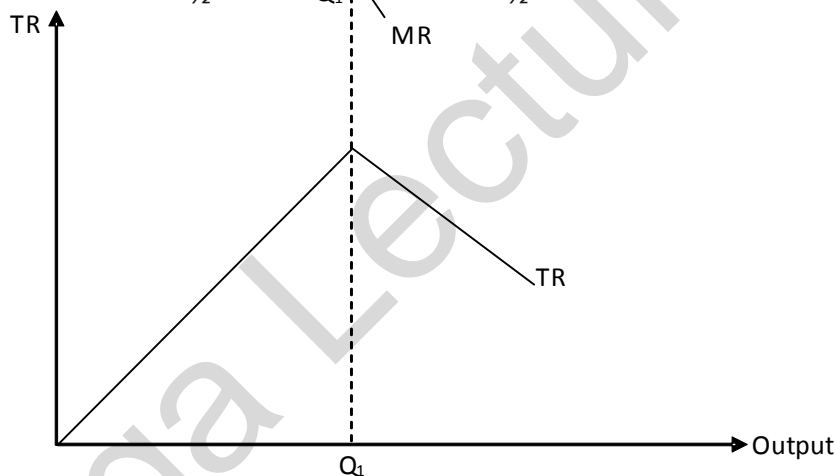


Diagram 8.1(a) shows a downward sloping demand curve which also depicts price and AR. MR curve lies below the demand curve and bisects the distance between the origin and the x intercept of demand curve. MR lies below AR (sale price), since a non-discriminating monopolist has to lower price on ALL units to sell more.

Demand is price elastic in the upper half of the linear demand curve, unitary price elastic at its mid point and price inelastic in the lower half. A price reduction therefore increases Total Revenues (MR is positive) in the upper half and decreases them (MR is negative) in the lower half of the demand curve. Diagram 8.1(b) shows Total Revenues, which rise initially and then fall. Total Revenues are maximized where elasticity of demand equals 1 and MR equals zero i.e. at output Q<sub>1</sub>.

The following derivation helps establish an equation confirming the relationship between MR and elasticities of demand.

$$MR = \frac{dTR}{dQ}$$

$$TR = P \cdot Q$$

$$MR = \frac{dP \cdot Q}{dQ}$$

$$MR = P \cdot \frac{dQ}{dQ} + Q \cdot \frac{dP}{dQ}$$

$$MR = P + Q \cdot \frac{dP}{dQ}$$

$$MR = P \left( 1 + \frac{Q}{P} \cdot \frac{dP}{dQ} \right)$$

$$MR = P \left( 1 + \frac{1}{Ed} \right)$$

Since price elasticity of demand is negative:

$$MR = P \left[ 1 - \frac{1}{|Ed|} \right]$$

Marginal Revenue (MR) is positive when elasticity of demand exceeds unity i.e. in the upper half of linear demand curve.

Marginal Revenue (MR) equals zero when elasticity of demand is unity i.e. at the midpoint of linear demand curve.

Marginal Revenue (MR) is negative when elasticity of demand is less than unity i.e. in the lower half of linear demand curve.

The equation also confirms that price equals MR in case of a perfectly competitive firm, i.e. where price elasticity of demand is infinity.

The equation defining the linear demand function faced by a monopolist is:

$$P = a - bQ \quad (i)$$

where P & Q represent sale price and quantity sold.  $-b$  shows the slope of the demand curve, the negative sign confirming the inverse relationship between price and quantity sold.

Given equation (i), total revenues are given by:

$$TR = PQ = aQ - bQ^2 \quad (ii)$$

Differentiating (ii) with respect to quantity, we obtain:

$$MR = \frac{dTR}{dQ} = \frac{dPQ}{dQ} = a - 2bQ$$

$$MR = a - 2bQ$$

Demand and MR curves share the same vertical intercept,  $a$ , whereas their slopes are  $-b$  and  $-2b$  respectively. The MR curve has a slope twice as large as the demand curve's.

The x-intercept of AR (or price) function is calculated by assuming price to be zero.

$$P = a - bQ$$

$$0 = a - bQ$$

$$Q = \frac{a}{b}$$

The x-intercept of MR function is found out by calculating quantity at zero MR.

$$P = a - 2bQ$$

$$0 = a - 2bQ$$

$$Q = \frac{a}{2b}$$

MR's x-intercept is exactly half of that of the demand (price or AR function) curve. As stated earlier, MR bisects the distance between the origin and the x-intercept of demand curve.

### Price and output determination in monopoly

As explained before, a monopolist can either choose the price or quantity it wishes to sell but not both simultaneously. Decision to choose a certain amount of one automatically determines the other. A profit maximizing monopolist chooses to produce where the cost of making the last unit (MC) equals the revenue generated from selling that unit (MR). It then sells this output at the highest possible price, given by the height of the demand curve.

Diagram 8.2

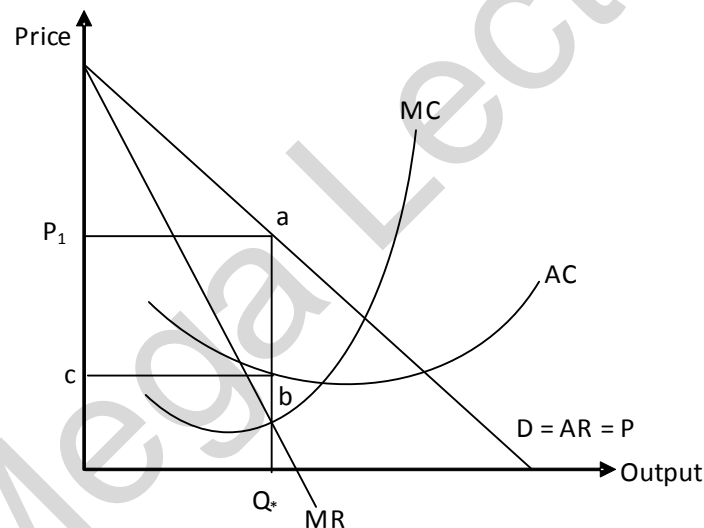
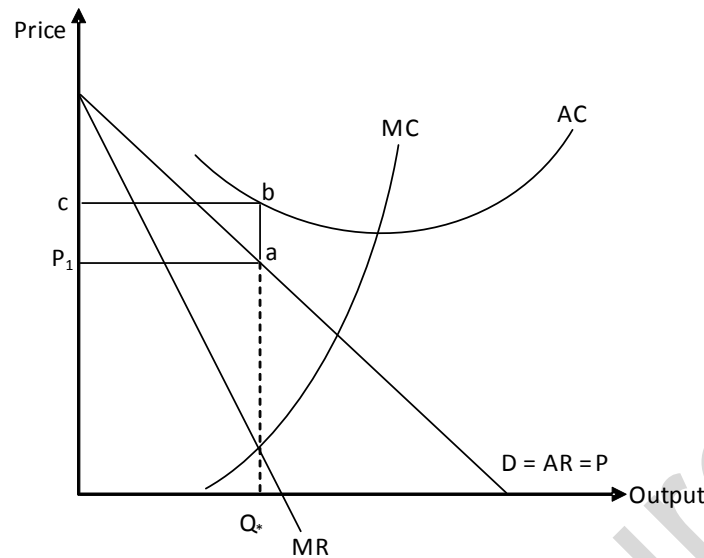


Diagram 8.2 shows the profit maximizing output ( $Q^*$ ), determined by the intersection of MC and MR. The monopolist sells this output at the highest possible price ( $P_1$ ), given by the height of the demand curve. Per unit profit is  $a - b$  (or  $P_1 - c$ ) and total profits (per unit profit times output,  $Q^*$ ), area  $abcP_1$ . The monopolist earns super normal profits and may continue to have them even in the long run as entry of new firms is impossible. Diagram 8.2 therefore shows both the short run and long run equilibrium for a monopolist.

However, It is not certain that the monopolist always makes profits. The inability of a monopolist to charge a price in excess of AC results in losses. The following diagram shows this scenario. The firm incurs losses equaling area  $cbP_1$ .

Diagram 8.3



**Where does the profit maximizing monopolist produce?**

It is generally thought that monopolists produce goods possessing price inelastic demand. Yet in reality, a monopolist always produces in the upper half of the linear demand curve where demand is price elastic. In the lower half of the demand curve (where demand is price inelastic), a profit maximizing monopolist will always be tempted to raise price which raises revenues and decreases Total Cost (since fewer units are sold at higher price), hence increasing profits. At the mid point of the linear demand curve, raising price leaves revenues unchanged but decreases Total Cost, hence profits increase. Thus a profit maximizing monopolist never produces at the mid point or in the lower half of the linear demand curve since there exists a possibility of increasing profit by lowering output.

A profit maximizing monopolist chooses to produce an output where MC equals MR. Since MC can never be zero or negative it can only equal MR in the upper half of the demand curve where MR is positive (try N/07/3/13)

**What should a profit maximizing firm do if Marginal Cost differs from Marginal Revenue?**

A profit maximizing firm should increase output if MR exceeds MC and decrease it if MR falls short of MC. A perfectly competitive firm can supply more or less at an unchanged price, however a monopolist can sell more only when price is decreased (try N/04/3/12).

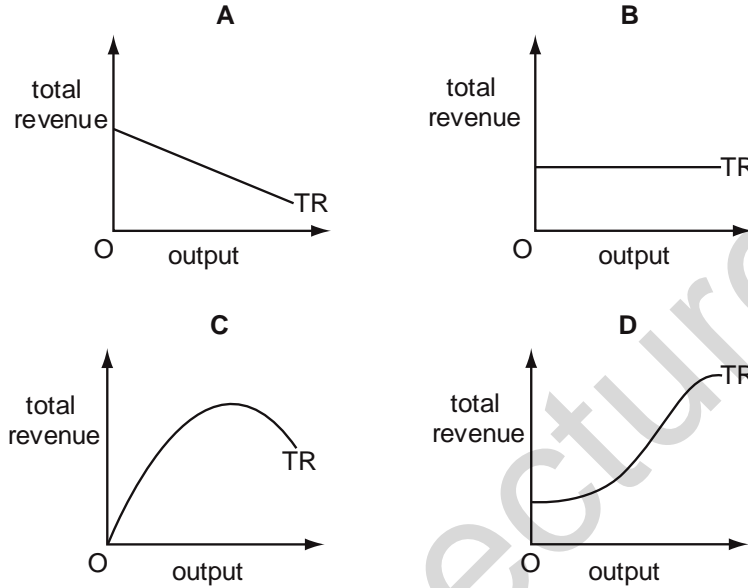
**Supply curve of monopoly- Is there any?**

For a perfectly competitive firm, the short run supply curve is given by the rising portion of MC over and above AVC. However, for a monopolist, the supply curve does not exist. Profit maximizing output is determined where MC = MR and since price and MR differ, determining a relationship between price, Marginal Cost and quantity supplied is not possible.

### Multiple Choice Questions (Section 8)

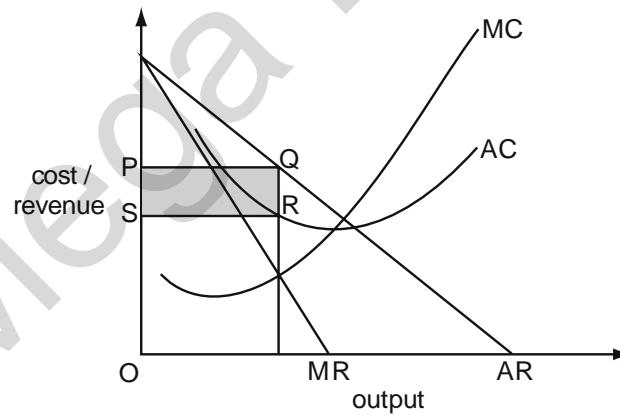
J/03/3/09

- 1 A monopolist faces a downward sloping, straight-line demand curve. Which diagram shows his total revenue curve (TR)?



J/03/3/11

- 2 The diagram shows a firm's cost and revenue curves.

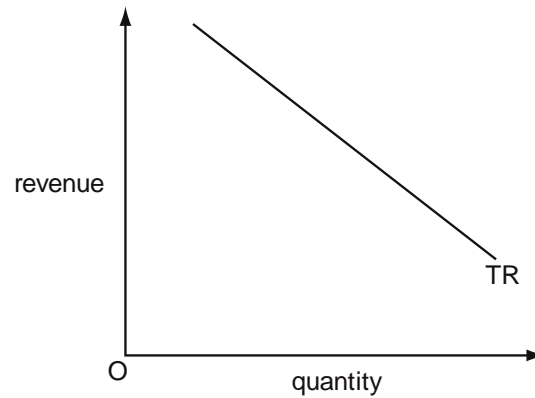


What does the shaded area SPQR measure?

- A abnormal profit
- B consumer surplus
- C total revenue
- D transfer earnings

N/03/3/13

- 3 The diagram shows the relationship between a firm's total revenue and the quantity of goods sold.

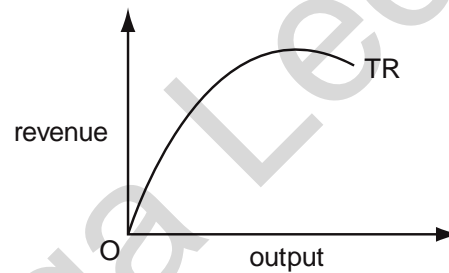


What is the price elasticity of demand for the good?

- A zero
- B between zero and one
- C one
- D between one and infinity

J/04/3/10

- 4 The diagram shows a firm's total revenue curve.



At the curve's highest point

- A marginal revenue is equal to marginal cost.
- B average revenue is equal to average cost.
- C marginal revenue is equal to average revenue.
- D marginal revenue is zero.



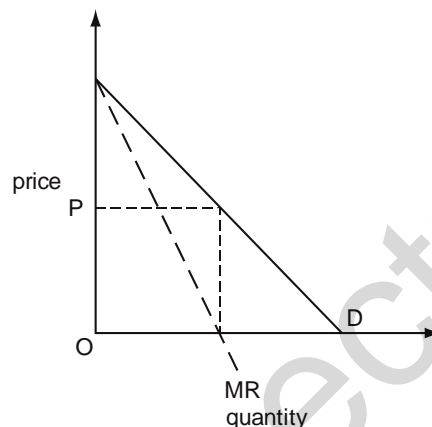
N/04/3/12

- 5 A monopolist finds that at his current level of output, marginal revenue is \$2.00 and marginal cost is \$2.50.  
 In order to increase his current level of profits, which strategy should the monopolist adopt?

	price	output
<b>A</b>	decrease	unchanged
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	unchanged

J/05/3/11

- 6 The diagram shows a firm's demand curve and its marginal revenue curve.

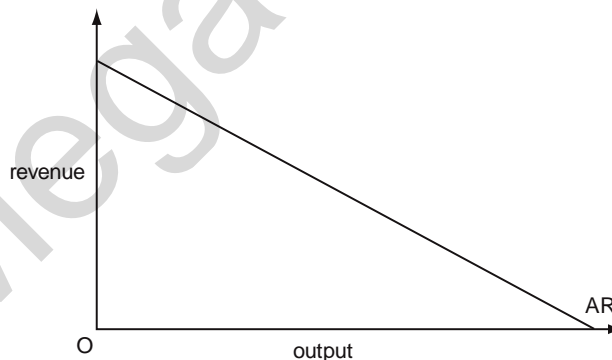


What is the price elasticity of demand at price OP?

- A** Zero      **B** 0.5      **C** 1.0      **D** infinity

N/06/3/09

- 7 The diagram shows a firm's average revenue curve.

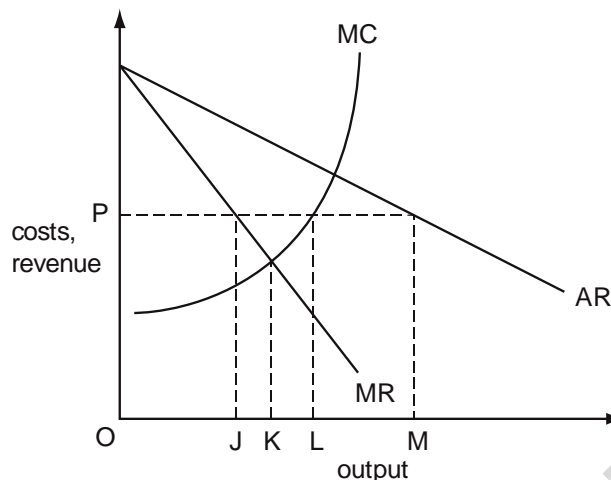


What can be deduced from the average revenue curve about the firm's total revenue as it increases output?

- A** It will rise continuously.  
**B** It will fall continuously.  
**C** It will rise initially then fall.  
**D** It will fall initially then rise.

N/06/3/15

8 The diagram shows the initial cost and revenue curves of a monopoly supplier.

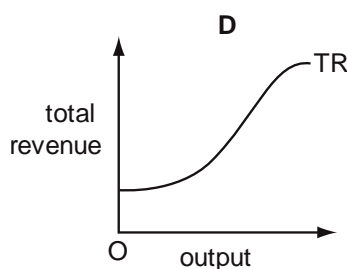
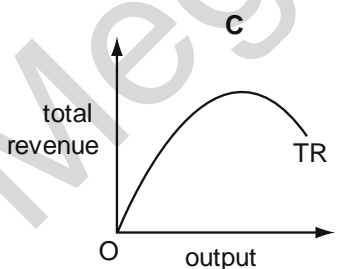
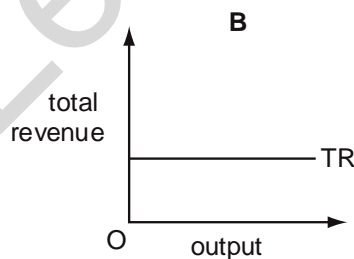
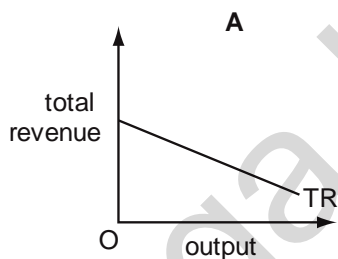


What will be the firm's profit-maximising level of output if the government fixes the price at OP?

- A OJ                      B OK                      C OL                      D OM

N/07/3/09

9 A monopolist faces a downward-sloping straight-line demand curve. Which diagram shows his total revenue curve (TR)?



N/07/3/13

**10** At its current level of output a monopolist is on the price-inelastic part of its demand curve.

Which changes should it make to price and output in order to maximise its profits?

	price	output
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	decrease
<b>D</b>	decrease	increase

J/09/3/07

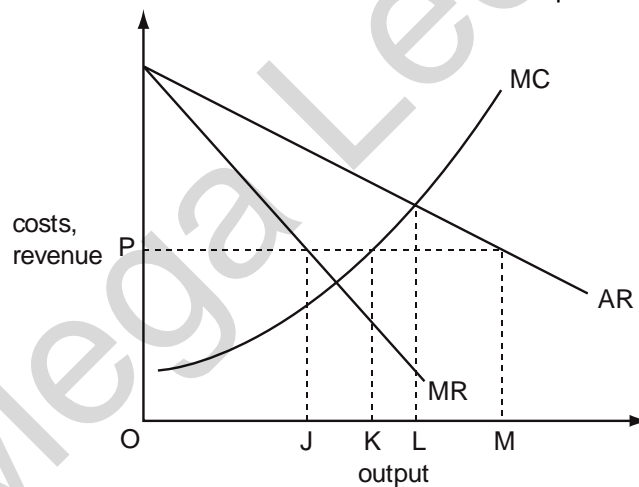
**11** A firm estimates that, all else remaining unchanged, an increase in its output will result in an equal proportionate increase in its revenue.

What can be deduced from this about the price elasticity of demand for the firm's product?

- A** It is  $-1$ .
- B** It is  $+1$ .
- C** It is perfectly inelastic.
- D** It is perfectly elastic.

J/09/3/08

**12** The diagram shows the initial cost and revenue curves of a profit-maximising monopolist.

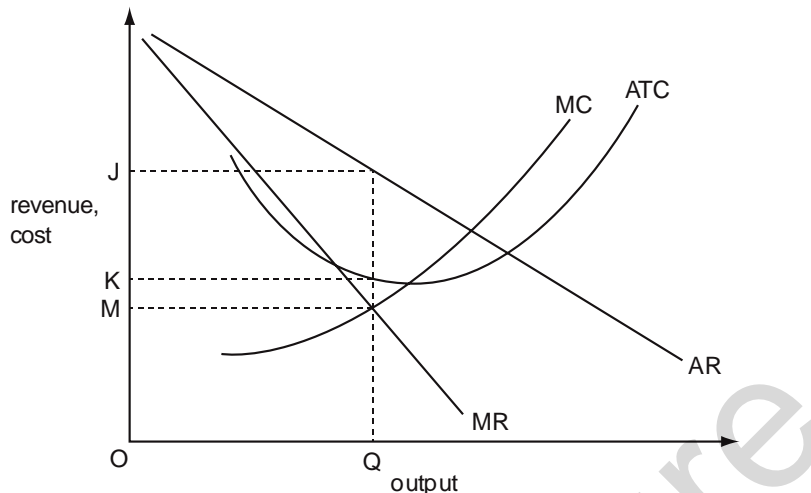


What output will the firm produce if the government fixes the price at OP?

- A** OJ
- B** OK
- C** OL
- D** OM

J/09/3/13

13 The diagram shows the cost and revenue curves of a profit-maximising monopolist.



What measures the monopoly profit per unit of output made by the firm?

- A JM    B JK    C JM × OQ    D JK × OQ

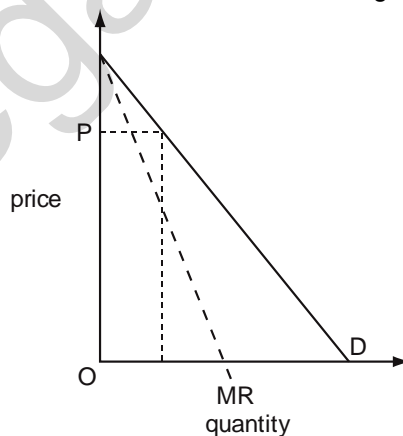
N/09/3/10

14 The price elasticity of demand for a firm's product is zero. What will be the effect on the firm's revenue if it increases its price by 5 %?

- A Its revenue will be unchanged.  
B Its revenue will increase by 5 %.  
C Its revenue will decrease by 5 %.  
D Its revenue will fall to zero.

J/10/3/08

15 The diagram shows a firm's demand curve and its marginal revenue curve.



What is the approximate price elasticity of demand at price OP?

- A 0.25    B 0.5    C 1    D 2

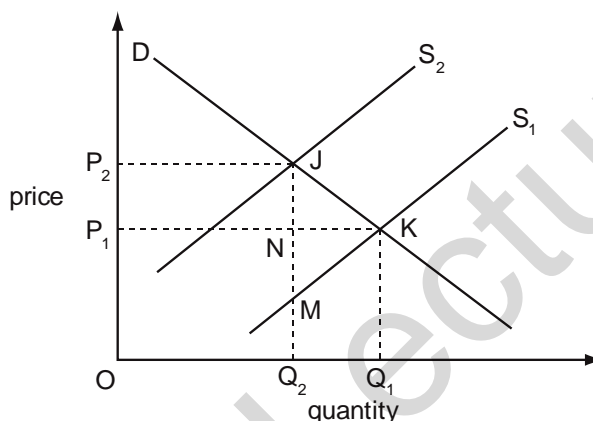
N/11/32/03

- 16** To prevent a surplus of milk, each milk producer is given a production quota which specifies the volume of milk he is allowed to supply. Initially the quotas are not tradable, but then trade in quotas is allowed. Who would gain or lose when trade in quotas takes place?

	purchasers of quotas	sellers of quotas
<b>A</b>	gain	gain
<b>B</b>	gain	lose
<b>C</b>	lose	gain
<b>D</b>	lose	lose

J/12/32/14

- 17** In the diagram the imposition of a tax on a commodity causes its supply curve to shift from  $S_1$  to  $S_2$ .



Which area measures the resulting deadweight loss?

- A**  $P_1P_2JK$       **B**  $JKQ_1Q_2$       **C**  $JKM$       **D**  $JKN$

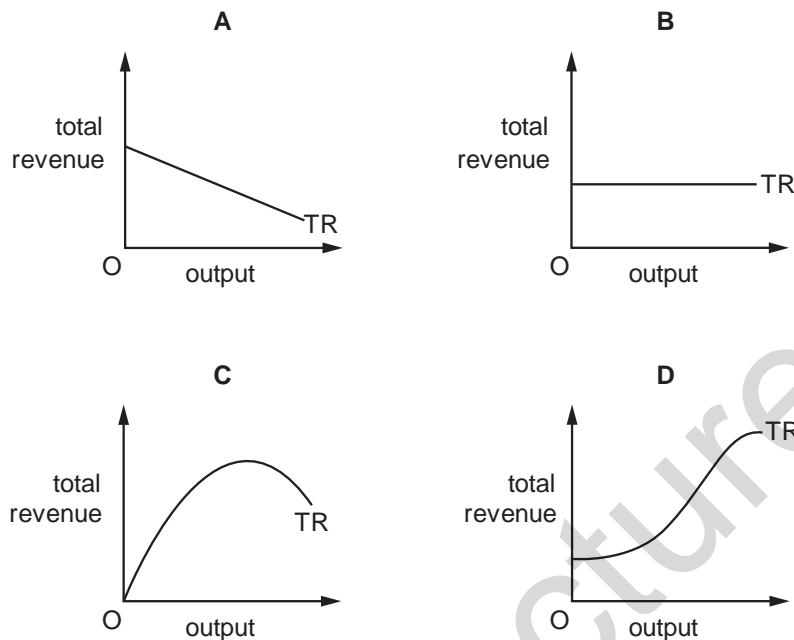
J/13/32/10

- 18** The demand for a firm's product is perfectly inelastic. What will be the effect on the firm's revenue if it increases its price by 5%?

- A** Its revenue will be unchanged.  
**B** Its revenue will increase by 5%.  
**C** Its revenue will decrease by 5%.  
**D** Its revenue will fall to zero.

J/14/32/11

19 A monopolist faces a downward-sloping straight-line demand curve. Which diagram shows his total revenue curve (TR)?

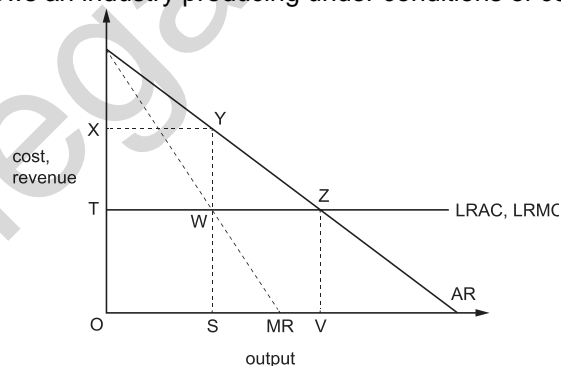


N/14/32/10

20 The price elasticity of demand for a firm's product is zero. What will be the effect on the firm's revenue if it reduces its price by 5%?  
**A** Its revenue will be unchanged. **B** Its revenue will decrease by 5%.  
**C** Its revenue will increase by 5%. **D** Its revenue will fall to zero.

N/14/32/11

21 The diagram shows an industry producing under conditions of constant average costs.



Under perfect competition, the industry produces output OV. Which area measures the increase in the industry's profits if it were to become a monopoly?

- A** XYSO      **B** XYWT      **C** XYZT      **D** YZW

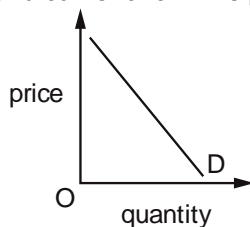
N/14/32/17

**22** A government introduces tax incentives which promote effort and enterprise. They also redistribute income from those who receive a higher marginal utility from money to those with a lower marginal utility from money.  
 What effect will these tax incentives have on efficiency and equity?

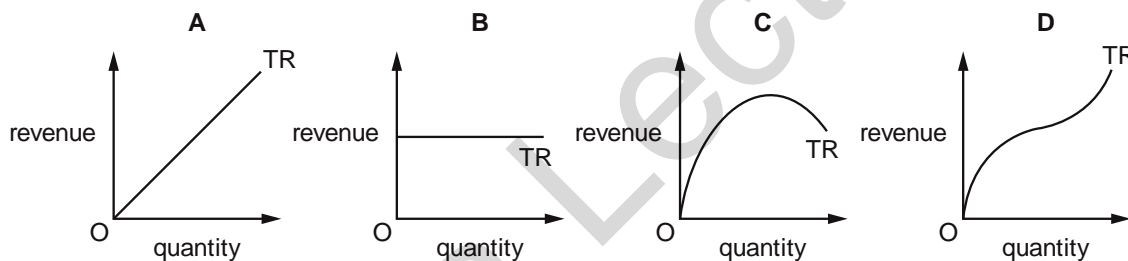
	efficiency	equity
<b>A</b>	increase	increase
<b>B</b>	increase	reduce
<b>C</b>	reduce	increase
<b>D</b>	reduce	reduce

J/15/32/10

**23** The diagram shows the demand curve for a firm's product.

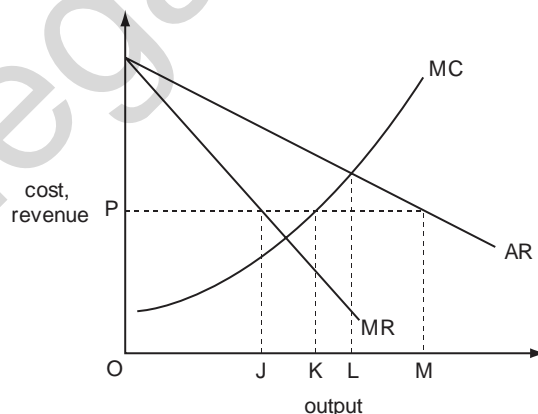


Which diagram depicts the shape of the firm's corresponding total revenue (TR) curve?



N/15/32/13

**24** The diagram shows the initial cost and revenue curves of a profit-maximising monopolist.

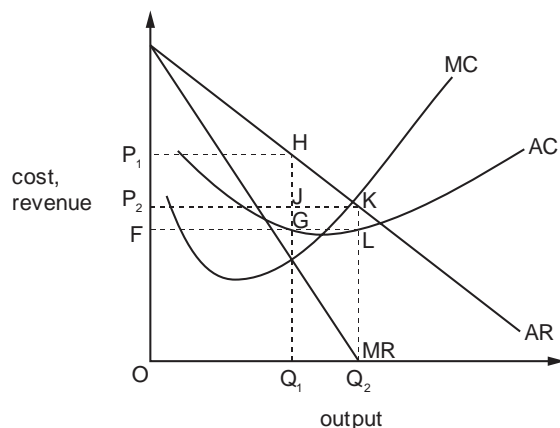


What output will the firm produce if the government fixes the price at OP?

- A** OJ                      **B** OK                      **C** OL                      **D** OM

J/16/32/07

**25** A monopolist changes its objective from profit maximisation to sales revenue maximisation.



On the diagram, which areas represent the monopolist's total profit?

	original profit	final profit
<b>A</b>	$P_1HJP_2$	$P_2KLF$
<b>B</b>	$P_1HJP_2$	JKLG
<b>C</b>	$P_1HGF$	$P_2KLF$
<b>D</b>	$P_1HGF$	JKLG

J/16/32/08

**26** A firm estimates that, all else remaining unchanged, an increase in its output will result in a fall in its revenue.

What can be concluded from this?

- A** The demand for the firm's product is price-elastic.
- B** The demand for the firm's product is price-inelastic.
- C** The supply of the firm's product is price-elastic.
- D** The supply of the firm's product is price-inelastic.



## Section: 9

## Externalities

Externalities are factors which result in a benefit or cost to a firm or society which originate, in part, from outside the firm or as an adjunct to productive activity. A firm which does not invest in training its labour force itself, for example, may nonetheless benefit from being able to attract employees who have been trained by other firms or by the government. Pollution is an example of external cost imposed on society: a chemical company which pollutes the air or contaminates river water incurs only the immediate cost of producing its product, while society suffers the extra cost of cleaning up the atmosphere and river.

Externalities are 'third party' or 'spill over' effects of an economic transaction. They exist when the costs or benefits of an economic transaction are split over to a third party i.e. to people other than buyers and sellers of the product. Externalities can be categorized as follows:

- (1) Negative
- (2) Positive

### Negative Externalities

Negative externalities exist when a non member is forced to pay a cost of an economic transaction. For example, residents in the neighborhood of a steel mill are forced to live in a noisy and polluted environment. The cost borne by them is the external cost of this transaction. The opening of a night club leading to increased street crime in the surrounding areas is another example of a negative externality. External cost exceeds zero when negative externalities exist.

#### External cost

External cost is the cost incurred, either knowingly or unknowingly, by the non-members of a transaction. External cost for neighbors of a steel factory are reduced sleep hours, increased medical bill, increased expenditures on making their houses sound proof and decreased productivity at their work places.

#### Private (internal) cost

Private or internal cost is the cost incurred by the members of the transaction. Private cost of producing steel is the cost of raw material, salaries of workers, utility bills of the factory, rent of the building etc.

#### Social cost

Social cost is the cost borne by society as a whole and hence includes both private and external costs.

Social cost = private cost + external cost

For transactions with negative externalities, social cost exceeds private cost.

#### Marginal private cost (MPC)

Marginal private cost is the cost incurred by members of a transaction for producing an extra unit of the product.

#### Marginal external cost (MEC)

Marginal external cost is the cost incurred by non-members of a transaction with the production of an extra unit of the product.

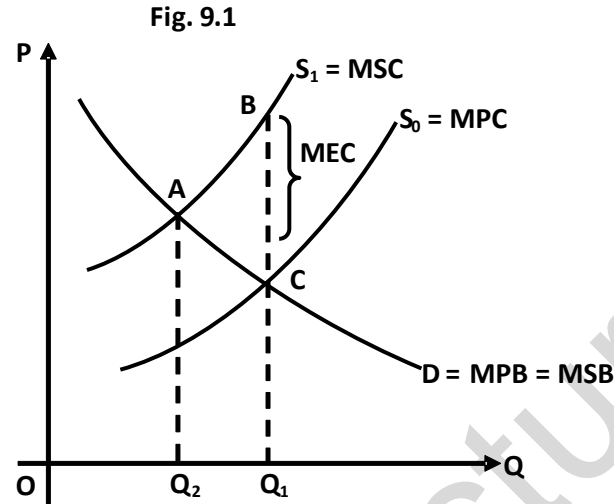
### Marginal social cost (MSC)

Marginal social cost is the cost incurred by the society for producing an extra unit of the product.

Marginal social cost = Marginal private cost + Marginal external cost

$MSC = MPC + MEC$

### Resource allocation when there are negative externalities



In Fig. 9.1, the height of the demand curve shows marginal social benefit (MSB) as well as marginal private benefit (MPB). The height of supply curve  $S_0$  shows marginal private cost (MPC). The height of supply curve  $S_1$  shows marginal social cost (MSC). Marginal social cost is higher than marginal private cost since marginal external costs are assumed to be positive. The vertical distance between both supply curves is the marginal external cost (MEC).

The firm maximizes its profits by producing  $Q_1$ , where the private benefit of the last unit equals its private cost ( $MPB = MPC$ ). However, society's welfare is maximized at  $Q_2$ , where the society's cost of making the last unit equals society's benefit ( $MSC = MSB$ ). Units between  $Q_2$  and  $Q_1$  cost more to the society and benefit less to society-hence their production decreases society's welfare. The firm makes these units since they benefit more than they cost ( $MPB > MPC$ ) - hence their production increases firm's profits.

The firm's insistence to produce profit maximizing output i.e.  $Q_1$  diminishes society's welfare by area ABC. Price mechanism over allocates and overproduces products when there are negative externalities.

### Negative Externalities-How to correct market failure

Price mechanism fails to allocate resources efficiently in the case of negative externalities, making government interference desirable. Governments can intervene in more than one way to check overproduction where negative externalities exist.

- **Taxes**

One of the ways to rectify over allocation of resources is to impose taxes. Taxes internalize external cost by making the firm pay for the pollution it emits. The (indirect) tax raises production cost and shifts supply curve upwards, forcing the firm to decrease its production and bringing it closer to the socially optimal level i.e.  $Q_2$  in Fig. 9.1.

Taxes can be used to correct market failure but can create their own third party effects. To minimize them, governments can impose heavier taxes on firms using outdated technology and undesirable production methods. Firms using environment friendly production techniques on the other hand, can be given a tax relief. Such a tax system minimizes third party effects of taxes by inducing producers to reduce pollution.

- **Legislation**

Governments can pass laws, restricting firms from polluting the environment or creating other negative externalities. Firms can be asked to fulfill certain requirements before being issued licenses. Government inspectors can periodically monitor the performance of firms and renew licenses for firms which keep pollution within acceptable limits.

- **Tradable pollution permits**

Governments can issue permits to firms, allowing them to pollute up to a certain level. More efficient firms can meet their production targets without fully utilizing the permits and make profits by selling unutilized permits to less efficient firms. This market based system provides a monetary incentive to firms to be more efficient and socially responsible.

As the right to pollute becomes expensive, firms should be discouraged from acting this way.

Climate change is a global issue and in 1997, most of the world's governments adopted an international agreement, the Kyoto Protocol, to tackle climate change. Like tradable pollution permits, carbon emission trading is one way in which countries can meet their obligations under protocol. Firms that can reduce their emissions at a low cost can sell their credits to firms that struggle to reduce them.

- **Media and public campaigning**

Media can play an important role in informing stakeholders about the consequences of production activities carried out by different firms. The increased awareness among general public can create a pressure on firms to use environment friendly production techniques.

## Positive Externalities

Positive externalities exist when the benefit of a transaction is passed on to outsiders of a transaction. For example, a public inoculation program does not only benefit the people getting vaccinated but also others, since the probability of a person catching an infection is low when more people are vaccinated. Similarly, the construction of an underground railway line yields a positive externality in the form of reduced number of accidents and road congestion.

- **Marginal private benefit (MPB)**

It is the benefit accruing to members of the transaction from producing an extra unit. From a firm's point of view, it is the revenue generated from selling an extra unit i.e. marginal revenue (MR).

- **Marginal external benefit (MEB)**

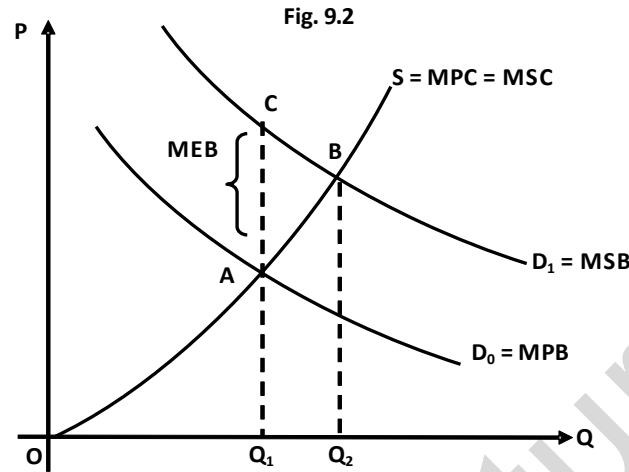
It is the benefit enjoyed by non-members with the production of an extra unit. Marginal external benefit exceeds zero for transactions with positive externalities.

- **Marginal social benefit (MSB)**

Marginal social benefit is the benefit enjoyed by society overall, for having an extra unit of the product.

Marginal social benefit = Marginal private benefit + Marginal external benefit

$$MSB = MPB + MEB$$



In Fig.9.2, the height of the supply curve shows marginal private cost (MPC) as well as marginal social cost (MSC). The height of demand curve  $D_0$  shows marginal private benefit (MPB) and the height of demand curve  $D_1$  shows marginal social benefit (MSB). The vertical distance between two demand curves measures marginal external benefit. Marginal social benefit exceeds marginal private benefit since marginal external benefit (MEB) is positive. The society's welfare is maximized at output  $Q_2$  ( $MSB = MSC$ ), but the firm's profits are maximized at output  $Q_1$  ( $MPB = MPC$ ). Units between  $Q_1$  and  $Q_2$  increase society's welfare ( $MSB > MSC$ ) but decrease profits ( $MPB < MPC$ ). Firms fail to allocate resources efficiently and underproduce this product by choosing to produce profit maximizing output,  $Q_1$ . Society is deprived of a possible welfare gain of area ABC. Firms ignore the external benefits as they cannot charge a price for providing these benefits.

Price mechanism under allocates and under produces goods when there are positive externalities.

#### Positive Externalities-How to correct market failure

- **Subsidies**

Governments can provide subsidies (negative taxes) that reduce production cost. The supply curve shifts downwards and the firm is encouraged to increase production-getting closer to the socially optimal level of production.

- **Self financing**

Government can provide goods itself, such as schools, hospitals and parks, knowing they will be under produced if left to market forces alone.

- **Media and public campaign**

Media can play an important role in informing and persuading people to produce and consume greater quantities of goods having positive externalities. For instance, the

importance of education, a public inoculation program and planting trees can be greatly emphasized through media.

- **Legislation**

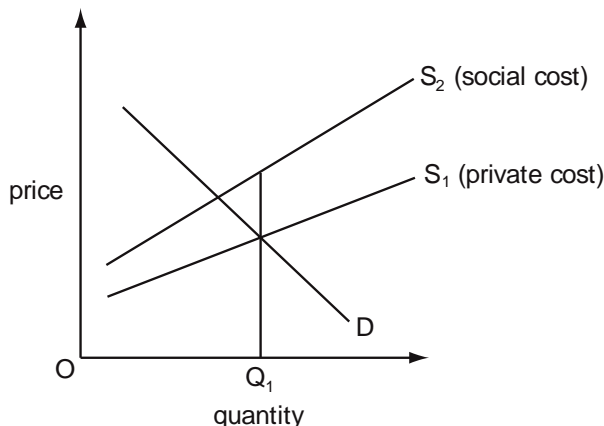
Governments can pass laws to ensure that production and consumption of products bearing positive externalities is increased. For example, in some countries, not sending children to school is considered a crime. Similarly, governments can restrict planning permissions to those housing societies only which provide adequate space for parks, play grounds, community centres and educational institutions.

Mega Lecture



J/04/1/14

5 In the diagram,  $Q_1$  is the quantity produced of a good as the result of market forces.



What concept is present at output  $Q_1$ ?

- A** a government subsidy
- B** a negative externality
- C** excess supply
- D** price instability

J/04/1/18

6 An international oil company announced in 2002 that it would not continue to explore for oil off the coast of Namibia. This was because there was only enough oil to support a local power station for Namibia and not enough to allow exports of oil. What might be a possible advantage and disadvantage to Namibia of this decision?

	<b>Advantage</b>	<b>Disadvantage</b>
<b>A</b>	a saving in costly research paid for by the oil company	a loss of employment opportunities
<b>B</b>	a reduction in taxes paid by the oil company to the Namibian government	the conservation of a natural resource
<b>C</b>	a reduction in potential external costs of pollution	the loss of cheaper oil
<b>D</b>	The exploitation of a natural resource	the loss of potential exports

N/04/1/14

7 Which combination shows examples of the private and external costs of the particular activity?

	activity	private cost	external cost
<b>A</b>	car journeys	traffic police costs	labour mobility
<b>B</b>	foreign holidays	crowded beaches	airport taxes
<b>C</b>	jet flights	night flight disturbance	landing fees
<b>D</b>	pop concerts	admission charges	noise intrusion

J/05/1/14

- 8** The growing of flowers in a private garden results in a positive externality. What can be concluded from this?
- A** External benefits exceed private costs.
  - B** External costs exceed private costs.
  - C** Private costs exceed social benefits.
  - D** Social benefits exceed private benefits.

N/05/1/14

- 9** In some countries in the last twenty years the amount of freight traffic carried by roads has increased and the amount carried by railways has decreased. Recently, there has been an attempt to reverse this trend. What could be the most likely reason for this attempt?
- A** The external benefits of road transport are higher than the external benefits of rail transport.
  - B** The private benefits of road transport are high.
  - C** The private costs of road transport are low.
  - D** The social costs of road transport are higher than the social costs of rail transport.

J/06/1/14

- 10** In which situation are there definitely positive externalities?
- A** Private benefits exceed private costs.
  - B** Private benefits exceed social benefits.
  - C** Social benefits exceed private benefits.
  - D** Social benefits exceed private costs.

N/06/1/14

- 11** What is an external cost of building new houses in a city centre?
- A** the cost of compensating residents for mud on local roads
  - B** the cost of city centre traffic congestion resulting from the building
  - C** the cost of obtaining planning permission
  - D** the cost of painting the outside of the new houses

J/07/1/15

- 12** Which consequence of building an underground railway line would be classified as an externality?
- A** a reduction in road accidents
  - B** the gain in profit for the train operators
  - C** the revenue from foreign visitors travelling on the line
  - D** the saving in travel time by passengers who travel on the line



J/07/1/17

**13** Vandalism and crime have increased in an area of a city following the opening of a night club. As a result, additional police have been sent to patrol the area. What does this statement illustrate?

- A** a negative externality and a merit good
- B** a negative externality and a public good
- C** a positive externality and a merit good
- D** a positive externality and a public good

J/08/1/14

**14** What will be the result, from society's view, if the market price for a product does not reflect the negative externalities in its production?

- A** too much consumption and too much production
- B** too much consumption and too little production
- C** too little consumption and too little production
- D** too little consumption and too much production

N/08/1/15

**15** Which statement about externalities is correct?

- A** Externalities are easier to value than private costs and benefits.
- B** Externalities are only associated with industrial production.
- C** Externalities can be both beneficial and harmful.
- D** Externalities cannot exceed private costs and benefits.

N/08/1/16

**16** The table shows, for two different quantities of good X, the total amount consumers are willing to pay and the total external benefits that are generated.

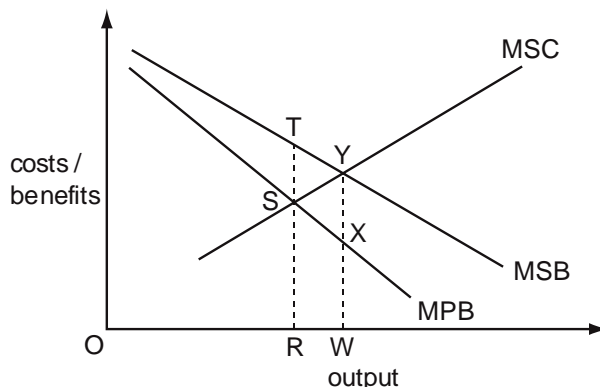
quantity of good X (units)	consumers' willingness to pay (\$)	total external benefits (\$)
3	240	54
4	280	68

What is the additional social benefit when 4 units rather than 3 units are produced?

- A** \$14
- B** \$40
- C** \$54
- D** \$348

J/09/1/14

**17** A government is planning to intervene in a market to fix output at the economically desirable level by giving a subsidy.



To achieve its objective, what should be the subsidy per unit?

- A** ST                      **B** SX                      **C** TY                      **D** XY

J/09/1/15

**18** A town council estimated the costs and benefits of operating a bus service in 2006 and 2007. These are shown in the table.

	2006 \$000	2007 \$000
private costs	2000	2200
external costs	500	900
private benefits	1500	2300
external benefits	1000	800

What can be concluded from the table?

- A** Between 2006 and 2007, social costs fell and social benefits rose.  
**B** Between 2006 and 2007, social costs rose and social benefits fell.  
**C** In both years, positive externalities exceeded negative externalities.  
**D** In both years, social costs equalled social benefits.

J/10/1/13

**19** James grows fruit trees in his garden. They attract butterflies and bees. What is **not** an externality of this?

- A** Neighbours may be stung by the bees that pollinate the trees.  
**B** Neighbours may buy fruit more cheaply from James than the local supermarket.  
**C** Neighbours may enjoy better air quality as the trees naturally improve the atmosphere.  
**D** Neighbours may like to watch the activity of the wildlife at no cost.

J/10/1/14

**20** The table shows some of the costs when a firm produces a good.

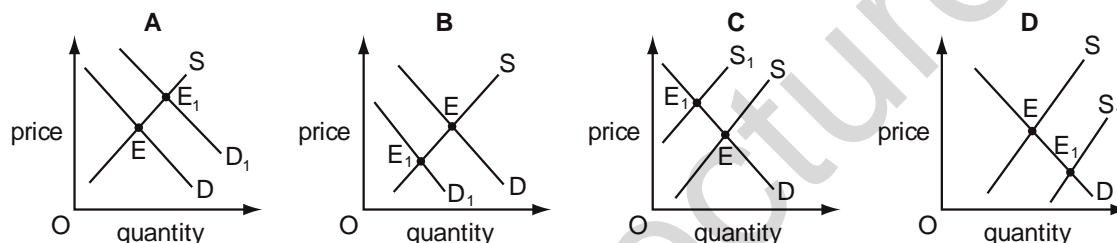
output	total cost to society \$	external cost \$
23	316	16
24	322	18

What is the additional cost to a firm of producing the 24<sup>th</sup> unit?

- A** \$2                      **B** \$4                      **C** \$6                      **D** \$8

J/11/1/14

**21** The consumption of a good generates external benefits. Its market equilibrium is E. Which diagram shows the change in the equilibrium (E to E<sub>1</sub>) necessary to reflect the correct value of the good to society?



N/11/1/14

**22** A congestion charge of £10 per day has been imposed on motorists taking their cars into Central London.

What is it about driving into Central London that provides the economic justification for this charge?

- A** The external benefits are greater than the external costs.  
**B** The private costs are greater than the external costs.  
**C** The social benefits are greater than the private benefits.  
**D** The social costs are greater than the private costs.

J/12/1/14

**23** Which statement is correct?

- A** External cost equals social cost minus private cost.  
**B** Private cost equals external cost minus social cost.  
**C** Social cost equals external cost minus private cost.  
**D** Social cost equals private cost minus external cost.

N/12/1/14

**24** Which policy adopted by an airline is the result of an externality?

- A** price cutting against rival airlines  
**B** the prohibition of smoking on aircraft  
**C** the provision of different classes of seating accommodation  
**D** the use of internet booking facilities

N/12/1/15

- 25** What will be the result, from society's view, if the market price for a product does not reflect the negative externalities in its production?
- A** too little consumption and too little production
  - B** too little consumption and too much production
  - C** too much consumption and too little production
  - D** too much consumption and too much production

J/13/1/14

- 26** Which is not an example of an externality?
- A** The establishment of a new firm in an area increases the general level of wage rates in the area.
  - B** The flowers planted by a householder in his garden give pleasure to his neighbours.
  - C** The immunisation of children against smallpox reduces the danger of the risk of infection to others.
  - D** The installation of security cameras in a city centre results in an increase in thefts elsewhere.

N/13/1/15

- 27** What will be the result, from society's view, if the market price for a product does not reflect the positive externalities in its production?
- A** too little consumption and too little production
  - B** too little consumption and too much production
  - C** too much consumption and too little production
  - D** too much consumption and too much production

J/14/1/14

- 28** The existence of a positive externality is possible when
- A** consumers are not the best judges of the future benefits from consuming a product.
  - B** groups of consumers act together to negotiate a discount on the sale of a product.
  - C** producers use a government scheme to clear waste from their offices at no cost to themselves.
  - D** social costs of production exceed private costs of production.

J/14/1/15

**29** A firm opens a new factory on derelict ground on the outskirts of a town. What will be included among the externalities arising from the opening of the new factory?

	an increase in air pollution	an increase in the rents of neighbouring factory sites	the change in the appearance of the neighbourhood
<b>A</b>	no	no	yes
<b>B</b>	no	yes	no
<b>C</b>	yes	no	yes
<b>D</b>	yes	yes	no

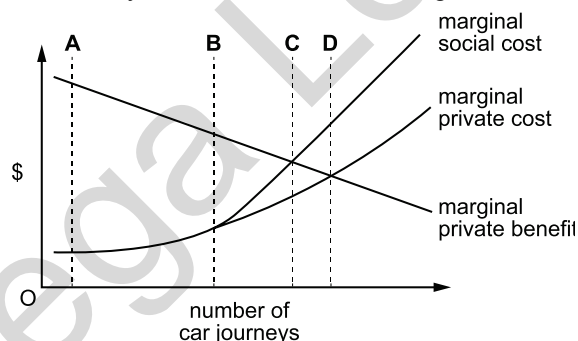
J/14/1/16

**30** A firm owns a bridge and charges all vehicle users who cross it. How might the charge be classified?

- A** a private benefit and a private cost
- B** a private benefit and an external cost
- C** an external benefit and a private cost
- D** an external benefit and an external cost

N/14/32/18

**31** The diagram shows the private and social costs and the private benefits that arise as the number of car journeys into a city centre increases. In the absence of any external benefits, which volume of traffic would maximise the community's welfare if entry could be restricted through the issue of permits?



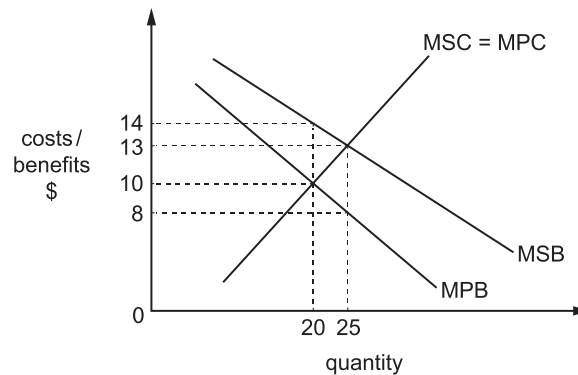
N/14/1/14

**32** A firm wishes to build a factory extension. Permission is required from the government because the extension may increase

- A** comparative costs.
- B** external costs.
- C** opportunity costs.
- D** private costs.

N/14/1/15

- 33** The diagram shows the private and social costs and benefits that arise from the consumption and production of a good.



If there is no government intervention, what is the value of the marginal external benefit?

- A** \$2                      **B** \$3                      **C** \$4                      **D** \$6

J/15/1/14

- 34** What is an example of an externality?

- A** Production of good X directly affects the cost of producing good Y.  
**B** The entry of a new firm reduces the profits of existing firms producing good X.  
**C** The introduction of bus-only lanes reduces the travel times of bus passengers.  
**D** The opening of a new underground railway reduces the revenue of bus operators.

## Section: 10 Cost Benefit Analysis

Cost benefit analysis (CBA) is an investment appraisal technique which judges the economic viability of a project by comparing its social costs and benefits. Projects whose (discounted) social benefits exceed social costs are considered viable and can be given a go ahead.

Cost benefit analysis is usually conducted for mega public sector projects such as building of a motorway, construction of a dam or of an airport. Such projects have a wide range of negative and positive effects. These effects should be carefully considered and weighed before deciding to undertake a project. For example, the cost benefit analysis for the construction of a motorway linking a major city with a port but passing through an area of breathtaking natural beauty can be conducted to judge the viability of this project. Some of the social benefits of this project are increased export revenues, increased employment opportunities, increased economic activity and improved transport network. The social costs could be the damage to the environment and the opportunity cost of resources used to construct the motorway.

However, conducting a cost benefit analysis is not a simple task. Identifying all the social costs and benefits and assigning an exact monetary value to them makes this analysis difficult to conduct.

Value judgment also complicates this analysis. Value judgment arises when different groups of people assign different values to the benefits and costs associated with a project. For example, some people might support the idea of cutting trees to widen a road, enabling commuters to travel safely and quickly. Another group, fearing a damaged environment, might oppose the idea.

Another problem that authorities confront while conducting CBA is that the costs of projects are immediate and concern a specific group of people whereas the benefits are remote and widely dispersed. For example, the construction of a water reservoir forces the displacement of people living near the proposed site. These people are adversely affected both economically and socially but the benefits of the dam accrue to the entire country. It is more likely that the affected group would succeed in forming a pressure group and increase the costs associated with this project.

## Multiple Choice Questions (Section 10)

J/03/1/15

- 1** A financial investigation by a private firm finds that a new railway line would not be profitable.  
 A cost-benefit analysis finds that the line is worth constructing.  
 What could explain this difference?
- A** There are external costs not included in the financial investigation.
  - B** There are external benefits not included in the financial investigation.
  - C** A higher rate of interest is used in cost-benefit analysis.
  - D** Cost-benefit analysis uses a higher estimate for wage costs.

N/03/1/15

- 2** What would **not** be included in a cost-benefit analysis of a proposed new university?
- A** the costs of building the new university
  - B** the extra income earned by the new university's graduates
  - C** the future staffing costs of other universities
  - D** the future staffing costs of the new university five years into the future

J/04/1/15

- 3** The table shows the expected costs and benefits from four government projects. The government can afford only one project.  
 Which project should the government choose?

	private benefits \$m	external benefits \$m	private costs \$m	external costs \$m
<b>A</b>	40	200	60	70
<b>B</b>	60	160	100	20
<b>C</b>	100	210	100	120
<b>D</b>	150	90	120	140

N/04/1/15

- 4** The government has to choose the best one of four possible sites to locate a port. The costs and benefits of each site are shown in \$m in the table.  
 Which site would be chosen?

Site	private costs	external costs	private benefits	external benefits
<b>A</b>	10	50	900	600
<b>B</b>	20	5	1 000	800
<b>C</b>	80	40	800	1 100
<b>D</b>	100	200	1 000	900



J/05/1/15

- 5 Prior to an election, the government proposes to build a new urban motorway. In a cost-benefit analysis, what would **not** be included among the prospective benefits?
- A the lower operating costs of public transport
  - B the lower running costs incurred by private motorists
  - C the value of time saved by commuters
  - D the improved chance of the re-election of the government

N/05/1/15

- 6 When is cost-benefit analysis most likely to be used?
- A by a firm when deciding whether to relocate
  - B by a firm when deciding to purchase new machinery
  - C by a government when choosing between two road schemes
  - D by a local authority when deciding its tax rate

J/06/1/15

- 7 Correct use of cost-benefit analysis should produce an outcome where
- A social costs are minimised and social benefits are maximised.
  - B social benefits are in excess of social costs.
  - C marginal private benefits equal marginal social benefits.
  - D marginal social benefits equal marginal social costs.

N/06/1/15

- 8 What is an advantage of using cost-benefit analysis in decision-making rather than using only private costs and private benefits?
- A It does not require detailed calculations.
  - B It is easier to calculate social costs than private costs.
  - C It speeds up the decision-making process.
  - D It takes into account a wider range of effects.

J/07/1/16

- 9 The costs and benefits of building a bridge have been calculated as follows.

	\$ million
building costs	100
disturbance to people nearby	10
time saved by using the bridge	90
less congestion on other routes	30

Which of the following is true?

- A The external cost exceeds the private costs.
- B The private benefit exceeds the private costs.
- C The social benefit exceeds the social costs.
- D The external cost exceeds the external benefits.

N/07/1/14

- 10** A government decided to approve a private airport-building scheme because it was socially beneficial. In making its decision it calculated private costs at \$700 m, private benefits at \$800m and external costs at \$200 m.  
What does this suggest must have been true about the external benefits of the scheme?
- A** External benefits equalled private benefits.
  - B** External benefits exceeded \$100m.
  - C** External benefits exceeded external costs.
  - D** There were no external benefits.

N/07/1/15

- 11** In cost-benefit analysis the term net social benefit refers to
- A** private benefit plus social benefit.
  - B** social benefit minus private benefit.
  - C** social benefit minus private cost.
  - D** social benefit minus social cost.

J/08/1/16

- 12** The government has to choose the best one of four possible sites to locate a port. The benefits and costs of each site are shown in \$m in the table.  
Which site would be chosen?

	private benefits	external benefits	private costs	external costs
<b>A</b>	900	600	10	50
<b>B</b>	700	1100	20	5
<b>C</b>	800	1100	80	40
<b>D</b>	1000	900	100	200

J/09/1/16

- 13** When would cost-benefit analysis definitely indicate that a government project should be approved?
- A** if it eliminated all external costs
  - B** if it gave a higher rate of return than a private sector project
  - C** if it maximised net social benefit
  - D** if it minimised total social cost

N/09/1/13

- 14** The government is considering building flood defences along a river. It has calculated the costs and benefits as follows.

	costs \$m	benefits \$m
private	450	260
external	60	190

According to cost-benefit analysis, which decision and reasoning about flood defences is correct?

	decision	reasoning
<b>A</b>	Build.	External benefits are greater than external costs.
<b>B</b>	Build.	Social benefits are greater than private benefits.
<b>C</b>	Do not build.	Private costs are greater than the external benefits.
<b>D</b>	Do not build.	Social costs are greater than the social benefits.

J/10/1/15

**15** What makes it particularly difficult to take decisions using cost-benefit analysis?

- A** External costs are difficult to estimate accurately.
- B** Government have no method of valuing time savings.
- C** Market forces have no influence on the outcome.
- D** Private costs can vary from one day to the next.

N/10/1/15

**16** How would net external benefit be calculated?

- A** external benefit minus external cost
- B** external benefit plus private benefit
- C** private benefit plus social benefit
- D** social benefit minus private cost

N/10/1/16

**17** The table shows the expected costs and benefits from four government projects. The government can afford only one project. Which project should the government choose?

	private benefits \$m	external benefits \$m	private costs \$m	external costs \$m
<b>A</b>	40	200	60	70
<b>B</b>	60	160	100	20
<b>C</b>	100	210	100	120
<b>D</b>	150	90	120	140

J/11/1/13

**18** The table shows some of the costs and benefits at a given level of production of a good.

costs	\$m	benefits	\$m
private	80	private	90
social	200	external	100

What is correct at this level of production?

- A** External benefits exceed external costs.
- B** Private benefits exceed external costs.
- C** Private costs exceed social benefits.
- D** Social costs exceed social benefits.

J/11/1/15

**19** What is an advantage, rather than a disadvantage, of cost-benefit analysis in deciding on a government investment project?

- A** Economic agents place different values on external costs and external benefits.
- B** Estimates of external costs and external benefits are included.
- C** Forecasts of future costs and benefits vary over time.
- D** Miscalculations of the costs are financed by the taxpayer.

N/11/1/15

- 20** A cost-benefit analysis of a proposed underground railway produced the following statistics.

annual costs and benefits	\$ million
annual capital cost	10
operating and maintenance costs	3
fare revenue	6
savings to private travellers	5
savings to business	10
other economic benefits	7

What can be concluded from the statistics?

- A** If undertaken by the private sector there would be a loss of \$13m.
- B** If undertaken by the private sector there would be a profit of \$3m.
- C** If undertaken by the public sector there would be a net social benefit of \$15m.
- D** If undertaken by the public sector there would be a net social cost of \$1m.

J/12/1/15

- 21** In deciding whether to invest in a new project, what would be taken into account in government cost-benefit analysis but not by a private company?

- A** consultancy fees
- B** consumer surplus
- C** interest charges
- D** tax payments

N/12/1/16

- 22** The table shows some of the costs and benefits, in \$ millions, associated with a road building project. Both a government department and a profit-maximising private firm are considering building the road.

PRIVATE COSTS	EXTERNAL COSTS	EXTERNAL BENEFITS	SOCIAL BENEFITS
450	75	50	550

Who would be willing to build the road?

- A** Both would be willing to build it.
- B** Neither would be willing to build it.
- C** Only the government department would be willing to build it.
- D** Only the private firm would be willing to build it.

J/13/1/15

- 23** A government decided to approve a private airport-building scheme because it was socially beneficial. In making its decision it calculated private costs at \$700 m, private benefits at \$800 m and external costs at \$200 m.

What must have been true about the external benefits of the scheme?

- A** External benefits equalled private benefits.
- B** External benefits exceeded external costs.
- C** External benefits exceeded \$100 m.
- D** There were no external benefits.

N/13/1/14

- 24** The table shows the expected costs and benefits from four government projects. The government can afford only one project. Which project should the government choose?

	private benefits (\$m)	external benefits (\$m)	private costs (\$m)	external costs (\$m)
<b>A</b>	40	200	60	70
<b>B</b>	60	160	100	20
<b>C</b>	100	210	100	120
<b>D</b>	150	90	120	140

J/14/1/17

- 25** The table shows the results of a cost-benefit analysis into the building of a new runway at an airport.

	Costs US\$m	Benefits US\$m
private	100	125
external	25	20

Which statement about the new runway is correct?

- A** The net external benefit is US\$5 million.  
**B** The net private benefit is US\$25 million.  
**C** The net social benefit is US\$105 million.  
**D** The net social benefit is US\$145 million.

J/15/1/01

- 26** In 2013, there was much criticism of a government project to build a new high-speed rail link between two cities.

What is the most likely reason for abandoning such a project?

- A** The construction cost is greater than the running cost.  
**B** The external cost is greater than the external benefit.  
**C** The future costs are difficult to calculate.  
**D** The opportunity cost is too high.

J/15/1/15

- 27** The table gives the estimated costs and benefits of a proposed new leisure complex.

	\$000s
private benefits	120
external benefits	80
private costs	140
external costs	20

What is the estimated value of the social benefits of the project?

- A** \$40 000      **B** \$60 000      **C** \$80 000      **D** \$200 000

J/15/1/16

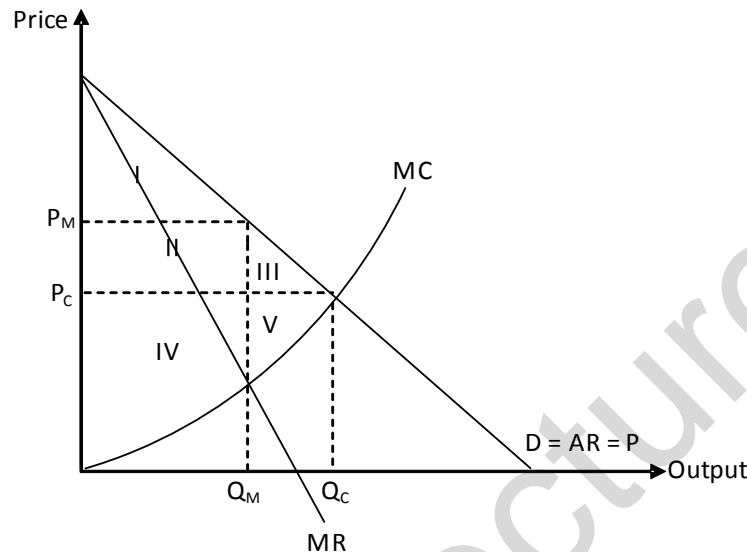
- 28** The production of what is most likely to require a government cost-benefit analysis?

- A** houses      **B** medicines      **C** roads      **D** schools

## Section: 11 Comparison between Perfect Competition and Monopoly

The following diagram helps us analyze how the two market structures studied so far, perfect competition and monopoly differ on the basis of their efficiency.

Diagram 11.1



The equilibrium price and quantity for a perfectly competitive industry are determined by the intersection of downward sloping demand curve and upward rising supply curve at  $P_C$  and  $Q_C$ . The intersection of MR and MC determines the profit maximizing output for monopoly  $Q_M$  which the monopolist sells at price  $P_M$ . Assuming a similar marginal cost curve for both, it is clear that the monopolist sells too little at too high prices compared to a perfectly competitive setting.

Whereas consumer surplus for a monopolist is only area I, that for a perfectly competitive industry comprises areas I, II and III. Monopoly reduces consumer surplus by selling a lower output at a relatively high price. Producer surplus for a monopolist is areas II and IV whereas that for perfect competition is IV and V. Monopolist gains area II by charging a high price but loses area V since fewer units are sold at a higher price. However, the gain shown by II must be greater than the loss, V, to incentivize producers to monopolize an otherwise perfectly competitive industry.

The sum of consumer and producer surplus equals area I, II, III, IV and V for the perfectly competitive industry but only I, II and IV for monopoly. Area III and V are those components of consumer and producer welfare losses which do not become the gain of any one. Thus III and V show the dead weight loss caused by a monopoly.

A perfectly competitive firm is allocatively efficient as it charges a price equal to the marginal cost of the last unit and total welfare of society is maximized. Monopoly on the other hand, is allocatively inefficient since it charges a price higher than the marginal cost and results in a welfare loss to society i.e. III and V. Marginal social benefit (given by the height of the demand curve) exceeds marginal cost of units between  $Q_M$  and  $Q_C$  so their production increases society's welfare but reduces monopolist's profits (since marginal cost exceeds marginal revenue). The temptation to maximize profits forces monopolists to restrict output to  $Q_M$  where MR equals MC.

A perfectly competitive firm must be productively efficient to be able to continue operating in the long run. Productive efficiency requires a firm to produce at minimum possible Average Cost (AC). A perfectly competitive firm can not charge a price higher than average cost in the long run as firms that do so incur a loss and are unable to survive. However, the ability of a monopolist to charge a price in excess of average cost provides room for complacency. A monopolist may still be productively efficient but the pressure to be so is decreased because of its ability to make super normal profits.

Note that assuming the supply curve of perfectly competitive market to be similar to the Marginal Cost (MC) curve of monopoly ignores the possibility of economies of scale which monopoly may exploit because of its large size.

The following set of diagrams show how the conversion of a perfectly competitive industry into a monopoly affects market price and output. The equilibrium price  $P_C$  and quantity  $Q_C$  of a perfectly competitive market are given by the intersection of supply curve,  $S(C)$  and demand curve. Assuming the industry is monopolized, Marginal Revenue (MR) and demand curve diverge and Marginal Cost (MC) curve shifts downwards due to the existence of economies of scale. The intersection of the MC curve,  $MC(M)$  and MR determines the profit maximizing quantity  $Q_M$  for a monopoly and the demand curve yields the corresponding price,  $P_M$ . Compare this price and quantity with the initial ones under perfect competition in each of the following diagrams.

In diagram 11.2 (a) monopoly, compared to perfect competition, sells too little at too high prices.  
 In diagram 11.2 (b) price and output are the same under both scenarios.  
 In diagram 11.2 (c) the downward shift in Marginal Cost (MC) is large enough to allow monopoly to sell a greater output and charge a lower price compared to perfect competition.

Diagram 11.2 (a)

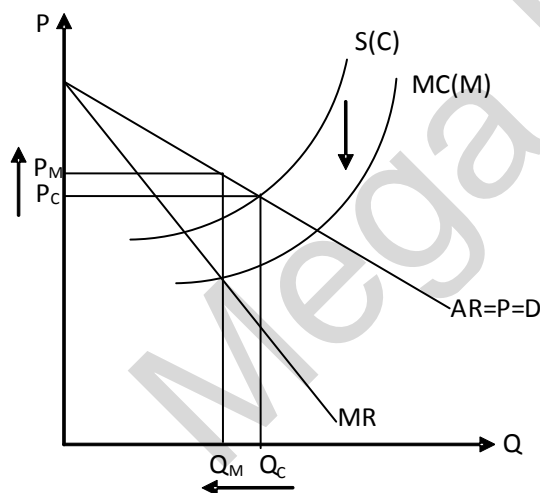


Diagram 11.2 (b)

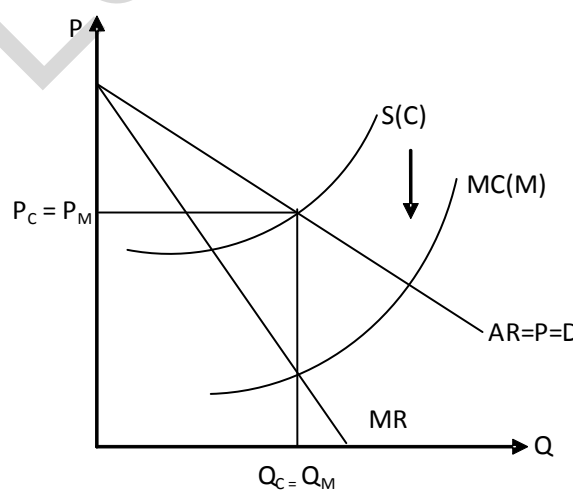
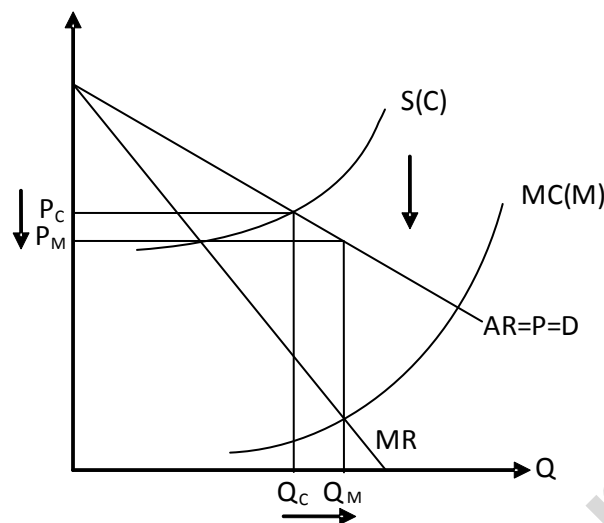


Diagram 11.2 (c)



Impacts on price and output of monopolizing a competitive market			
	Marginal cost	Price	Output
Economies of scale are not available and cost conditions remain unchanged	Unchanged	Increases	Decrease
Monopoly exploits economies of scale and costs decrease	Decreases	Uncertain	Uncertain

### Efficiency: Productive and Allocative Efficiency

The following summary combines information on productive and allocative efficiency from AS and A Level divisions of the syllabus and helps attempt essays as well as solve multiple choice questions.

Productive Efficiency	Allocative Efficiency
<p>A resource allocation is productively efficient when output is maximized and more of a product can only be produced by choosing to produce less of something else. All points on a production possibility curve (PPC) are productively efficient. However, productive efficiency does not guarantee full employment of ALL factors of production.</p> <p>Consider a factory with two machines, each producing 25 units/hour. The firm employs seven workers to pack the finished product, the</p>	<p>A resource allocation is efficient when welfare of the society is maximized and it is impossible to make someone better off without making someone else worse off. This principle is known as Pareto Optimality. (see N/02/3/11)</p> <p>A resource allocation is efficient when the marginal social cost of last unit equals marginal social benefit</p>



<p>average speed of each worker being 8 units/hour. In a working day of 8 hours, workers can process 448 units (7 workers × 8 units × 8 hours) whereas machines can only produce 400 units (2machines × 25 units × 8 hours). Although the firm produces its maximum possible output i.e. 400 units each day and does not have excess capacity, six working hours remain idle. This firm is productively efficient, yet it does not employ ALL factors of production (see J/02/3/01)</p>	
<p>Productive efficiency implies that all output is produced at minimum cost i.e. average cost (AC) is lowest.</p>	<p>A firm is allocatively efficient when it charges a price equal to the marginal cost (MC) of the last unit produced.</p>
<p>A firm tends to be productively inefficient if it charges a price higher than AC. However, firms making only normal profits can not survive if they are productively inefficient. Perfectly and monopolistically competitive* firms may be productively inefficient in the short run (since charging a price higher than average cost is possible) but they must be productively efficient in the long run if they are to survive (since charging a price higher than average cost is not possible).</p>	<p>A perfectly competitive firm is likely to be allocatively efficient in both the short run and long run since it charges a price equal to the marginal cost of the last unit. However, it may be allocatively inefficient if marginal social cost and marginal private cost diverge. In almost all cases, allocative efficiency implies productive efficiency. However, productive efficiency does not guarantee allocative efficiency.                  Question:                  Think of a case where a firm is allocatively efficient but productively inefficient (consult table in section 14 for answer)</p>
<p>Monopoly can be productively inefficient both in the short and long run (since charging a price higher than average cost is possible)</p>	<p>Profit maximizing monopoly and monopolistic competition (section 14) are allocatively inefficient since demand (price) and marginal revenue diverge and equating MC and MR (to maximize profits) implies that price exceeds MC</p>

Efficiency and Equity are two different principles and an efficient resource allocation does not guarantee equitable income distribution (try J/03/3/01).

A socially optimal level of output maximizes social welfare and is determined by the intersection of Marginal Social Benefit, MSB and Marginal Social Cost, MSC. The following cases highlight instances where the price mechanism fails to result in such a level of output, causing a welfare loss to society:

- Monopoly restricts output below socially optimal level to maximize its profits.
- A profit maximizing firm causing negative externalities tends to ignore external cost and produce above the socially optimal level. Thus a profit maximizing monopolist generating negative externalities may produce either below or above the socially optimal level.

- Production activities generating positive externalities under produce goods i.e. operate below the socially optimal level. Thus a profit maximizing monopolist generating positive externalities is bound to produce output below the socially optimal level.
- Price mechanism under produces merit goods and over produces demerit goods.

Cases of market failure other than monopoly have been discussed in detail in Understanding Economics- AS Level. Students must prepare this topic using both books and attempt following essays.

J/02/4/07	J/05/4/06	N/07/4/04	N/09/42/02(b)	J/11/42&43/02
N/02/4/03(a)	N/05/4/02	J/08/4/02	J/10/41/02	N/11/41/02
J/03/4/02	J/06/4/02	N/08/4/04	J/10/42/02	N/11/42/02(b)
N/03/4/02	N/06/4/02	J/09/4/07(b)	N/10/42/02	N/11/43/02
J/04/4/05	J/07/4/02	N/09/41/02	J/11/41/02	

For popular subjects like Economics, CIE introduced three variants of examination papers in June 2010 preceded by two variants in November 2009. Students appearing for CIE A Level examinations from Pakistan follow the second variant. This book, therefore, provides guidance on only Variant 2 Multiple Choice Question Papers. However, students are encouraged to attempt essays from all variants for the sake of good practice. To identify the variant of a certain examination paper, students must refer to the code in the top right corner of the paper's cover page. 9708/42 can be deciphered as the syllabus code for Economics (9708) followed by the Paper No. (4) and the Variant No. (2). Likewise, 9708/31 refers to variant 1 of paper 3.

## Remedies to Monopoly Abuse

As discussed in the previous section, monopoly is allocatively inefficient since it charges a price higher than MC and produces below the socially optimum level of output. It could also be productively inefficient since its ability to make super normal profits erodes the pressure to produce at the minimum Average Cost. In order to make them socially responsible, governments can force monopolists to increase output and reduce profits through various forms of intervention. The following discussion examines one such line of intervention- taxing monopolies to force them closer to the socially optimal level. Governments can tax monopoly profits to make them productively efficient and prevent them from using otherwise huge profits to erect entry barriers.

The taxes discussed below are indirect and do not affect the position of demand curves. However, they may affect the position of supply and cost curves of a firm, hence altering output decisions and profits.

### **Lump sum tax**

Lump sum tax is imposed on production capacity and is independent of a firm's output. Like fixed cost, it increases average cost and lowers profits but does not affect the position of marginal cost curve- output, determined by the intersection of MC and MR remains unchanged. However, a monopolist can be forced to shut down if the tax is high enough to convert its profits into losses. Lump sum tax fails to achieve the objective of increasing output but does reduce monopoly profits, increasing the pressure to be productively efficient.

### **Per unit tax**

Per unit tax is applicable on the number of units a monopolist produces. This tax shifts both the average and marginal cost curves upwards. Profits decrease and so does the output since new marginal cost curve intersects the downward sloping MR curve at a higher point i.e. a lower output.

Like lump sum tax, per unit tax decreases monopoly profits but fails to meet the objective of raising output and achieving allocative efficiency.

### **Per unit subsidy**

Like per unit tax, per unit subsidy is also applicable on the number of units a monopolist produces. It reduces both average and marginal cost, shifting their curves downwards. Profits increase and so does the output since new marginal cost curve intersects the downward sloping MR curve at a lower point i.e. a higher output.

To achieve goals of both increased output and decreased profits simultaneously, a combination of lump sum tax and per unit subsidy may be used. A per unit subsidy encourages the monopolist to produce more and a lump sum tax reduces profits.

The government can also use its legislative powers to control monopoly power. The Monopoly and Merger Commission (MMC) and the Office of Fair Trading (OFT) in UK continuously monitor firms' performances and take action against unfair trading practices. Firms spending an unreasonably high percentage of their sales revenues on promotion can be questioned about the intentions behind such lavish spending. Regulators can order them to decrease advertisement budgets if they suspect erection of entry barriers. Regulators should also intervene where firms are suspected to collude and formulate price fixing agreements. Ceilings can be imposed on firm size and those exceeding the ceiling can be forced to split. Agreements giving exclusive rights for supplies, production and distribution can be declared illegal in order to open doors for more competition. Government can impose price ceilings, reducing monopoly profits and hence, reducing the scope for consumer exploitation.

The role of regulatory authorities is crucial to controlling monopoly abuse and protecting consumers. In Pakistan, the job of regulating markets has been assigned to Monopoly Control Authority (MCA).

### **Monopolies- The iPhone example**

The launch of the iPhone in the UK in November 2007 was a great success for Apple and its partner O2. Apparently, more than 40,000 iPhones were bought in the first weekend. Buyers had to pay \$269 for the device, then sign up for \$35 for 18 months, making the total commitment \$899. The high cost largely resulted from Apple's deal with O2, giving it a network monopoly on the phones. When Apple tried the same in Germany, Vodafone threatened legal action under the country's anti-monopoly laws forcing Apple to back down. People in UK have criticized British anti-monopoly laws for not being effective in controlling monopoly abuse.

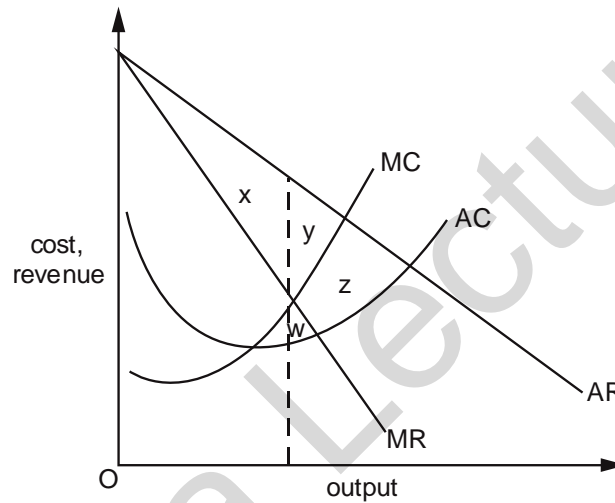
## Multiple Choice Questions (Section 11)

J/02/3/01

- 1 Which condition defines productive efficiency?
- A All factors of production are fully employed.
  - B All firms are producing at their profit maximising levels of output.
  - C The output of all goods is produced at minimum cost.
  - D There are no further opportunities for substituting capital for labour.

J/02/3/15

- 2 The diagram shows the cost and revenue curves of a profit-maximising monopolist. Which area measures the deadweight loss arising from the exercise of monopoly power?



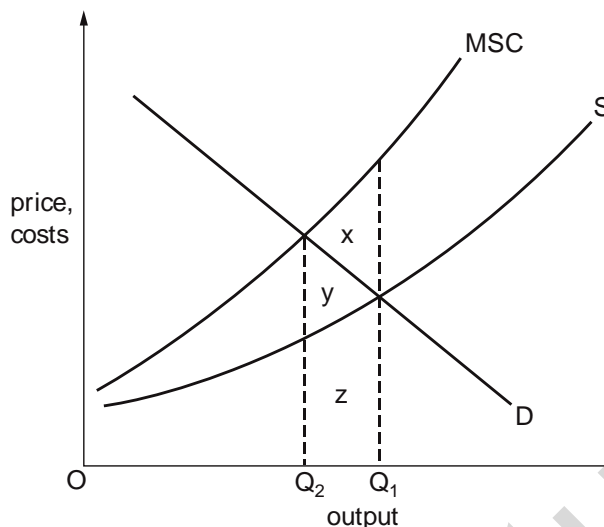
- A  $x + y$
- B  $y$
- C  $y + z$
- D  $w + y + z$

N/02/3/11

- 3 When is allocative efficiency achieved in an economy?
- A when nobody can become better off without somebody else becoming worse off
  - B when the economy is operating at its natural rate of unemployment
  - C when the level of social costs is minimised
  - D when the rate of economic growth is maximised

N/02/3/12

- 4 The diagram shows the supply and demand curves for a good. The curve labelled MSC shows the marginal social cost of producing the good.



Which area measures the net welfare gain to society from reducing output from  $OQ_1$  to  $OQ_2$ ?

- A x      B y      C x + y      D x + y + z

J/03/3/01

- 5 In an economy, no one can be made better off without making someone else worse off. What does not necessarily follow from this?

- A The distribution of income is socially acceptable.  
B The conditions for allocative efficiency have been met.  
C The economy is operating at a point on its production possibility frontier.  
D The conditions for productive efficiency have been met.

J/03/3/14

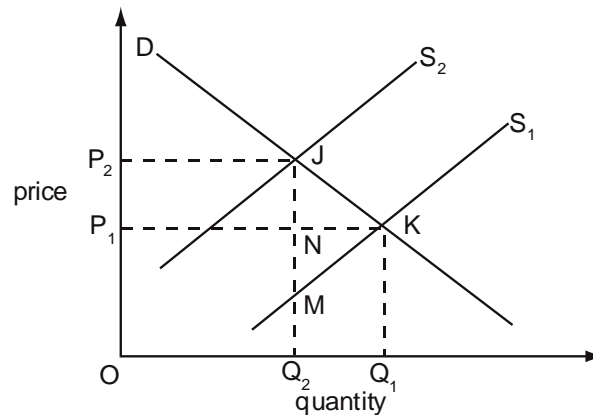
- 6 A perfectly competitive industry becomes a profit maximising monopoly. The marginal cost curve of the monopolist is identical to the supply curve of the perfectly competitive industry.

How will output and price be affected?

	output	price
A	increases	increases
B	increases	decreases
C	decreases	decreases
D	decreases	increases

J/03/3/15

- 7 In the diagram the imposition of a tax on a commodity causes its supply curve to shift from  $S_1$  to  $S_2$ .



Which area measures the resulting deadweight loss?

- A  $P_1P_2JK$       B  $JKQ_1Q_2$       C  $JKM$       D  $JKN$

J/03/3/16

- 8 In what circumstances will the entry of additional fishing boats into the fishing industry necessarily result in a net loss in welfare?

- A The entry of the new boats reduces fish caught by other boats.  
 B The entry of the new boats reduces the profits of other boat owners.  
 C The value of the increase in the fish caught is less than the loss in value of output elsewhere in the economy.  
 D The entry of the new boats reduces the overall fish stock.

N/03/3/01

- 9 An economy is operating at a point inside its production possibility curve. Why is this described as inefficient?

- A Individuals are enjoying too much leisure.  
 B Labour and capital are combined in the wrong proportions.  
 C More of one good can be produced without decreasing production of another.  
 D There are shortages of some goods and an excess supply of others.

N/03/3/17

- 10 By reallocating resources an economy produces more of one good but no less of other goods. What change has necessarily occurred?

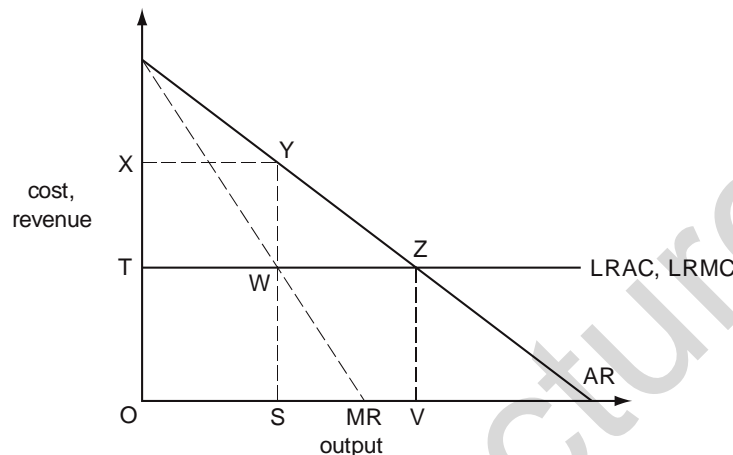
- A improved technology  
 B improved efficiency  
 C increased equity  
 D increased employment

J/04/3/01

- 11 What does **not** pose a threat to the achievement of allocative efficiency?  
**A** imperfect information on the part of consumers  
**B** income inequalities  
**C** the existence of externalities  
**D** the presence of monopolistic elements

J/04/3/11

- 12 The diagram shows an industry producing under conditions of constant average costs.

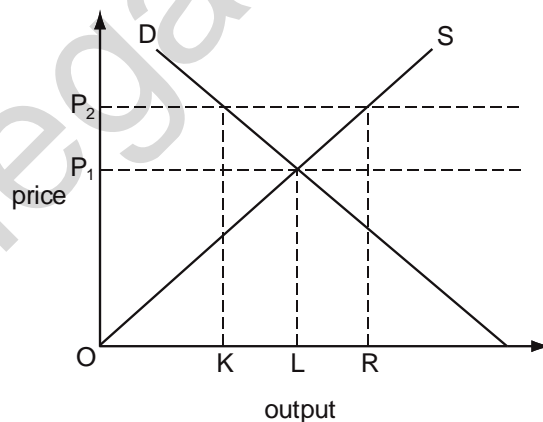


Under perfect competition, the industry produces output OV.  
 Which area measures the increase in the industry's profits if it were to become a monopoly?

- A** XYSO      **B** XYWT      **C** XYZT      **D** YZW

J/04/3/15

- 13 The diagram shows the market supply and demand curves for corn.



What should a government do if it is to maintain a minimum price of  $OP_2$ ?

- A** buy quantity KR      **B** buy quantity LR  
**C** sell quantity KL      **D** sell quantity OL

N/04/3/01

- 14** A firm is operating in a perfectly competitive market.  
What would ensure that it is both productively and allocatively efficient?
- A** It is in long-run equilibrium.
  - B** It is maximising total revenue.
  - C** It is producing where marginal revenue is equal to marginal cost.
  - D** Long-run average costs are falling and sales are rising.

N/04/3/16

- 15** What might prevent an economy in which all firms are required to equate price and marginal cost from achieving allocative efficiency?
- A** differences in preferences between consumers
  - B** divergences between private and social costs
  - C** inequalities of income and wealth
  - D** product differentiation

N/04/3/17

- 16** A good gives rise to external benefits and is produced under conditions of imperfect competition.  
Which statement must be true?
- A** Consumers of the good are paying too low a price.
  - B** Firms producing the good will make a loss.
  - C** Output of the good is below the socially optimum level.
  - D** Social costs of production exceed private costs.

J/05/3/01

- 17** Which condition defines productive efficiency?
- A** All factors of production are fully employed.
  - B** All firms are producing at their profit-maximising levels of output.
  - C** The output of all goods is produced at minimum cost.
  - D** There are no further opportunities for substituting capital for labour.

J/05/3/13

- 18** The government imposes a specific tax equal to \$0.20 per unit on the output of a monopoly producer.  
What will be the effect on the price charged by the monopoly and on the quantity it produces?

	price	quantity
<b>A</b>	increases by \$0.20	decreases
<b>B</b>	increases by less than \$0.20	decreases
<b>C</b>	increases by \$0.20	unchanged
<b>D</b>	increases by less than \$0.20	unchanged

J/05/3/14

- 19** In an economy no one can be made better off without making others worse off.  
What can be deduced from this?
- A** All markets are perfectly competitive.
  - B** There are no externalities.
  - C** The economy is operating on its production possibility curve.
  - D** The distribution of income reflects what each individual deserves.



N/05/3/01

**20** What will happen if a firm is subsidised by an amount equivalent to the external benefits that it confers on the rest of society?

- A** Resource allocation will be improved.
- B** The firm will produce less.
- C** There will be a misallocation of resources.
- D** There will be no effect upon production.

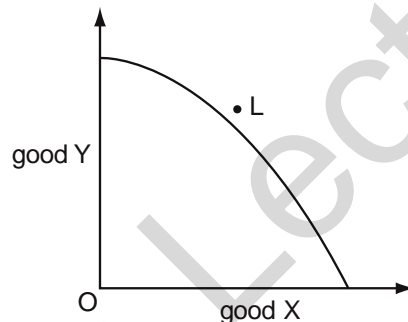
N/05/3/15

**21** Which area of skill possessed by the managers of government-owned enterprises in a planned economy is **less** relevant when industries are privatised?

- A** financial management
- B** marketing
- C** production targeting
- D** stock quality and control

J/06/3/01

**22** The diagram shows the production possibility curve for an economy.



What might make it possible for consumers in this economy to consume the combination of goods X and Y indicated by the point L?

- A** a reduction in unemployment
- B** the attainment of productive efficiency
- C** the elimination of a monopoly in the production of good X
- D** trade with other economies

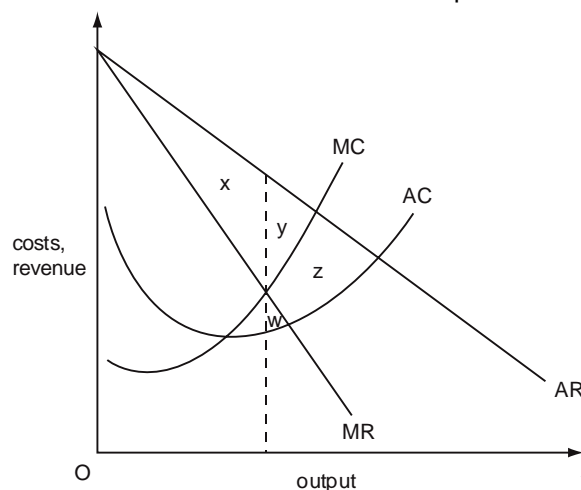
N/06/3/01

**23** An economy is operating at a point on its production possibility curve. What is true about the way the economy's resources are being used at this point?

	allocatively efficient	productively efficient	socially desirable
<b>A</b>	possibly	yes	yes
<b>B</b>	yes	possibly	possibly
<b>C</b>	possibly	yes	possibly
<b>D</b>	yes	possibly	yes

N/06/3/14

24 The diagram shows the cost and revenue curves of a profit-maximising monopolist.



Which area measures the deadweight loss arising from the exercise of monopoly power?

- A**  $x + y$       **B**  $y$       **C**  $y + z$       **D**  $w + z$

J/07/3/01

25 In an economy, no one can be made better off without making someone else worse off. What does not necessarily follow from this?

- A** The conditions for allocative efficiency have been met.  
**B** The conditions for productive efficiency have been met.  
**C** The distribution of income is socially acceptable.  
**D** The economy is operating at a point on its production possibility frontier.

J/07/3/15

26 A perfectly competitive industry becomes a monopoly. What would prevent a deadweight welfare loss resulting?

- A** The government converts it to a profit-maximising nationalised industry.  
**B** The government places an indirect tax on the monopolist's product.  
**C** The monopolist uses marginal cost pricing.  
**D** The monopolist charges the same price to all consumers.

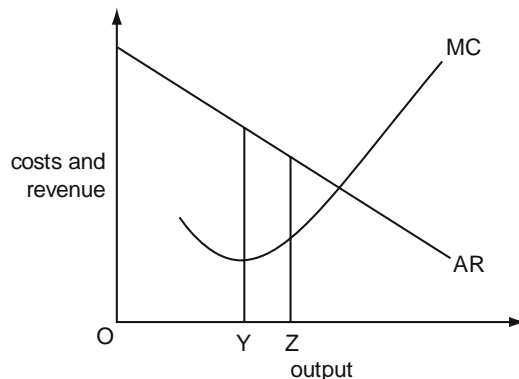
J/07/3/17

27 In 1995 the Canadian government increased the specific tax on each packet of cigarettes by \$3.50. What is the most likely explanation for the resulting fall in tax revenue from cigarette sales?

- A** Consumers switched to cheaper brands.  
**B** The demand for cigarettes is price-inelastic.  
**C** There was an increase in illegal imports of cigarettes from the USA.  
**D** The whole of the increase in tax was borne by the cigarette manufacturers.

N/07/3/01

**28** In the diagram, a firm increases its output from OY to OZ.



Which statement about the effect on economic efficiency is correct?

- A** It will increase because a greater quantity will be produced and higher total revenue will be earned.
- B** It will increase because the value that consumers place on the product comes closer to the cost of producing the last unit.
- C** It will decline because both average and marginal revenue will fall.
- D** It will decline because both total and marginal cost will rise.

N/07/3/14

**29** What is not an example of 'market failure'?

- A** inequality in the distribution of income
- B** a monopolist charging prices above marginal cost
- C** the damage to common land due to overgrazing
- D** aircraft noise affecting individuals living near airports

N/07/3/16

**30** What should an industry regulator control if it wishes to provide an incentive for a privatised firm to improve its productive efficiency?

- A** dividends
- B** output
- C** prices
- D** profits

N/07/3/17

**31** The introduction of a congestion charge on private motorists entering a city centre results in a significant reduction in traffic congestion.

What will be the net welfare effects on the following groups of car users?

	those who continue to use their cars	those who no longer travel	those who switch to public transport
<b>A</b>	uncertain	lose	uncertain
<b>B</b>	uncertain	uncertain	gain
<b>C</b>	lose	lose	gain
<b>D</b>	lose	uncertain	uncertain

J/08/3/01

- 32** What will happen if a firm is subsidised by an amount equal to the external benefits that it confers on the rest of society?
- A** Resource allocation will be improved.
  - B** The firm will produce less.
  - C** There will be a misallocation of resources.
  - D** There will be no effect upon production.

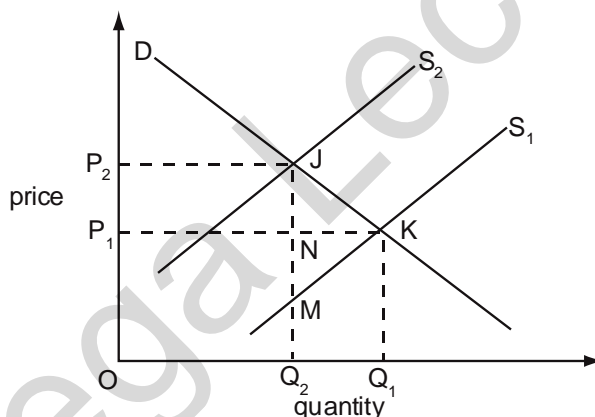
J/08/3/10

- 33** A perfectly competitive industry becomes a profit-maximising monopoly.  
 The marginal cost curve of the monopolist is identical to the supply curve of the perfectly competitive industry.  
 How will output and price be affected?

	output	price
<b>A</b>	increases	increases
<b>B</b>	increases	decreases
<b>C</b>	decreases	decreases
<b>D</b>	decreases	increases

J/08/3/12

- 34** In the diagram the imposition of a tax on a commodity causes its supply curve to shift from  $S_1$  to  $S_2$ .



Which area measures the resulting deadweight loss?

- A**  $P_1P_2JK$
- B**  $JKQ_1Q_2$
- C**  $JKM$
- D**  $JKN$

J/08/3/13

- 35** A good gives rise to external costs and is produced under conditions of monopolistic competition.  
 Which statement must be true?

- A** Output of the good is at the socially optimum level.
- B** Output of the good is below the socially optimum level.
- C** Private costs of production exceed social costs.
- D** Social costs of production exceed private costs.

J/08/3/15

**36** A government decides to privatise a state monopoly.  
What should the government do to try to ensure that this will result in an improvement in efficiency?

- A** allocate vouchers to all citizens entitling them to a share in the ownership of the monopoly
- B** encourage competition
- C** impose a maximum profit margin
- D** privatise the monopoly as a going concern

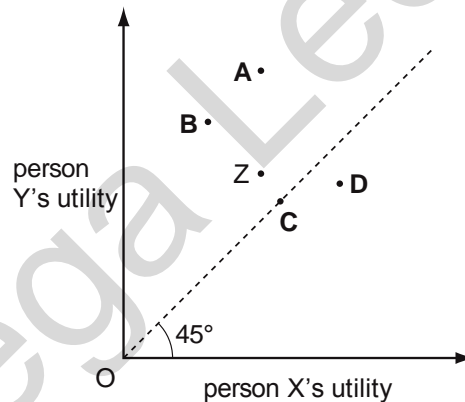
N/08/3/01

**37** Which condition must be met for economic efficiency to be achieved?

- A** Marginal social costs are zero in the production of all goods.
- B** Marginal social costs equal marginal social benefits in the production of all goods.
- C** Marginal social benefits are at a maximum in the production of all goods.
- D** Marginal social costs are at a minimum in the production of all goods.

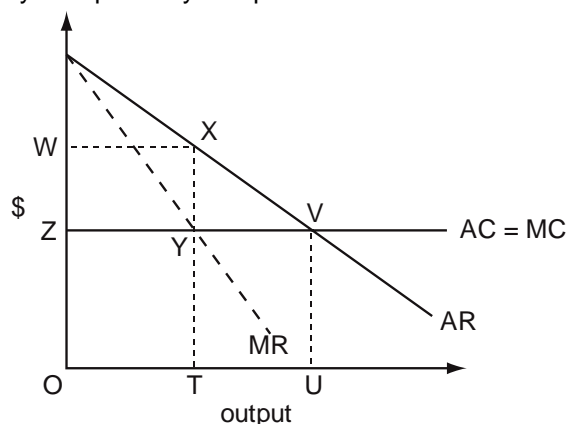
N/08/3/02

**38** The diagram shows the levels of utility corresponding to different allocations of resources between two people.  
The initial allocation is Z.  
Which reallocation of resources would definitely be more Pareto efficient?



N/08/3/11

**39** The diagram shows the cost and revenue curves of a profit-maximising monopolist. The monopolist's average cost curve is identical to the long-run supply curve which would exist if the industry was perfectly competitive.

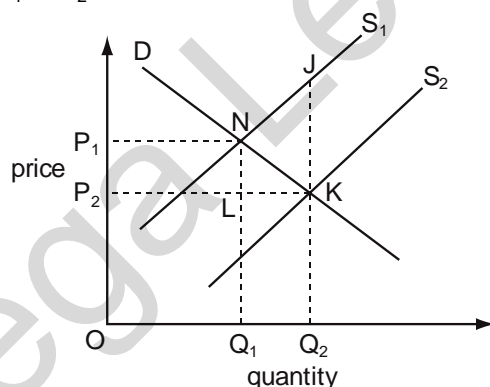


Which area shows the deadweight loss resulting from this monopoly situation?

- A** WXYZ      **B** WXYZ      **C** XVY      **D** XVUT

J/09/3/14

**40** In the diagram the introduction of a government subsidy causes an industry's supply curve to shift from  $S_1$  to  $S_2$ .

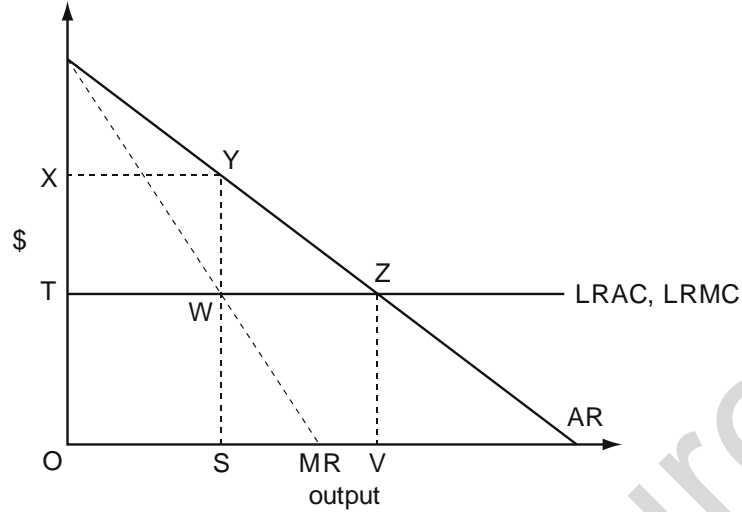


Which area measures the resulting deadweight loss to society?

- A**  $P_1NKP_2$       **B** JKN      **C** NLK      **D**  $Q_1Q_2JN$

N/09/3/09

41 The diagram shows an industry producing under conditions of constant average costs.



Under perfect competition, the industry produces output OV.

Which area measures the loss in consumer surplus if it were to become a monopoly?

- A** YWZ    **B** XYWT    **C** XYZT    **D** SYZV

N/09/3/14

42 What could prevent a market economy achieving allocative efficiency?

- A** disagreement among consumers over resource allocation  
**B** inequalities in the distribution of income and wealth  
**C** an inability to produce free goods  
**D** an inability to produce public goods

J/10/3/12

43 A competitive market becomes a monopoly.  
What is likely to happen?

- A** Consumer surplus will be reduced by the amount of the deadweight loss.  
**B** Producer surplus will be reduced by the amount of the deadweight loss.  
**C** The loss in consumer surplus will be balanced by the increase in producer surplus.  
**D** There will be a transfer of surplus from consumer to producer.

J/10/3/30

44 Which is a correct statement about efficiency?

- A Allocative efficiency occurs when marginal revenue equals marginal cost.
- B An economy is productively efficient when it is producing at a point on its production possibility curve.
- C An economy will improve its allocative efficiency when its production possibility curve moves outward.
- D Productive efficiency occurs when the prices of goods equal their marginal cost of production.

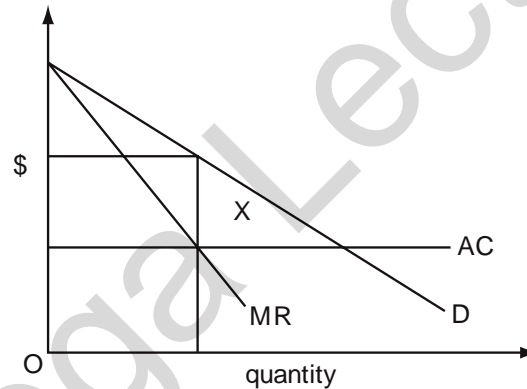
N/10/3/01

45 In an economy no one can be made better off without making others worse off. What can be concluded from this?

- A All markets are perfectly competitive.
- B There are no externalities.
- C The economy is operating on its production possibility curve.
- D The distribution of income reflects what each individual deserves.

N/10/3/12

46 The diagram shows the outcome when a perfectly competitive market is taken over by a monopoly.



What does area X represent?

- A monopoly profit
- B the reduction in consumer surplus
- C the resulting deadweight loss
- D transfer earnings

N/10/3/14

47 Which is **not** a policy designed to correct market failure?

- A competition policy
- B free inoculation against infectious diseases
- C minimum wage policy
- D regulations to limit river pollution



J/11/32/07

**48** A product with infinite elasticity of supply has sales of 1000 units a week at a price of \$1 per unit.

Price elasticity of demand is 1.5 over the relevant range.

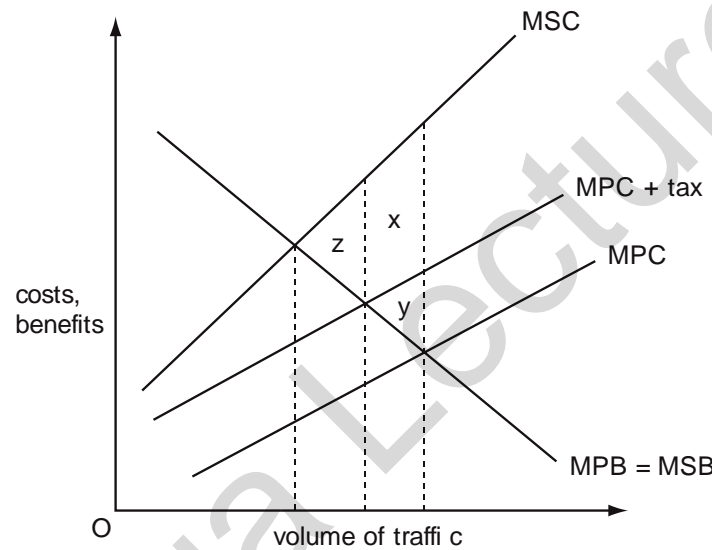
The government imposes a tax of 10 %.

What will be the government's weekly tax revenue?

- A** \$15                      **B** \$85                      **C** \$100                      **D** \$150

J/11/32/10

**49** The diagram shows the private and social marginal costs and benefits at different volumes of traffic.



The imposition of a congestion tax raises the MPC curve to MPC + tax. Which area measures the resulting reduction in the deadweight loss?

- A** x + y only                      **B** x + y + z                      **C** y only                      **D** z only

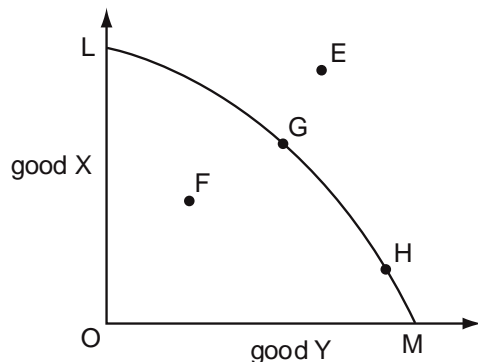
J/11/32/11

**50** A government imposes a maximum price for electricity. Which statement justifying this measure might be considered valid on economic grounds?

- A** It will encourage electricity suppliers to invest in additional capacity.  
**B** It will increase the incentive for consumers to conserve energy.  
**C** It will prevent the monopolistic exploitation of consumers.  
**D** It will prevent the rationing of electricity through power cuts.

J/11/32/30

51 In the diagram, LM is an economy's production possibility curve.

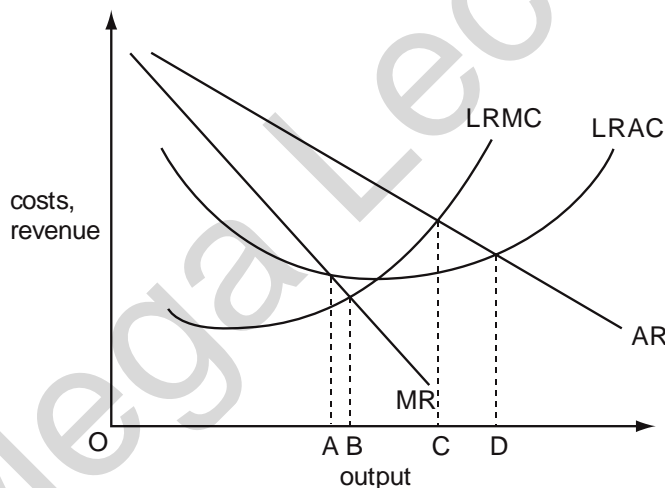


Which statement is correct?

- A E only is attainable.
- B F is economically efficient.
- C G may be economically efficient but is not productively efficient.
- D H is productively efficient but may not be economically efficient.

N/11/32/02

52 The diagram shows a firm's long-run cost and revenue curves.

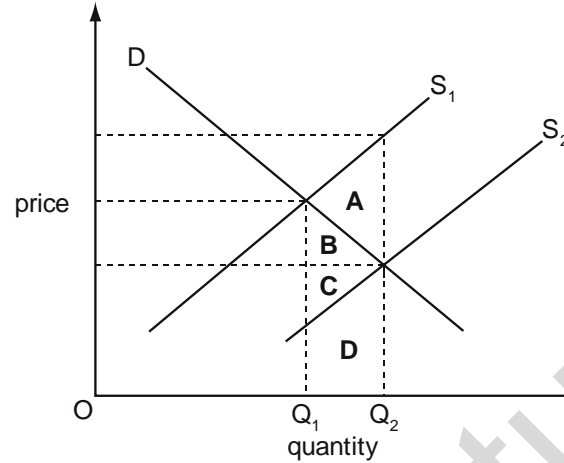


At which level of output is the firm both allocatively and productively efficient?

- A OA
- B OB
- C OC
- D OD

N/11/32/15

- 53** The diagram shows the supply and demand curves of a commodity. A government subsidy causes the supply curve to shift from  $S_1$  to  $S_2$ . Which area measures the difference between the cost to the economy of producing the resulting increase in output ( $Q_1 - Q_2$ ) and the value consumers place on this increase in output?



J/12/32/01

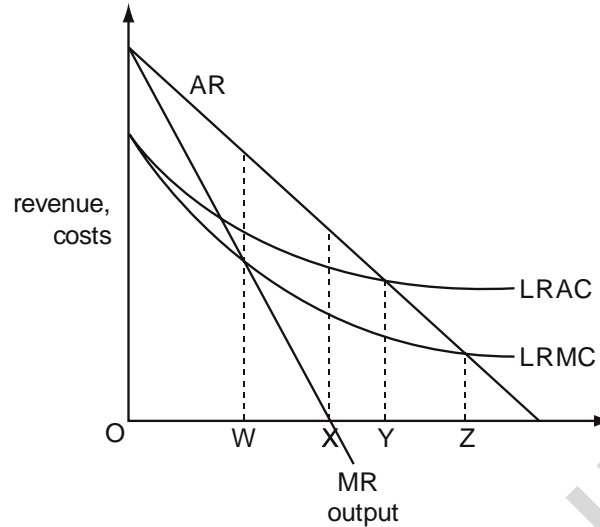
- 54** When is economic efficiency achieved in an economy?
- A** when nobody can become better off without somebody else becoming worse off
  - B** when the economy is operating at its natural rate of unemployment
  - C** when the level of social costs is minimised
  - D** when the rate of economic growth is maximized

J/12/32/15

- 55** A good gives rise to external benefits and is produced under conditions of imperfect competition. Which statement must be true?
- A** Benefits to consumers exceed the benefits to society.
  - B** Firms producing the good will make a loss.
  - C** Output of the good is below the socially optimum level.
  - D** Social costs of production exceed private costs.

J/12/32/16

**56** The diagram shows the long-run cost and revenue curves of a monopolist.



Which level of output satisfies the condition for an efficient allocation of resources?

- A** OW                      **B** OX                      **C** OY                      **D** OZ

N/12/32/01

**57** What will happen if a firm is subsidised by an amount equal to the external benefits that it confers on the rest of society?

- A** There will be no effect upon production.  
**B** The firm will produce less.  
**C** There will be a misallocation of resources.  
**D** Resource allocation will be improved.

N/12/32/07

**58** What would be the effect of imposing a specific tax on each item produced by a profit maximizing monopolist?

- A** Average revenue falls by the amount of the tax.  
**B** Marginal costs rise by the amount of the tax.  
**C** Price increases by the amount of the tax.  
**D** There will be no change in price or output.

N/12/32/14

**59** All firms in an economy produce at levels of output where price and marginal private cost are equal.

Why might this not be sufficient to ensure that allocative efficiency is achieved?

- A** a small number of buyers and sellers  
**B** differences in consumers' preferences  
**C** product differentiation  
**D** the presence of externalities

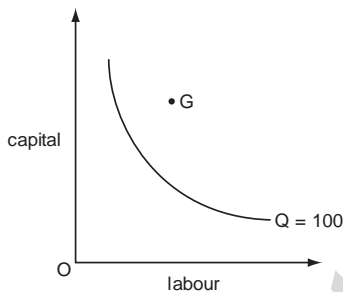
J/13/32/12

**60** A firm operates in a perfectly competitive market.  
Which relationship between the firm's cost and revenue describes a position where allocative efficiency would be improved if the firm reduces its present level of output?

- |          |               |          |               |
|----------|---------------|----------|---------------|
| <b>A</b> | $P = MR > MC$ | <b>B</b> | $P = MR < MC$ |
| <b>C</b> | $P > MR = MC$ | <b>D</b> | $P > MR > MC$ |

J/13/32/14

**61** The curve in the diagram shows the minimum combinations of capital and labour that are needed to produce 100 units of output.

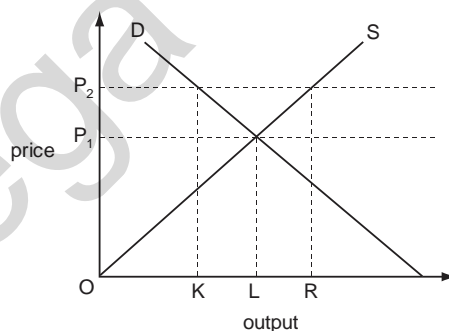


A firm's management hires the combination of capital and labour indicated by point G in the diagram to produce 100 units of output.  
Which term best describes this situation?

- |          |                        |          |                       |
|----------|------------------------|----------|-----------------------|
| <b>A</b> | lack of specialization | <b>B</b> | managerial diseconomy |
| <b>C</b> | market failure         | <b>D</b> | X-inefficiency        |

J/13/32/16

**62** The diagram shows the market supply and demand curves for corn.



What should a government do if it is to maintain a minimum price of  $OP_2$ ?

- |          |                  |
|----------|------------------|
| <b>A</b> | buy quantity KR  |
| <b>B</b> | buy quantity LR  |
| <b>C</b> | sell quantity KL |
| <b>D</b> | sell quantity OL |

N/13/32/01

**63** What is the purpose of trying to achieve economic efficiency?

- A** to ensure that economic decisions are made equitably
- B** to ensure that firms are internationally competitive
- C** to ensure that firms maximise their profit levels
- D** to ensure that the economy does not waste scarce resources

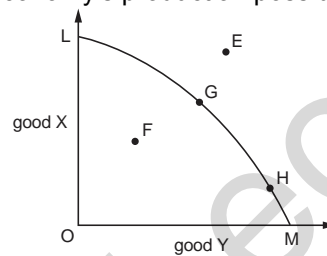
N/13/32/16

**64** The firms in a perfectly competitive industry combine to form a monopoly. What would prevent a deadweight welfare loss resulting?

- A** The government imposes an indirect tax on the monopolist's product.
- B** The government requires the monopolist to charge a price equal to average cost.
- C** The monopolist adopts marginal cost pricing.
- D** The monopolist charges the same price to all consumers.

J/14/32/01

**65** In the diagram, LM is an economy's production possibility curve.



Which statement must be correct?

- A** F is productively inefficient.
- B** G and H are productively efficient but economically inefficient.
- C** Only E is economically efficient.
- D** Only G is productively efficient.

J/14/32/13

**66** A country's government reduces the specific tax on packets of cigarettes. What could explain why this leads to an increase in tax revenue from cigarette sales?

- A** Consumers switch to dearer brands.
- B** The demand for cigarettes is price-inelastic.
- C** The price of cigarettes falls by less than the reduction in tax.
- D** There is a reduction in illegal imports of cigarettes.

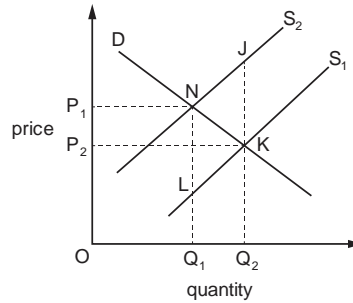
J/14/32/14

**67** Which is not a policy designed to correct market failure?

- A** competition policy
- B** free inoculation against infectious diseases
- C** minimum wage policy
- D** regulations to limit river pollution

J/14/32/15

68 In the diagram the imposition of a specific tax causes an industry's supply curve to shift from  $S_1$  to  $S_2$ .



- |          |            |          |            |
|----------|------------|----------|------------|
| <b>A</b> | NLK        | <b>B</b> | JKN        |
| <b>C</b> | $P_1NKP_2$ | <b>D</b> | $Q_1Q_2JN$ |

N/14/32/01

69 Which condition defines productive efficiency?

- A** All factors of production are fully employed.
- B** All firms are producing at their profit-maximising levels of output.
- C** There are no further opportunities for substituting capital for labour.
- D** The output of all goods is produced at the lowest possible cost.

J/15/32/01

70 What need **not** pose a potential threat to allocative efficiency in a market economy?

- A** externalities
- B** differentiated products
- C** monopolistic elements
- D** perfect knowledge

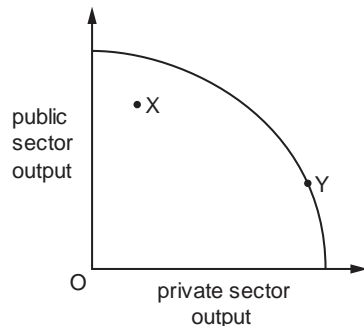
J/15/32/17

71 Which government policy would **not** be classified as regulation?

- A** bans on heroin and cocaine consumption
- B** compulsory wearing of seatbelts in cars and coaches
- C** licences for the extraction of water from lakes and rivers
- D** taxation of cigarettes and tobacco products

N/15/32/01

**72** The diagram shows the production possibility curve for a successful transition economy that moves from point X to point Y over time.



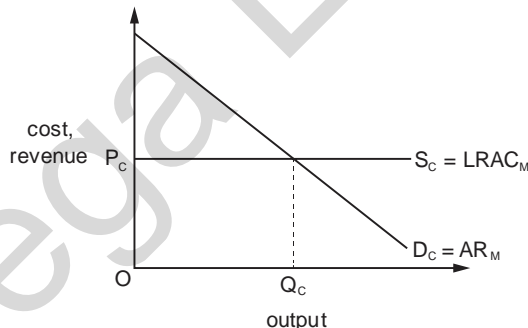
During the transition process the population of the country expressed a strong preference for increased privatisation.

What happens to economic efficiency as a result of the transition from point X to point Y?

	productive efficiency	allocative efficiency
<b>A</b>	increases	decreases
<b>B</b>	increases	increases
<b>C</b>	unchanged	decreases
<b>D</b>	unchanged	unchanged

N/15/32/15

**73** The diagram shows the demand curve,  $D_C$ , and supply curve,  $S_C$ , of a perfectly competitive industry.



The industry is taken over by a monopolist. The monopolist's long-run average cost curve,  $LRAC_M$ , is identical to the supply curve of the perfectly competitive industry.

What will be the effects of the takeover on profit and allocative efficiency?

	profit	allocative efficiency
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases



N/15/32/16

**74** Which government microeconomic policy is not usually aimed at correcting allocative inefficiency in an economy?

- A** anti-monopoly legislation
- B** congestion charges for the use of roads in cities
- C** pollution taxes imposed on various firms
- D** subsidies for agricultural producers

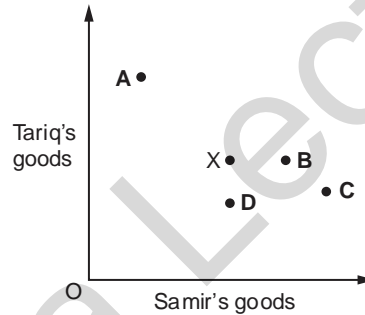
J/16/32/01

**75** What action by a firm is most likely to raise its dynamic efficiency?

- A** distributing all its current profit to its existing shareholders
- B** maximising the labour productivity of its current workers
- C** minimising the average cost of producing its current output
- D** retaining its current profit for product research and development

J/16/32/02

**76** The current distribution of goods between two individuals in a two-person economy with given technology and resources is at point X. According to the Pareto criterion, which point would definitely indicate increased allocative efficiency?



J/16/32/03

**77** The concept of allocative efficiency assumes that each individual in society is the best judge of their own economic welfare. Which example of government intervention is based on an argument which rejects this assumption?

- A** pollution controls
- B** subsidies for merit goods
- C** the provision of public goods
- D** the regulation of monopolies

J/16/32/18

**78** A government regulates the price charged by a monopolist. In which circumstance will such intervention improve economic efficiency?

- A** The government sets the price where average revenue equals marginal cost.
- B** The government sets the price where marginal cost is below average cost.
- C** The intervention results in an increase in producer surplus.
- D** The intervention results in predatory pricing.

## Section: 12

## Objectives of Firms

So far, our analysis has revolved around the assumption that firms seek to maximize profits by producing at an output level where revenue generated from selling an extra unit (MR) equals the cost incurred on producing that unit (MC). However, it is reasonable to argue that this theory of maximizing profits may not always depict how firms operate in the real world.

Firms may not be able to calculate the MR and MC of every individual unit, hence rendering the idea of indentifying the  $MR=MC$  output a mathematical fantasy. It is difficult for a hotel manager or a principal at school for instance, to determine the marginal cost of serving an extra customer in a restaurant or teaching an extra student in the school.

In reality, firms seem to be aiming at a level of profits that is enough to satisfy their owners. 'Satisficing profits' theory assumes that firms don't aim to maximize profits by calculating MC and MR for individual units, instead they set a target for profits and are happy achieving it.

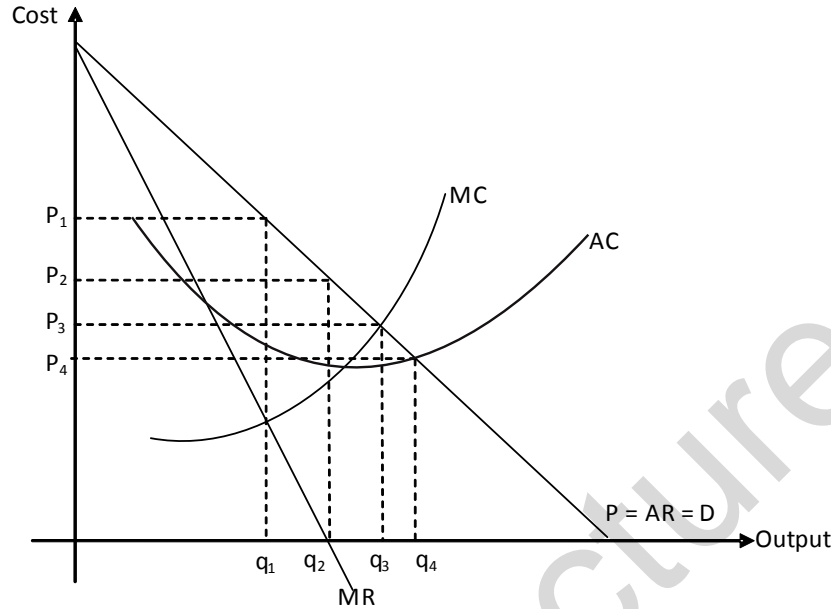
Moreover, there are situations where firm behavior has little to do with making profits in the first place and tunes in to more important objectives. For example, firms penetrating new markets forgo higher prices and profits as their immediate aim is to establish themselves and build brand awareness among customers and distributors. Threatened existence attributed to entry by hostile competitors or changes in consumers' tastes and preferences induce firms to ensure survival rather than profits.

Likewise, instead of focusing on profit maximization, firms desiring to be market leaders aim to maximize sales and market share. Increased market share provides greater control over market and hence profits, that sustain over a longer period of time. Such firms can afford to charge lower prices in order to keep potential competitors away.

Today's modern world witnesses the existence of many firms that are driven by motivations like social responsibility. As environmental concerns by consumers and society become increasingly pressing onto firms, the latter are forced into forgoing their profits and switch production methods to environment friendly technologies. "Greener" production techniques aid promotions and exhibit adequate concern on part of the firm towards the welfare of their work force. Implementing such costly techniques may first appear to be in conflict with the traditional goal of profit maximization but it improves the firm's image in the eyes of all stakeholders and may very well win generous profits.

Diagram 12.1 shows various pricing and output options firms pursue while seeking different objectives.

Diagram 12.1

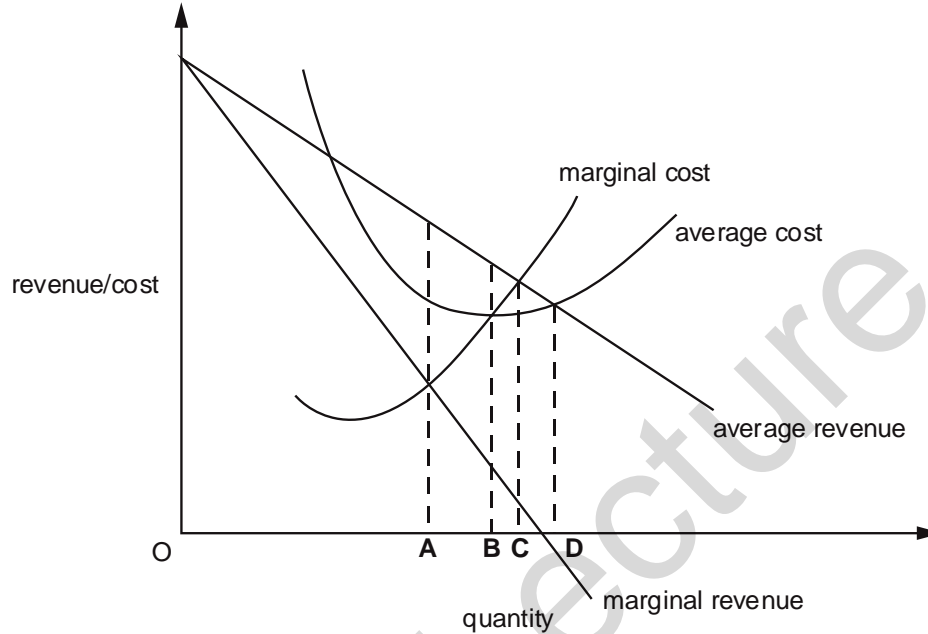


Firm's objective	Point of production	Price charged	Output obtained
Profit maximization	$MC = MR$	$P_1$	$q_1$
Sales revenue maximization	$MR = 0$	$P_2$	$q_2$
Allocatively efficient output	$P = MC$	$P_3$	$q_3$
Maximum quantity ensuring that at least normal profits are made	$P = AC$	$P_4$	$q_4$

### Multiple Choice Questions (Section 12)

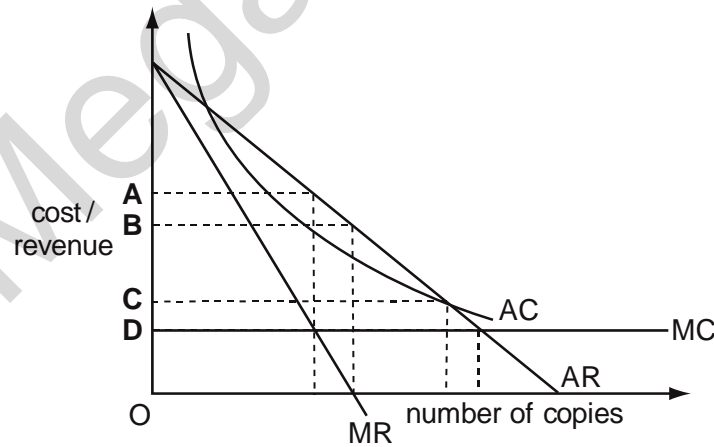
J/02/3/02

- 1 The diagram shows a firm's cost and revenue curves.  
 At which level of output will the firm be making only normal profit?



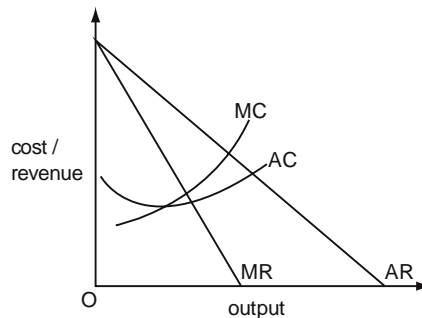
J/03/3/10

- 2 The diagram shows the cost and revenue curves for the production of a textbook. The contract with the publisher entitles the author to a fixed percentage of the value of sales. Which price would maximise the author's income from the book?



N/03/3/14

3 The diagram shows a firm's cost and revenue curves.

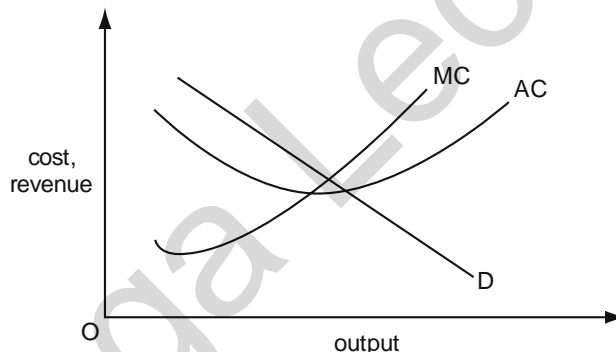


The firm changes its objective from profit maximisation to sales revenue maximisation. Which groups are likely to be winners and losers as a result of this change?

	winners	losers
<b>A</b>	customers	shareholders
<b>B</b>	managers	customers
<b>C</b>	workers	managers
<b>D</b>	shareholders	workers

J/04/3/14

4 The diagram shows the demand and cost curves of a monopolist who initially produces at his profit-maximising level of output.



If the monopolist were required by the government to adopt marginal cost pricing, what would be the effect on the price charged and the output produced?

	price	output
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	increase
<b>D</b>	decrease	decrease

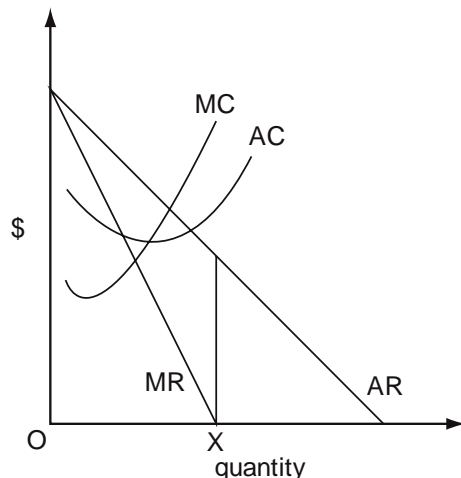
N/04/3/11

5 To maximise total revenue, up to which point should a monopolist increase output?

- A** where marginal revenue equals average revenue
- B** where marginal revenue is maximised
- C** where marginal revenue is zero
- D** where price elasticity of demand is zero

J/06/3/10

6 The diagram shows the cost and revenue curves of a monopoly.



What is the firm's objective if it produces output OX?

- A to achieve normal profit
- B to maximise profit
- C to maximise total revenue
- D to minimise average cost

J/06/3/14

7 The maximum price that a privatised natural monopoly is allowed to charge its customers is determined by the following formula:

the price charged in the previous year plus the annual % change in the consumer price index minus 2 %.

Assuming the firm charges the maximum price allowed, how will an increase in productive efficiency affect customers and the company's shareholders?

	customers	shareholders
A	gain	gain
B	gain	no effect
C	no effect	gain
D	no effect	no effect

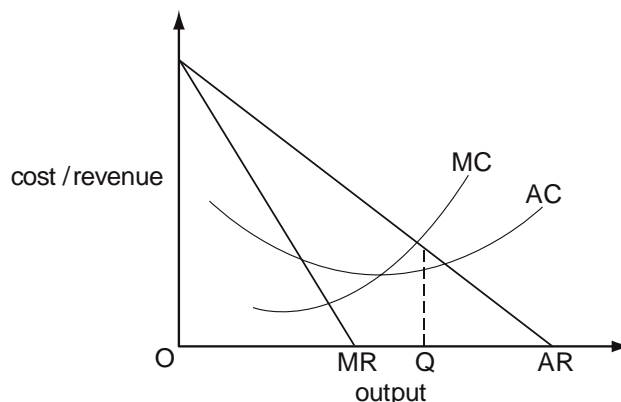
N/06/3/10

8 A firm decides to aim to maximise sales revenue rather than profits. What is likely to be one of the consequences of this decision?

- A an increase in the price of the firm's product
- B a reduction in the price of the firm's shares
- C a reduction in the firm's market share
- D a reduction in the number employed by the firm

N/07/3/10

9 The diagram shows a firm's cost and revenue curves.

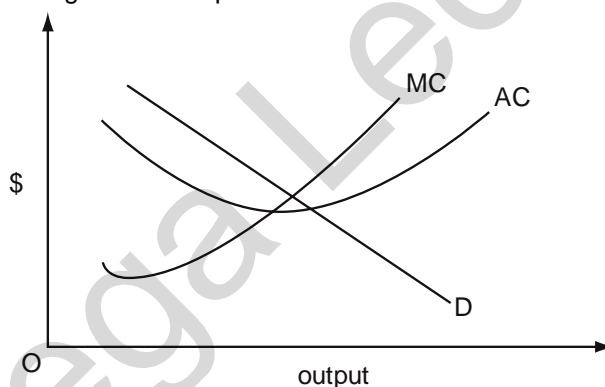


Which policy objective is consistent with a decision by the firm to produce output OQ?

- A maximising profit
- B maximising revenue subject to earning a normal profit
- C maximising sales revenue
- D satisficing profits

N/08/3/12

10 The diagram shows the demand and cost curves of a monopolist who initially produces at the profit-maximising level of output.

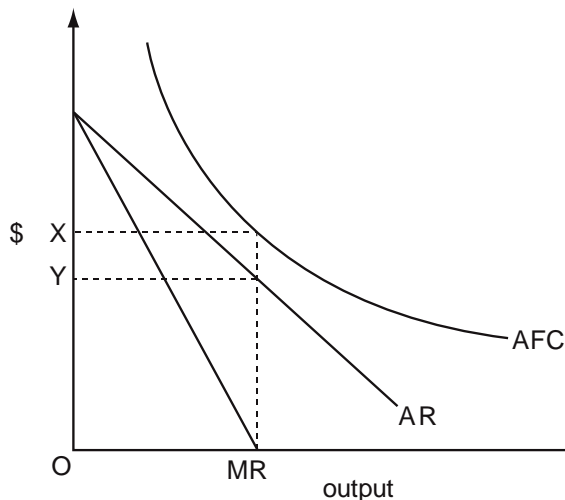


The monopolist is required by the government to adopt marginal cost pricing. What will be the effect on the price charged and the output produced?

	price	output
A	increase	increase
B	increase	decrease
C	decrease	increase
D	decrease	decrease

N/09/3/12

11 The diagram shows the cost and revenue curves of a monopoly producer whose only cost of production is a fixed cost.

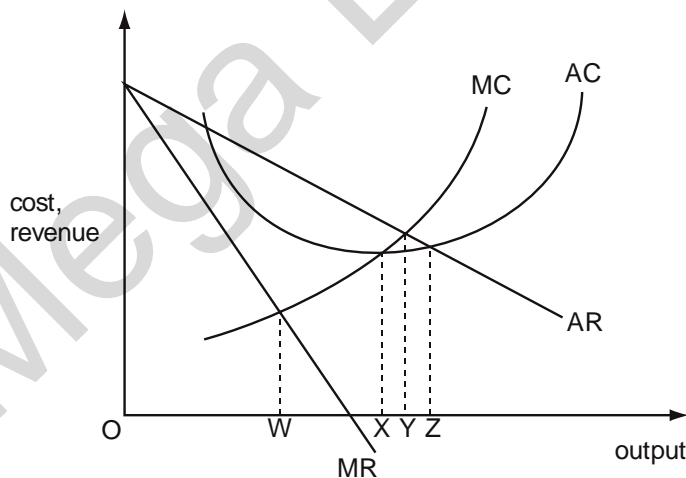


What will such a monopolist do?

- A set a price of OX in the short run and the long run
- B set a price of OY in the short run and the long run
- C set a price of OX in the short run, but discontinue production in the long run
- D set a price of OY in the short run, but discontinue production in the long run

N/11/32/11

12 The diagram shows the cost and revenue curves of a monopoly.



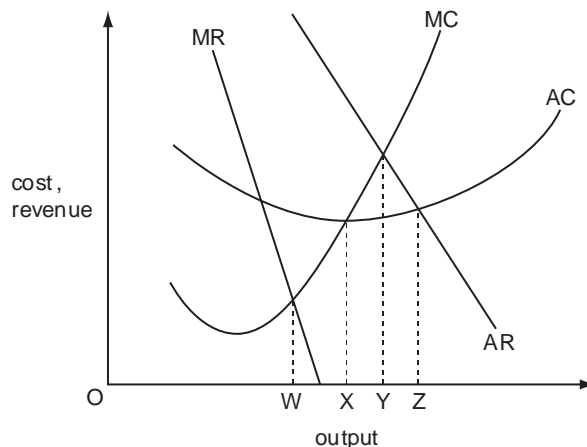
Which movement between levels of output would indicate a wish to change from unit cost minimisation to earning a normal profit?

- A W to Y
- B W to Z
- C X to W
- D X to Z



N/12/32/13

13 The diagram shows a profit-maximising firm's cost and revenue curves.

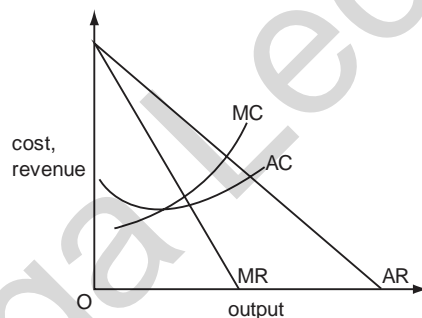


What would be the increase in the firm's output if it was required to charge a price equal to marginal cost?

- A** WX      **B** XY      **C** WY      **D** XZ

J/13/32/11

14 The diagram shows a firm's cost and revenue curves.

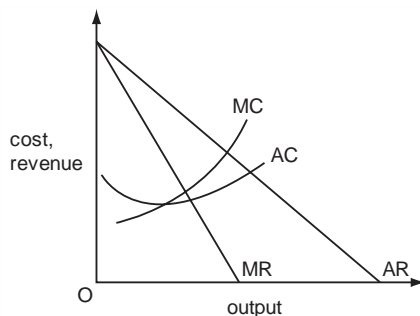


The firm changes its objective from sales revenue maximisation to profit maximisation. Which groups are most likely to be winners and losers as a result of this change?

	winners	losers
<b>A</b>	customers	managers
<b>B</b>	managers	workers
<b>C</b>	workers	shareholders
<b>D</b>	shareholders	customers

N/13/32/10

15 The diagram shows a firm's cost and revenue curves.

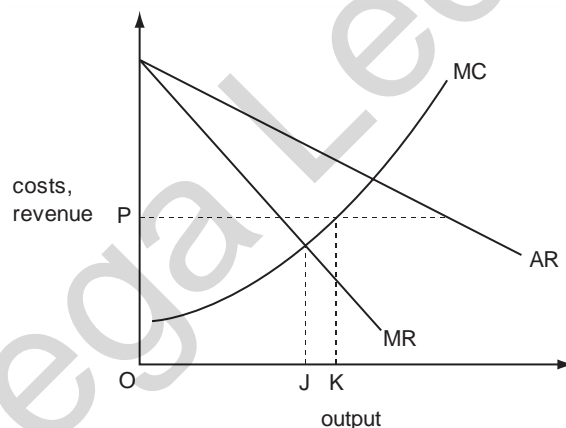


The firm changes its objective from profit maximisation to sales revenue maximisation. Which groups are likely to be winners and losers as a result of this change?

	winners	losers
<b>A</b>	customers	shareholders
<b>B</b>	managers	customers
<b>C</b>	workers	managers
<b>D</b>	shareholders	workers

N/13/32/12

16 The diagram shows the initial cost and revenue curves of a profit-maximising monopolist.



What would cause the firm to increase its output from OJ to OK?

- A** The government fixes the price at OP.
- B** he government requires the firm to charge a price equal to marginal cost.
- C** The government imposes an indirect tax on the firm's product.
- D** The firm is allowed to earn only a normal profit.

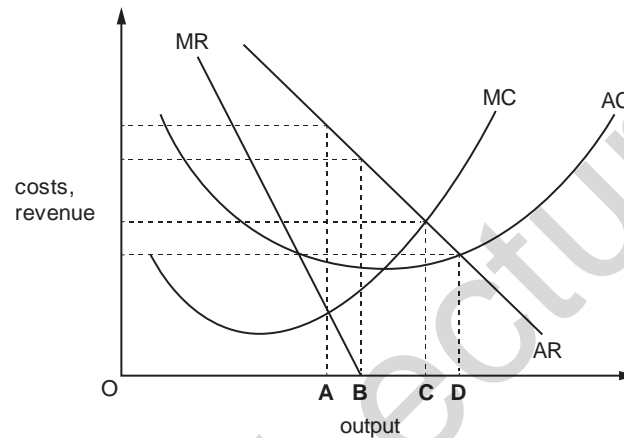
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**17** What makes it most likely that a firm's profits will be volatile and subject to substantial fluctuations?

- A** Fixed costs are a high percentage of total costs.
- B** It produces a diversified range of products.
- C** It produces basic consumer products.
- D** It sells its product in a number of different markets.

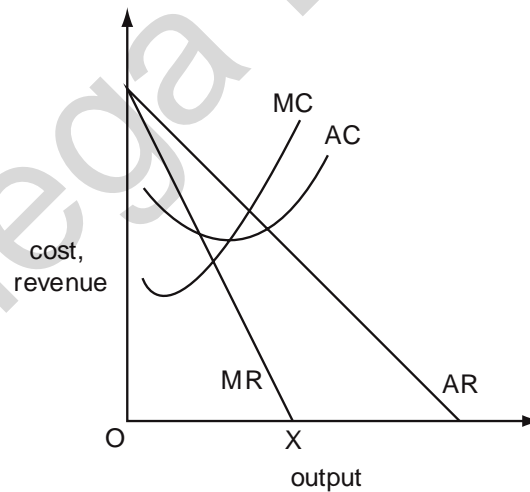
J/14/32/12

**18** The diagram shows the cost and revenue curves of a monopolist. Which output will the firm produce if its aim is to maximise sales revenue?



J/15/32/12

**19** The diagram shows the cost and revenue curves of a monopoly.



What is the firm's objective if it produces output OX?

- A** to achieve normal profit
- B** to maximise profit
- C** to maximise total revenue
- D** to minimise average cost

N/15/32/11

**20** A firm, operating in an imperfectly competitive market, produces at the level of output where the price elasticity of demand for its product is equal to unity. What has the firm achieved?

- |          |                 |          |                      |
|----------|-----------------|----------|----------------------|
| <b>A</b> | normal profit   | <b>B</b> | maximum profits      |
| <b>C</b> | maximum revenue | <b>D</b> | maximum sales volume |

J/16/32/11

**21** A firm wishes to eliminate competition and become a monopoly. What should it do?

- |          |                                    |
|----------|------------------------------------|
| <b>A</b> | maximise output                    |
| <b>B</b> | maximise profit                    |
| <b>C</b> | reduce prices                      |
| <b>D</b> | reduce the number of its suppliers |

J/16/32/13

**22** What is likely to have its cause in the separation of ownership and control in a firm?

- |          |                         |
|----------|-------------------------|
| <b>A</b> | contestable markets     |
| <b>B</b> | diseconomies of scale   |
| <b>C</b> | principal-agent problem |
| <b>D</b> | prisoner's dilemma      |

## Section: 13 Price Discrimination

Price discrimination is the process of charging different prices from different customers or for different units sold, for reasons unrelated to costs. Price discrimination can only be successful if:

- Discriminating firms have some monopoly power
- Firms are able to identify and separate different market segments with different elasticities of demand. Market segments are sub-groups comprising customers with similar characteristics such as age, income or gender. Separating different market segments implies that re-sale is impossible- those obtaining the product at lower prices cannot earn profits by re-selling it in segments where higher prices are charged. This condition explains why examples of price discrimination are most commonly found in the services sector, as services cannot be resold.

Keeping these conditions in mind, consider some of the following examples of price discrimination:

**Time:** We typically experience high prices from phone companies, airlines, rail/bus operators, electricity firms etc during peak hours and lower rates in off peak hours.

**Age:** Children and elderly people for instance, may be charged lower prices in theme parks, restaurants or libraries etc.

**Timing of purchase:** Fabulous discounts can be won if an airline or a train ticket is purchased well in advance or at the last minute. Making reservations just before the departure of a train or flight can make unsold tickets available at much discounted prices.

**Quantity:** Discounts encouraging bulk buying may be an example of price discrimination as long as price reductions are not attributed to reduced packaging and handling costs.

**Place:** Cinemas, theatres and live concerts cost more for people occupying seats with a better view whereas people with a restricted view generally have to pay less. A more contentious example is that of business class travelers paying higher fares versus economy class. It could be argued that the price differential is related to costs- the cost of serving a business class traveller is high as better services are provided both on ground as well as on plane, seats have extra leg space and customers are allowed to carry more weight. However, this exercise may still be regarded as price discrimination if the difference in fares is not fully explained by the difference in airlines' costs.

Though the difference in costs of serving a business class traveller compared to an economy class passenger is almost the same on London-New York and London-Delhi routes, the difference in business and economy class fares is much higher on London-New York route. The reason is high purchasing power and lower price elasticity of demand for business travellers on the London-New York route, thus making it an example of price discrimination.

**Frequency of purchase:** Day passes or monthly cards for frequent commuters cost much less per journey than the ticket for a single travel.

### Executing price discrimination

Given that the cost of selling the product to different customers and in different segments is the same, profits are maximized when Marginal Revenue (MR) is equated in all market segments. Thus, price discrimination is the process of equating MR in all segments. The following equation (derived in section 8) explains that firms charge different prices in different segments only when price elasticities of demand differ.

$$MR = P \left[ 1 - \frac{1}{|Ed|} \right]$$

Marginal revenue must be equated in both segments ('a' and 'b') for maximizing profits

$$MR_a = MR_b$$

$$Pa \left[ 1 - \frac{1}{|Ed|_a} \right] = Pb \left[ 1 - \frac{1}{|Ed|_b} \right]$$

Assuming elasticities of demand are equal in both segments;

$$\left[ 1 - \frac{1}{|Ed|_a} \right] = \left[ 1 - \frac{1}{|Ed|_b} \right]$$

In a situation as above, Marginal Revenue can only be equated by charging same price in both segments i.e.  $Pa = Pb$ . Firms find it profitable to charge high prices in segments with price inelastic demand and lower prices in segments where demand is price elastic.

Now assume that demand in segment 'a' is more price elastic than demand in segment 'b'.

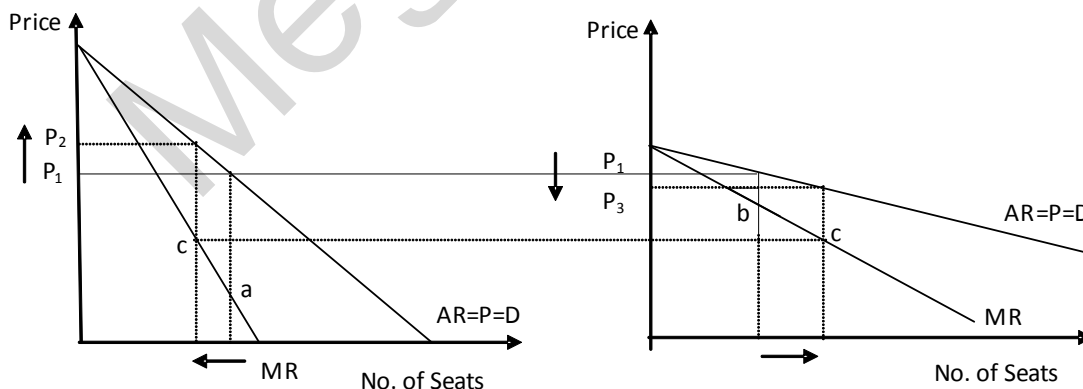
$$|Ed|_a > |Ed|_b \quad \frac{1}{|Ed|_a} < \frac{1}{|Ed|_b}$$

$$1 - \frac{1}{|Ed|_a} > 1 - \frac{1}{|Ed|_b}$$

In such a situation, Marginal Revenue can only be equated by charging a lower price in segment 'a' and a higher price in segment 'b' i.e.  $Pa < Pb$

The following example provides a graphical representation of successful price discrimination by an airline operator.

Diagram 13.1



The panel on the left shows a price inelastic demand curve for business travelers, compared to a flatter demand curve for tourists, shown in the figure on the right. Initially, the price charged in both the segments is the same,  $P_1$ . At this price, revenue generated from selling an extra seat to a business traveler, 'a' is smaller than that generated by offering the same seat to a tourist, 'b'. A profit maximizing monopolist may therefore decide to reduce the number of seats for business travellers and offer the same to tourists. Increased Total Revenues and unchanged Total Costs imply greater profits for the monopolist. The monopolist continues to sell more seats to tourists till the revenue generated from the sale of an extra seat becomes equal in both segments. This happens at point "c" in the given figure. Eventually, the airline operator charges a higher price,  $P_2$  in the segment where demand is price inelastic and a lower price,  $P_3$  from tourists, whose demand is price elastic. Once MR is equated in all market segments, there is no further possibility of increasing total revenues and profits by selling more or less in a certain segment.

**Perfect Price Discrimination**

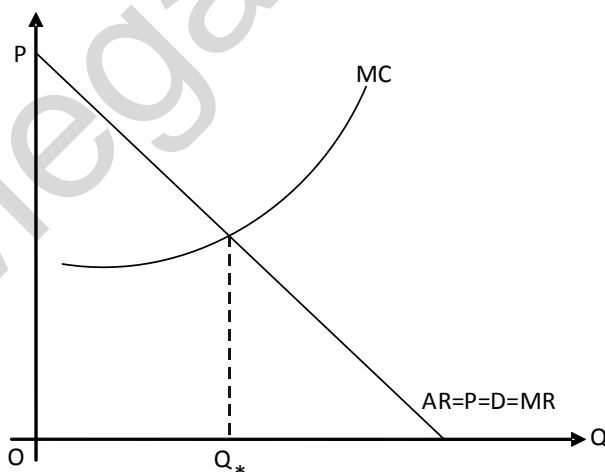
Perfect price discrimination occurs when each unit is sold at a different price. In such a case, the divergence between sale price and MR disappears and revenue generated from selling an extra unit equal the sale price charged.

Consider the following demand schedule:

Price	Q	TR	MR
10	1	10	10
9	2	19	9
8	3	27	8
7	4	34	7
6	5	40	6

Assuming the monopolist can sell all units at different prices, total revenue from selling 2 units would be 19 (10 from selling the 1st unit and 9 from selling the 2nd), 27 from selling 3 units (10 + 9 + 8) and so on. MR is equal to price.

The following diagram shows the revenue curves for the perfectly price discriminating monopolist. Diagram 13.2



The firm sells quantity  $Q^*$  but there exists no market price as all units are sold at different prices. Such a firm can be described as allocatively efficient since the price it charges equals MC of the last unit. However, consumer surplus is zero as all of it becomes the gain of the monopolist. This is because the producer succeeds in charging a price for every unit such that it is the maximum price consumers are willing to pay for that unit.

#### **Is price discrimination desirable?**

It may appear that price discrimination is completely intolerable as it increases the profits of monopolists at the expense of the surplus enjoyed by consumers. Another distributive effect of price discrimination is that consumers with price elastic demand gain at the expense of those with price inelastic demand. However, price discrimination enables the seller to offer products at lower prices in segments which may remain unserved otherwise (because of high prices). Thus, quantity traded increases. Price discrimination may be desirable and beneficial, as highlighted by the following examples:

- Intelligent students getting scholarships
- The poor and less privileged getting food stamps and other essentials at subsidized rates
- Organizations giving discounts to their employees on buying goods produced by them, for instance an airline offering discounted prices for air tickets to its employees (however, misuse of subsidies and discounts should not be overlooked)
- An airline offering discounts to commuters in less privileged areas and cross subsidizing the losses by providing the same service in a more affluent segment of society with relatively high purchasing power.



## Multiple Choice Questions (Section 13)

J/02/3/14

- 1 A firm produces only one product. Under which condition is it most likely to be able to pursue a policy of price discrimination?
- A Both price and marginal revenue are identical in all markets.
  - B It is benefiting from economies of scale.
  - C Its product has a low elasticity of demand.
  - D There are separate and distinct markets for its product.

N/04/3/15

- 2 A discriminating monopolist, faced with two demand curves of differing elasticity, will equate the combined marginal cost of production with
- A marginal revenue in each market.
  - B average revenue in each market.
  - C the difference between the marginal revenues in the two markets.
  - D the difference between the average revenues in the two markets.

N/06/3/12

- 3 A firm wishes to acquire some of the consumer surplus its customers currently enjoy. How might it achieve this?
- A by charging a price that maximises revenue
  - B by introducing price discrimination
  - C by reducing operating costs
  - D by taking advantage of economies of scale

N/07/3/12

- 4 Instead of charging all its customers the same price, a firm decides to charge different prices in different markets. How is this likely to affect consumers' surplus and the firm's marketing costs?

	consumers' surplus	marketing costs
A	decreases	decreases
B	decreases	increases
C	increases	increases
D	increases	decreases

J/08/3/11

- 5 Why might a firm introduce a policy of price discrimination?
- A to achieve allocative efficiency
  - B to achieve productive efficiency
  - C to avoid diseconomies of scale
  - D to turn consumer surplus into producer surplus

N/10/3/10

**6** A firm wishes to acquire some of the consumer surplus its customers currently enjoy. How might it achieve this?

- A** by introducing price discrimination
- B** by reducing operating costs
- C** by setting a price that maximises revenue
- D** by taking advantage of economies of scale

J/11/32/09

**7** A firm is engaging in price discrimination. In order to maximise profits, what should the firm do?

- A** charge a higher price to consumers earning higher incomes
- B** charge a higher price to consumers earning lower incomes
- C** charge a higher price to consumers whose demand for the product is price inelastic
- D** charge a higher price to consumers whose demand for the product is price elastic

N/11/32/10

**8** Which would be **least** likely to practise price discrimination?

- A** a baker
- B** a cinema
- C** a hairdressing salon
- D** a restaurant

N/12/32/12

**9** Instead of charging all its customers the same price, a firm decides to charge different prices in different markets. How is this likely to affect consumer surplus and the firm's marketing costs?

	consumer surplus	marketing costs
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

N/14/32/14

**10** A firm wishes to acquire some of the consumer surplus its customers currently enjoy. How might it achieve this?

- A** by introducing price discrimination
- B** by reducing operating costs
- C** by setting a price that maximises revenue
- D** by taking advantage of economies of scale

N/15/32/14

- 11** Instead of charging all of its customers the same price, a firm decides to charge different prices in different markets.  
How is this likely to affect consumer surplus and the firm's marketing costs?

	consumer surplus	marketing costs
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	Increase

Mega Lecture

## Section: 14 Monopolistic Competition

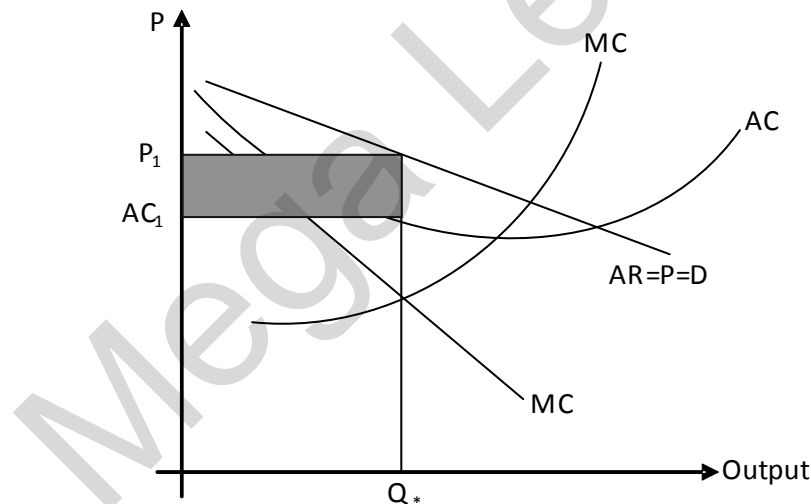
Meeting the conditions of a perfectly competitive market structure, particularly that of homogenous products is beyond the scope of firms in the real world. In reality, goods not only differ from those made by other firms but also those produced and sold by the same firm. For example, a Toyota car is different not only from those manufactured by other brands such as Honda but also from other Toyota models.

For consumers, products may seem to have real differences or what is known as 'perceived' differences. Real attributes include better quality, superior design, extra features or/and improved performance etc whereas consumers may be made to perceive a product as "better" through advertisements and various marketing tools.

Differences, whether perceived or real, provide firms with some control over price. Unlike perfect competition where a firm loses all its customers by raising price, a monopolistically competitive firm can retain some customers even when charging high prices- the demand curve faced by a monopolistically competitive firm slopes downwards. The price elasticity of demand depends upon the firm's ability to retain customers at high prices, which is determined by the degree of product differentiation. Successful price differentiation lowers PED, meaning that the firm loses few customers if it raises price.

As in the case of a monopoly, the marginal revenue (MR) curve for a monopolistically competitive firm lies below the demand curve. A profit maximizing monopolistically competitive firm chooses to produce an output level where MR equals MC.

Diagram 14.1

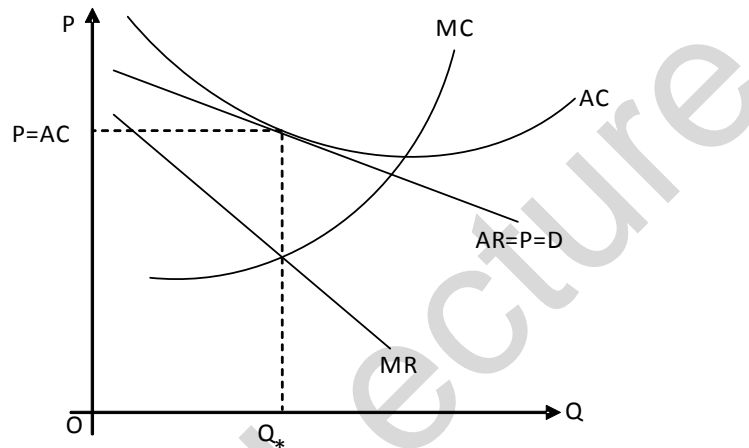


The shaded area in the figure above shows profits earned by a monopolistically competitive firm as it sells output  $Q^*$  at Price  $P_1$ . However, these profits can only be earned in the short run. Like perfect competition, ease of entry dilutes supernormal in the long run till the point they completely disappear. What is different in the case of monopolistic competition is the mechanism through which these profits disappear.

In perfect competition, the arrival of new firms attracted by supernormal profits raises market supply and industry moves downwards along its demand curve resulting in reduced price and profits. New firms continue to enter till supernormal profits completely disappear. On the other hand, under monopolistic competition, products are differentiated and defining a market is difficult since different kinds of products are meant to satisfy different market segments. Entry by new firms, instead of increasing market supply, decreases demand for existing firms' products shifting their demand curves leftwards and hence lowering prices. Firms continue to enter till price equals Average Cost and super normal profits disappear completely.

Diagram 14.2 shows the long run equilibrium for a monopolistically competitive firm. Firms make normal profits in the long run and charge a price exactly equal to AC.

Diagram 14.2



### Is product differentiation desirable?

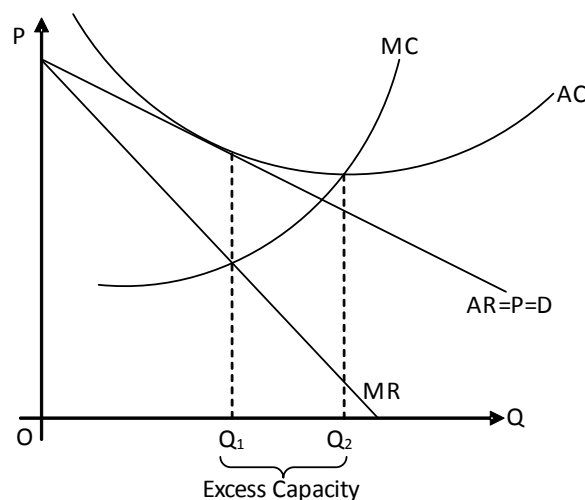
The key feature differentiating between perfectly and monopolistically competitive firms is product differentiation. It is by virtue of differentiated products that monopolistically competitive firms have downward sloping demand curves and their prices and MR diverge.

Monopolistically competitive firms are allocatively inefficient since they charge a price higher than the MC of the last unit. Output produced is below the socially optimum level and society is deprived of a possible welfare gain. Monopolistically competitive firms are criticized for leaving excess capacity. Excess capacity is the difference between the output where AC is minimized (where AC equals MC) and the profit maximizing output (where MC = MR).

Excess capacity arises when it is possible for a firm to increase its output and reduce per unit cost simultaneously. Consider the following facts regarding monopolistically competitive firms:

MC = MR	Profit maximizing output
P > MR	MR curve lies below demand/price
P > MC	Firms are allocatively inefficient as price and MR diverge
P = AC	Firms can only make normal profits in the long run
MC < AC	Profit maximizing monopolistically competitive firms are bound to leave excess capacity i.e. produce where MC is below AC. (AC is falling).

Diagram 14.3



Firms operating in the falling portion of their Average Costs Curves leave excess capacity. As shown above, a monopolistically competitive firm is bound to leave excess capacity since Price diverges from MR but equals AC. The firm produces where MC equals MR and hence cannot operate at the lowest point of Average Cost (AC) if it produces the profit maximizing output. In diagram 14.3, output  $Q_2 - Q_1$  is excess capacity.

Product differentiation reduces society's welfare via two sources- allocative inefficiency as  $P > MC$  of the last unit and excess capacity. However, it may benefit consumers by satisfying diverse ranges of their wants. Imagine how dull and colourless a market would be with just one type of cars, TVs, crisps or clothes. Different designs, brands, features and styles of packaging not only add colours to the shelves of super markets and shopping centers but also make the experience of shopping joyful and exciting. Some economists may argue that providing unnecessary varieties of the same basic product involves huge wastage of resources. The availability of a 1000 variants of toothpastes and anti dandruff shampoos for instance, is no more likely to result in brighter teeth and dandruff free hair than a society where only a limited variety of such products is available.

It is debatable though whether the benefits of being variety oriented and satisfying ever changing wants outweigh the costs of excess capacity. However, it is safe to say that product differentiation adds utility to products, makes them more attractive for one group of customers and yet affordable for another. For example, fully loaded, luxurious cars can be sold in segments where purchasing power is high whereas simpler versions of the same car can be offered in more price sensitive segments.

Market structure	Productive efficiency		Allocative efficiency
	Short run	Long run	
Perfect competition	May be	Yes	Yes
Monopolistic Competition	May be	Yes	No
Monopoly	May be	May be	No

## Oligopoly

None of the market structures described so far explains the operations of most of today's famous businesses. For instance, Coke and Pepsi together dominate the beverage industry of the world but can not be categorized as perfectly or monopolistically competitive firms. Neither is there a monopoly as the number of sellers exceeds one. Such industries are classified as 'oligopolies', the world oligopoly meaning fewness. It specifies a market structure where a significant percentage of industry's output is concentrated in the hands of few firms. Automobiles, electronics, newspapers, soaps, cosmetics, oil companies and many other industries are dominated by few large firms and are thus oligopolies.

An oligopolistic market structure highlights the importance of strategic interdependence i.e. strategies of a particular firm do not only affect its own position and profitability but other firms' as well. When firms try to win an advantage over rivals by lowering prices or raising marketing budgets, competitors come up with their own promotional and marketing gimmicks to safeguard their positions. The outcome of such a strategic decision thus depends upon the reactions of competitors. Raising promotional budget or lowering prices is likely to provide intended benefits to a firm only if competitors fail to match the budget increase or price cut. Since it is almost impossible to accurately predict the reactions of rival firms, oligopolistic firms operate in a situation of uncertainty.

### Kinked demand curve

Given uncertain outcomes, it follows that a demand curve cannot exist in oligopolistic market structures. It is difficult to predict changes in quantity demanded with changes in price, as much depends on the reaction of competitors, which are both beyond a firm's control and knowledge. One may however, derive a hypothetical demand curve assuming the behavior of rival firms. The resulting 'kinked' demand curve is shown in the diagram below. It is assumed that the decision to raise price by a given firm is unmatched by competitors as their sales automatically increase by virtue of relatively lower prices. The decision to lower prices on the other hand, induces rivals to match the price cut due to threatened sales.

Diagram 14.4

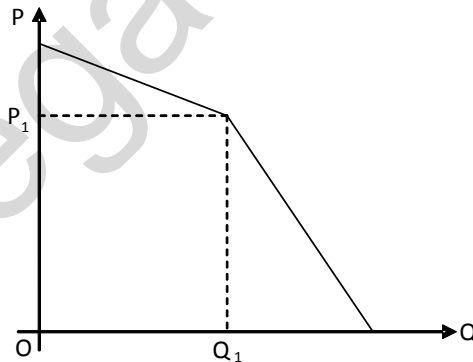
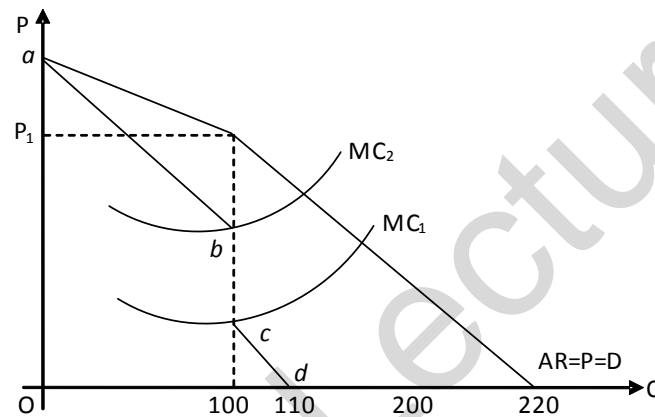


Diagram 14.4 shows a kinked demand curve, assuming that a given firm initially sells output  $Q_1$  at price  $P_1$ . The demand curve has two components- a flatter component showing price elastic demand beyond price  $P_1$ , as consumers switch to rivals whose unchanged prices are relatively lower and a steeper component showing price inelastic demand below  $P_1$ , where the firm's decision to lower price fails to attract many customers as competitors match the price cut.

## Price rigidity in Oligopoly

The kinked demand curve derived above helps us understand why oligopolistic firms avoid competing on prices and support price rigidity. As explained already, changing price reduces the firm's revenues as raising price results in loss of existing customers and lowering price fails to attract new customers. The profit maximizing quantity is determined by the intersection of MC and MR curves and price, by the height of the demand curve at the point where the two intersect. The MR curve is however, tricky to derive as it has two components corresponding to the elastic and inelastic portions of the kinked demand curve. The portion *ab* of the MR curve corresponds to the elastic component of the demand curve whereas *cd* corresponds to the inelastic portion. The straight vertical line *bc* shows a mathematical discontinuity exactly below the point of initial price and quantity. The firm continues to sell 100 units at price  $P_1$  as long as the MC curve shifts to lie somewhere between  $MC_1$  and  $MC_2$ .

Diagram 14.5



### Criticism on kinked demand curve

- Kinked demand curve assumes an initial price and quantity, but remains silent on how it is arrived at.
- It also fails to explain the new price and quantity if the MC curve falls outside the range determined by  $MC_1$  and  $MC_2$  (see diagram 14.5).
- Assuming that competitors always match a price cut and never follow a price increase is an over simplification of how markets and competitors behave in real life.

### Why avoid price competition?

The issue of price competition is specific to oligopoly, as monopolistically and perfectly firms are too small to compete on price and monopolies don't have anyone to compete against. As stated earlier, oligopolistic firms are interdependent due to their large size and small number. A price cut fails to win firms a Unique Selling Point (USP) since such an action is easily matched by competitors. Firms therefore avoid lowering prices to attract customers fearing that such an action is more likely to initiate a price war, a lose-lose scenario for all. Whereas producers struggle with declining revenues and profits, customers and employees lose since cost cutting measures by firms affect quality of the product and salaries and other benefits provided to workers. Distributors' commissions also decrease during a price war and pressure by distributors may force producers into fixing prices, ensuring reasonable sales margin for the former. Moreover,



lowering prices may damage the reputé and image of firms in the market, and hence result in declining sales. Customers may also decide to postpone purchases in hope of further price reductions.

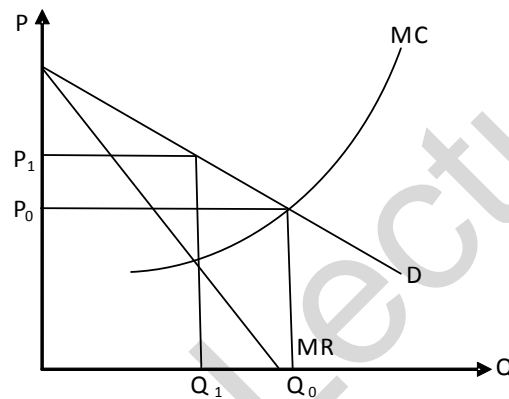
## Cartels

### (Collusive Oligopoly)

A cartel is a form of collusion between a group of suppliers aimed at suppressing competition between them, wholly or in part. Cartels are typically found in markets dominated by a few firms which are hence, interdependent. Since rivals' actions are important but cannot be predicted, firms always exist in a situation of uncertainty. It is to overcome this uncertainty that firms decide to collude and sign price fixing agreements, having a uniform policy regarding price and output. Member firms are assigned production quotas to ensure price is raised by restricting market supply.

Diagram 14.6 illustrates the impacts of cartel formation on market price and output.

Diagram 14.6



In a competitive market, equilibrium price and output is determined by the intersection of demand and supply curves, shown by  $P_c$  and  $Q_c$  in the diagram above. Cartel formation monopolizes a competitive market and demand and MR curves begin to diverge. Equilibrium price and output is determined by the intersection of MC and MR curves at  $P_1$  and  $Q_1$ . The cartel successfully raises price by restricting output.

However, cartels can only be successful when:

- The industry is dominated by a few large firms and all significant firms join the agreement
- Members don't cheat and stick to their assigned production quotas
- Product is homogeneous, as better quality firms would have an incentive to decline any offer to join.
- Entry barriers are high
- Firms have accurate information about each other's output levels.
- The firms' costs of production are quite similar.
- Demand is relatively stable.

## Non-Collusive Oligopoly: Game Theory

In a situation of oligopoly, where a few large firms dominate the market, the outcome of a strategic move of a firm does not only depend on that move but also on the reactions of other firms. In a non-collusive oligopoly, where firms act independently, predicting such reactions is often hard. Game Theory examines the best strategy a firm may employ while assuming reactions of competitors.

Let us take a simple example where only two firms X and Y operate, which have identical cost, and offer a homogenous product. Initially, they are both charging a price of £5 and making a profit of £50 million each. Let us assume that both firms are independently considering lowering the price to increase profits. If X is cautious, it may think that if it leaves its price unchanged, Y may lower it to £4 and increase its profits to £60 million, reducing X's profits to just £25 million (box 3). Alternatively, if X decides to cut its price to £4 to gain a bigger market share, the outcome will depend on the reaction of Y. The profits of both X and Y will decrease to £40 million (box 4) if Y decides to match the price cut (another cautious assumption of X about Y). Out of the two cautious approaches, X is better off if it lowers the price, instead of waiting for Y to do so. This is known as maximin approach, which involves choosing the better of the two options giving lower returns.

**Profits for firms X and Y at different prices**

		X's price	
		£5	£4
Y's price	£5	1 £50m each	2 £25m for Y £60m for X
	£4	3 £60m for Y £25m for X	4 £40m each

However, if X views the whole situation optimistically, it will assume that Y will leave its price unchanged, giving a greater market and profit to X i.e. £60 million shown in box 2 (Y's profits will decrease to £25 million). This strategy is maximax, where a firm chooses the outcome which maximizes its gains.

Interestingly, X picks the same strategy i.e. lowering the price to £4, whether it thinks optimistically or cautiously. This is known as dominant strategy game, where both approaches, maximin and maximax, lead to the same strategy.

The same scenario will apply to Y, which will also be tempted to lower the price. However, if both X and Y lower the price, they both lose, as their profits decrease from £50 million each (box 1) to £40 million each (box 4). Thus, they should collude and agree on a price-fixing agreement to avoid a price war, making both firms better off, yet they will both be tempted to cheat and cut prices. This is known as prisoner's dilemma (see section 30).

## Prisoner's Dilemma

The **prisoner's dilemma** is a standard example of a game analyzed in game theory that shows why two completely "rational" individuals might not cooperate, even if it appears that it is in their

best interests to do so. It was originally framed by Merrill Flood and Melvin Dresher working at RAND in 1950. Albert W. Tucker formalized the game with prison sentence rewards and named it, "prisoner's dilemma" presenting it as follows:

Two members of a criminal-gang are arrested and imprisoned. Each prisoner is in solitary confinement with no means of communicating with the other. The prosecutors lack sufficient evidence to convict the pair on the principal charge. They hope to get both sentenced to a year in prison on a lesser charge. Simultaneously, the prosecutors offer each prisoner a bargain. Each prisoner is given the opportunity either to: betray the other by testifying that the other committed the crime, or to cooperate with the other by remaining silent. The offer is:

- If A and B each betray the other, each of them serves 2 years in prison
- If A betrays B but B remains silent, A will be set free and B will serve 3 years in prison (and vice versa)
- If A and B both remain silent, both of them will only serve 1 year in prison (on the lesser charge)

These options are shown in the table below:

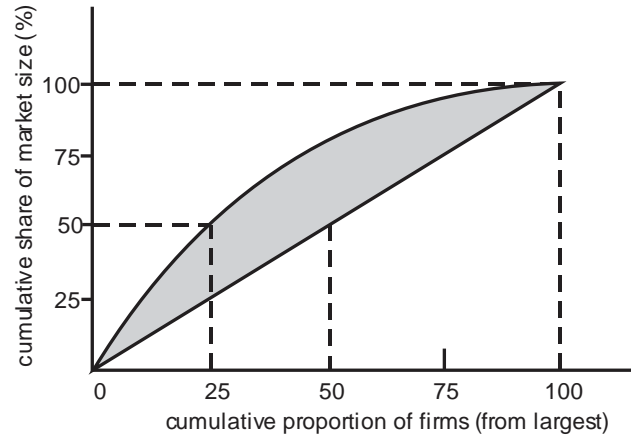
	<b>Prisoner B stays silent (<i>cooperates</i>)</b>	<b>Prisoner B betrays (<i>defects</i>)</b>
<b>Prisoner A stays silent (<i>cooperates</i>)</b>	Each serves 1 year	Prisoner A: 3 years Prisoner B: goes free
<b>Prisoner A betrays (<i>defects</i>)</b>	Prisoner A: goes free Prisoner B: 3 years	Each serves 2 years

Here, regardless of what the other decides, each prisoner gets a higher reward by betraying the other ("defecting"). The reasoning involves an argument by dilemma: B will either cooperate or defect. If B cooperates, A should defect, because going free is better than serving 1 year. If B defects, A should also defect, because serving 2 years is better than serving 3. So either way, A should defect. Parallel reasoning will show that B should defect.

In traditional game theory, some very restrictive assumptions on prisoner behaviour are made. It is assumed that both understand the nature of the game, and that despite being members of the same gang, they have no loyalty to each other and will have no opportunity for retribution or reward outside the game. Most importantly, a very narrow interpretation of "rationality" is applied in defining the decision-making strategies of the prisoners. Given these conditions and the payoffs above, prisoner A will betray prisoner B. The game is symmetric, so Prisoner B should act the same way. Since both "rationally" decide to defect, each receives a lower reward than if both were to stay quiet. Traditional game theory results in both players being worse off than if each chose to lessen the sentence of his accomplice at the cost of spending more time in jail himself.

### **Concentration Ratio (Lorenz Curve & Gini Coefficient)**

The CONCENTRATION RATIO records the percentage of a market's sales accounted for by a given number (maybe 3-5) of the largest firms in that market.



(b)

The Lorenz curve shows the cumulative share of market size on one axis accounted for by various (cumulative) percentages of the number of firms in the market.

Relative concentration measures are concerned with inequalities in the share of total firms producing for the market (or the inequalities in income distribution). Such irregularities (or income inequalities) can be recorded in the form of a Lorenz curve as in Fig. The diagonal straight line shows what a distribution of complete equality in firm shares (or complete equality in the distribution of income) would look like, so the extent to which the Lorenz curve deviates from this line gives an indication of relative seller concentration (or income inequality). For example, the diagonal line shows how we might expect 50% of market sales to be accounted for by 50% of the total firms, whilst in fact 50% of market sales are accounted for by the largest 25% of total firms, as the Lorenz curve indicates. The Gini coefficient provides a summary measure of the extent to which the Lorenz curve for a particular market deviates from the linear diagonal. It indicates the extent of the bow-shaped area in the Fig. by dividing the shaded area below the Lorenz curve by the area above the line of equality. The value of the Gini coefficient ranges from zero (complete equality) to one (complete inequality).

## Growth of Firms

Firms can increase their size by either extending production capacities internally i.e. organic growth, or through acquisitions, mergers and takeovers i.e. external growth.

External growth not only increases firm size but also eliminates competition. Firms acquire an established customer base and a complete network of suppliers, workers and distributors. However, external growth poses serious challenges as merging two firms with different cultures and work ethics may become difficult, costly and time consuming.

Integration may take up the following forms:

### Horizontal integration

A firm integrates horizontally by expanding or specializing at a particular level of a product's production or distribution e.g. a manufacturer doubling production capacity or merging with another manufacturer. Advantages of horizontal integration include economies of scale resulting in lower per unit cost, greater market share, reduced competition and increased market power. Avoidance of duplication of activities also makes firms more efficient and competitive. However, control and coordination costs may increase if the business becomes too large to manage.

### Vertical integration

A firm grows vertically when it takes control of an activity which is performed either prior to (backward vertical integration) or after the existing level of business activity (forward vertical integration).

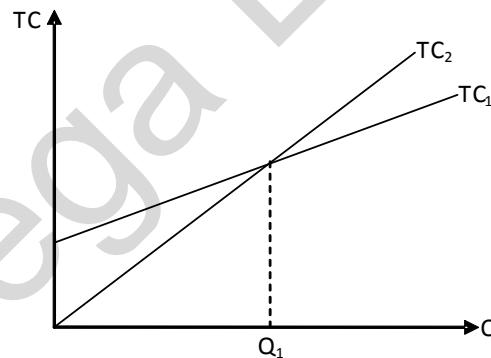
Backward vertical integration is a firm's move towards its source of supply e.g. a tea manufacturing firm purchasing a tea garden or a car manufacturing firm producing components itself which it previously bought from an outside supplier.

Forward vertical integration is a firm's move towards its market. This may involve a firm opening its own outlets to sell its products directly to the consumer e.g. a car manufacturer opening a company owned car showroom. Increased popularity of e-commerce and the possibility of placing orders online has facilitated vertical integration.

Vertical integration allows control over the entire production chain and hence, the resulting quality of the product. However, apart from requiring investment in additional resources, vertical integration may increase costs as core activities receive only divided attention compared to previous times. Firms wanting to concentrate on a narrower band of activities opt for outsourcing i.e. vertical disintegration.

Diagram 14.7 compares the cost structure of two firms: Firm 1 being fully integrated and Firm 2 opting to outsource.  $TC_1$  is flatter than  $TC_2$ , showing that total cost rises slowly when an extra unit is produced using the firm's own production facility. Fixed costs are also positive in this case. Fixed costs are zero if the firm purchases from an outside supplier but total cost curve is steeper i.e. a higher price is paid to the outside supplier and total costs rise faster. Outsourcing is cheaper when less than  $Q_1$  units are required. However, in house production facility becomes more economical beyond  $Q_1$ , when required volume is large.

Diagram 14.7



### Diversification

A firm may decide to grow by entering spheres unrelated to its existing activities. Such firms are better able to exploit risk bearing economies of scale, where they can survive and grow despite some of their activities/products resulting in losses. However, these firms are deprived of the benefits of specialization and may lose a portion of profits because of the divided attention paid to different types of activities. Before heading for it, firms must also ensure that they have the expertise and skills required to manage activities after diversification.

## Multiple Choice Questions

### (Section 14)

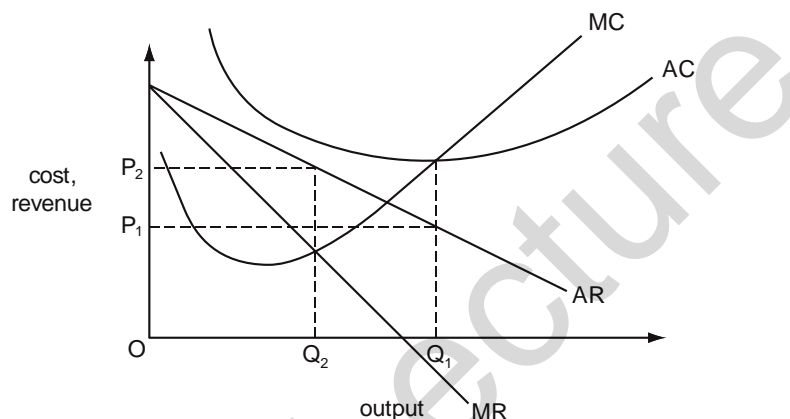
#### Monopolistic Competition

J/04/3/07

- 1 An industry consists of a large number of firms, all of which produce an identical product. What could explain why the demand curve facing each individual firm is downward-sloping?
- A diminishing marginal utility
  - B freedom of exit and entry
  - C imperfect knowledge on the part of consumers
  - D a limit on the amount consumers have available to spend

J/04/3/09

- 2 The diagram shows the cost and revenue curves of a monopolist.



The monopolist is currently producing output  $OQ_1$  and charging a price  $OP_1$ . How might the monopolist make a profit?

- A by adopting marginal cost pricing
- B by maximising sales revenue
- C by practising price discrimination
- D by reducing output to  $OQ_2$  and charging price  $OP_2$ .

N/04/3/14

- 3 In which way does monopolistic competition differ from perfect competition?
- A Average revenue exceeds average cost in long-run equilibrium.
  - B Barriers exist to the entry of new firms.
  - C Marginal revenue exceeds marginal cost in long-run equilibrium.
  - D Products are differentiated.

J/08/3/09

- 4 The table shows some of the assumptions of perfect competition and monopolistic competition. Which pairing is correct?

	perfect competition	monopolistic competition
A	barriers to entry	small number of firms
B	differentiated products	large number of firms
C	freedom of entry and exit	differentiated products
D	large number of firms	barriers to entry

J/09/3/09

5 What is a feature of monopolistic competition, but not of perfect competition?

- A a small number of buyers
- B product differentiation
- C the existence of abnormal profits
- D the existence of barriers to entry

N/13/32/11

6 The table shows some of the assumptions of perfect competition and monopolistic competition. Which pairing is correct?

	perfect competition	monopolistic competition
A	barriers to entry	small number of firms
B	differentiated products	large number of firms
C	freedom of entry and exit	barriers to entry
D	large number of firms	differentiated products

### Oligopoly

J/02/3/08

7 Which of the following is an assumption underlying the kinked demand curve in oligopoly?

- A A firm will increase its price in response to a price increase by a rival.
- B A firm will not match a price cut by a rival.
- C Consumers are less sensitive to price increases than price decreases.
- D Rivals are expected to match any reduction in price.

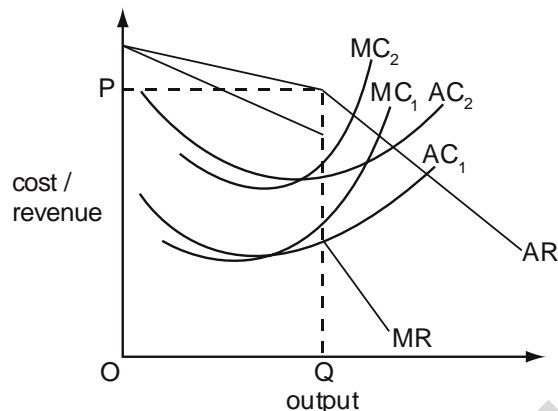
N/02/3/08

8 In which of the following market situations will a firm take account of the reactions of its competitors before deciding to cut its price?

- A monopoly
- B monopolistic competition
- C oligopoly
- D perfect competition

J/03/3/12

- 9 The diagram shows the cost and revenue curves of an oligopolist. In the initial situation,  $AC_1$  is its average cost curve,  $MC_1$  is its marginal cost curve and the firm is in equilibrium at output  $OQ$  and price  $OP$ . The cost of labour rises, so that  $AC_2$  and  $MC_2$  become the relevant cost curves.

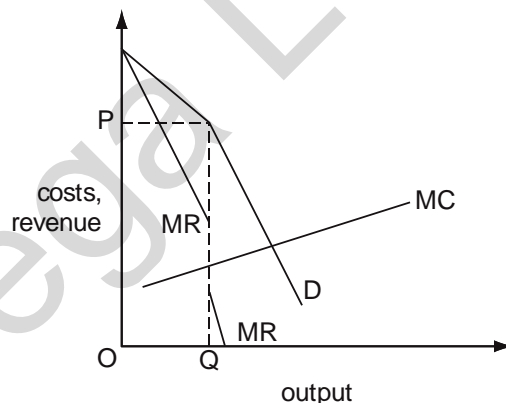


What should the firm do to maximise profit in this new situation?

- A leave both price and output unchanged
- B leave price unchanged and increase output
- C leave price unchanged and reduce output
- D raise price and leave output unchanged

N/05/3/13

- 10 The diagram shows a firm's cost and revenue curves.



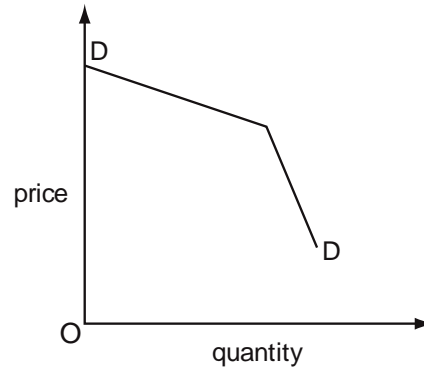
Which features are associated with the situation shown in the diagram?

- A economies of scale and allocative efficiency
- B interdependence and allocative efficiency
- C price rigidity and economies of scale
- D price rigidity and interdependence



N/07/3/11

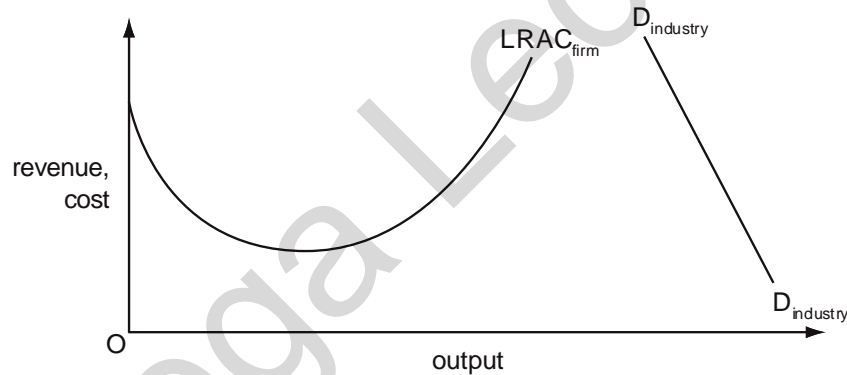
- 11** Which feature of oligopoly is being assumed when the demand curve for an individual firm is as shown in the diagram?



- A** price discrimination
- B** price leadership by the dominant firm
- C** interdependence between firms
- D** collusion between firms

J/09/3/11

- 12** The diagram shows the long-run average cost curve of a typical firm in an industry and the demand curve for the industry's product.



Which market structure is most likely to occur in this industry?

- A** monopolistic competition
- B** monopoly
- C** oligopoly
- D** perfect competition

J/12/32/10

- 13** The five firm concentration ratio for an industry changes from 50 % to 60 %. Which statement about the industry is correct?

- A** Each firm has become more efficient.
- B** The industry has become more oligopolistic.
- C** The industry has benefited from external economies of scale.
- D** The industry now has fewer barriers to entry.

N/12/32/11

**14** What is meant by a four firm concentration ratio of 25 %?

- A** The largest four firms' market share totals 25 %.
- B** The largest four firms have a market share of 25 % each.
- C** There are only four firms in the industry.
- D** The largest firm has a 25 % market share.

J/13/32/01

**15** In which market situation will a firm take account of the reactions of its competitors before deciding to cut its price?

- A** monopoly
- B** monopolistic competition
- C** oligopoly
- D** perfect competition

N/14/32/12

**16** When is collusion likely to be successful in an oligopolistic market?

- A** Barriers to entry are relatively low.
- B** Firms have accurate information about each other's output levels.
- C** There are significant differences in the firms' costs of production.
- D** There are significant fluctuations in demand from one period to another.

J/15/32/11

**17** The firms in an industry all produce a homogeneous product, but each firm is able to influence the price it charges for its own product. In which market structure do the firms operate?

- A** perfect competition
- B** monopolistic competition
- C** oligopoly
- D** monopoly

### Cartels

J/02/3/13

**18** Which of the following characteristics is most likely to be present when collusion occurs between firms in an industry?

- A** low barriers to entry
- B** a large number of firms
- C** the absence of significant economies of scale
- D** product homogeneity

J/06/3/13

**19** What will increase the likelihood that the firms in an industry will collude to maximise their joint profits?

- A** The industry has many differentiated products.
- B** The industry is characterised by rapid technological change.
- C** The industry consists of a large number of producers.
- D** There are significant barriers to prevent new firms entering the industry.

J/07/3/14

**20** An industry consists of a dominant producer and a number of smaller producers. The dominant producer joins with some of the other producers to form a cartel with a view to maximising their joint profits. Who will derive the greatest short-run benefit from this arrangement?

- A** the industry's suppliers
- B** the dominant firm
- C** smaller producers within the cartel
- D** the producers who do not join the cartel

N/08/3/10

**21** Which characteristic would make it easier for firms in an industry to collude?

- A** low barriers to entry
- B** a large number of firms
- C** rapid technological change
- D** product homogeneity

N/08/3/13

**22** The table shows the costs of two milk producers.

	costs per litre
firm X	\$9
firm Y	\$7

The price received by producers is \$10 per litre. Both firms have been given quotas allowing them to produce 200 litres per day. Firm X sells its quota to firm Y. Assuming constant costs of production and zero costs of entry and exit, what price did firm Y pay (per day) to buy X's quota?

- A** \$200
- B** \$600
- C** \$700
- D** between \$200 and \$600

N/09/3/13

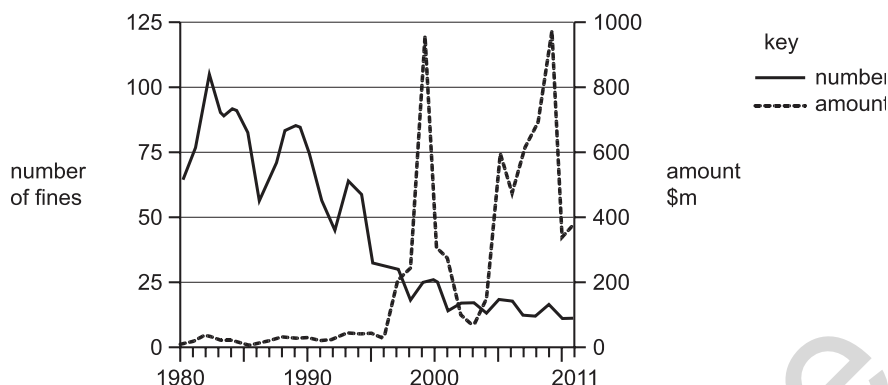
**23** A country's steel producers are members of a cartel. Each member is allocated a production quota, and initially produces the maximum allowed under its quota. What will be the effect on total steel production and the industry's total profits of allowing the producers to trade the quotas among themselves?

	effect on production	effect on total profits
<b>A</b>	increase	increase
<b>B</b>	increase	no change
<b>C</b>	no change	increase
<b>D</b>	no change	no change



N/14/32/19

**28** The diagram shows the number and amount of fines (\$m) imposed by the US Department of Justice for firms' illegal cartel behaviour between 1980 and 2011.



What is the most likely conclusion from the diagram about the view of the US Department of Justice of firms' cartel behaviour?

- A** It believed that cartel behaviour was unimportant before 1980.
- B** It believed that illegal cartel behaviour was insignificant in 2011.
- C** It believed that increasing fines was necessary to deter cartel behaviour.
- D** It believed that the free market can regulate cartel behaviour.

J/15/32/16

**29** A country's steel producers are members of a cartel. Each member is allocated a production quota and initially produces the maximum allowed under its quota. What will be the effect on productive efficiency and on the industry's profits if the producers are allowed to trade the quotas amongst themselves?

	effect on productive efficiency	effect on profits
<b>A</b>	improvement	increase
<b>B</b>	improvement	no change
<b>C</b>	no change	increase
<b>D</b>	no change	no change

### Growth of firms/Integration

J/06/3/08

**30** Samsung Electronics, which began as a semiconductor firm making simple memory chips, has used continuous research and investment to emerge as an industry leader. In addition, it has applied its strength in semiconductors to other markets including televisions and mobile phones.

What has taken place?

- A** external growth and diversification
- B** external growth and sales revenue maximisation
- C** internal growth and diversification
- D** internal growth and sales revenue maximisation

J/06/3/12

**31** An example of forward vertical integration for a computer manufacturer would be a merger with

- A** another computer manufacturer.
- B** a computer retailer.
- C** a silicon chip manufacturer.
- D** a software developer.

N/14/32/09

**32** In 2009, the United Kingdom's largest grocery supermarket, Tesco plc, created Tesco Bank offering a range of financial services to customers. This is an example of

- A** external growth and horizontal merger.
- B** external growth and vertical merger.
- C** internal growth and diversification.
- D** internal growth and market concentration.

N/15/32/10

**33** Firms can grow either externally or internally. What represents internal growth?

	finding new export markets	merging with rival firms in the same industry	merging with firms in other industries
<b>A</b>	no	no	yes
<b>B</b>	no	yes	no
<b>C</b>	yes	no	no
<b>D</b>	yes	yes	yes

N/15/32/11

**34** The table shows the five-firm concentration ratios for a selection of industries in an economy.

industry	percentage of total sales accounted for by the five largest firms in the industry (%)
tobacco	95
steel	60
water supply	60
printing	12

What can be concluded from the table?

- A** The firms are of equal size in the steel industry and the water supply industry.
- B** The printing industry is more competitive than the tobacco industry.
- C** The tobacco industry is a monopoly market.
- D** There are more firms in the tobacco industry than in the water supply industry.

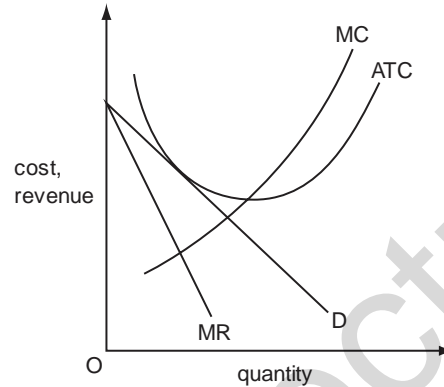
J/16/32/06

**35** Which statement about the 'kinked demand curve' model of oligopoly is incorrect?

- A** The kink in the demand curve of each firm is based on expectations about other firms' responses to changes in its price.
- B** The marginal revenue curve of the firm has a vertical segment at the market price.
- C** The model explains how the equilibrium market price is determined.
- D** The model suggests price stickiness within a certain range of marginal costs.

J/16/32/09

**36** The diagram shows the cost and revenue curves of a firm.



What does the diagram represent?

- A** a firm in monopolistic competition making normal profit
- B** a firm in monopolistic competition making short-term losses
- C** a firm in perfect competition at long-run equilibrium
- D** a monopoly making abnormal profits

## Section: 15 Contestable Market

Competitive markets are differentiated on the basis of number of firms, a more competitive market being one with a large number of firms.

Contestable markets are characterized by low barriers to entry and exit. Contestable firms behave in a similar fashion as competitive firms as fear of entry by potential competitors forces them to adopt consumer friendly policies. Firms in a contestable market may deliberately lower prices and sacrifice profits to discourage entry by potential competitors. A high number of firms is therefore not required to make firms adopt consumers' friendly policies, instead, lowering entry barriers is enough.

Students are encouraged to prepare following essays:

J/02/4/03	J/05/4/05	N/08/4/03	J/11/42&43/04
N/02/4/02	N/05/4/04	J/09/4/04	N/11/41/03
J/03/4/04	J/06/4/04	N/09/42/02	N/11/42/03
N/03/4/04	N/06/4/04	J/10/42/03	
J/04/4/03	N/07/4/02(b) & 3	N/10/42/03	
N/04/4/07	J/08/4/04	N/10/43/02 & 03	



## Multiple Choice Questions (Section 15)

J/02/3/09

1 What is the essential feature of a contestable market?

- A ease of entry and exit
- B interdependence between firms
- C large number of buyers and sellers
- D product homogeneity

J/04/3/08

2 A firm operates in a contestable market.  
Which statement correctly describes the firm's conduct?

- A It will set a price to maximise profits in the short run.
- B It will set a price to maximise its revenue.
- C It will set a price to deter the entry of new firms.
- D It will produce at minimum average cost.

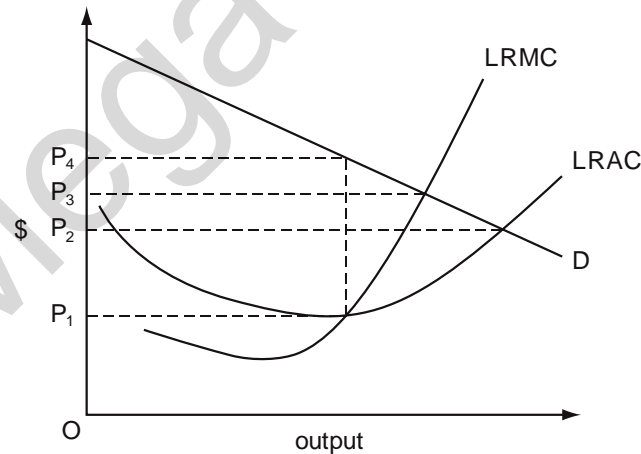
J/05/3/12

3 What determines the contestability of a market?

- A the degree of differentiation of the product
- B the costs of entry and exit
- C the price elasticity of demand for the product
- D the number of firms in the industry

N/05/3/12

4 The diagram shows the demand curve and the long-run cost curves of a firm that operates in a perfectly contestable market.



Which price will the firm charge for its product?

- A  $OP_1$
- B  $OP_2$
- C  $OP_3$
- D  $OP_4$

J/06/3/11

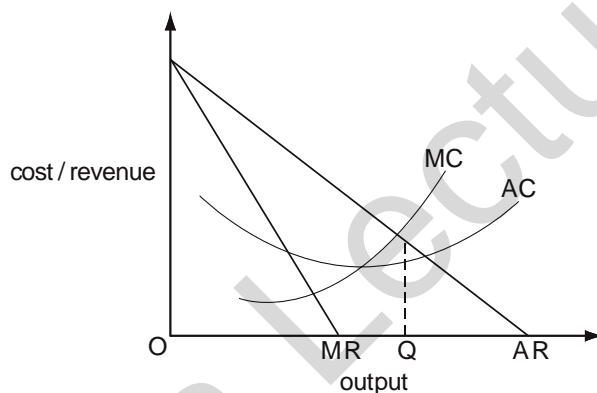
- 5** A firm charges the maximum price it is able to charge without attracting competition from new entrants.  
In which type of market does this firm operate?
- A** a contestable market
  - B** a monopolistically competitive market
  - C** a monopsonistic market
  - D** a perfectly competitive market

N/06/3/11

- 6** Which assumption is essential for a market to be contestable?
- A** The market is supplied by a large number of firms.
  - B** Firms are free to enter and leave the market.
  - C** Firms cannot earn abnormal profits in the short run.
  - D** Firms produce differentiated goods.

J/07/3/13

- 7** The diagram shows a firm's cost and revenue curves.



- What could explain why the firm produces output OQ?
- A** Its aim is to maximise profits.
  - B** Its aim is to maximise sales revenue.
  - C** It is operating in a contestable market.
  - D** It is operating in a perfectly competitive market.

N/08/3/09

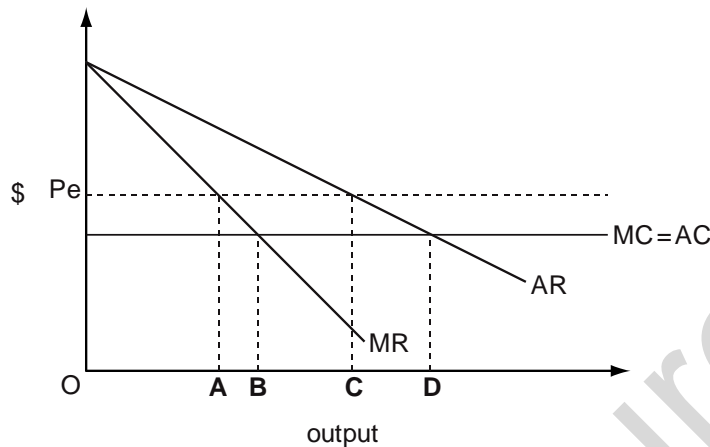
- 8** Which feature does a contestable market share with a perfectly competitive market?
- A** Firms must be price takers.
  - B** Firms must operate on a small scale.
  - C** There must be freedom of entry to and exit from the industry.
  - D** There must be many firms in the industry.

J/09/3/10

- 9** Which assumption is essential for a market to be contestable?
- A** The market is supplied by a large number of firms.
  - B** Firms are free to enter and leave the market.
  - C** Firms cannot earn abnormal profits in the short run.
  - D** Firms produce differentiated goods.

N/09/3/11

- 10** The diagram shows the short-run position of a monopolist who believes that, in the long run, excessive profits might attract new entrants to the industry. If the monopolist believes that at prices above  $P_e$  new competitors would enter, which output would he choose to protect his long-run profits?

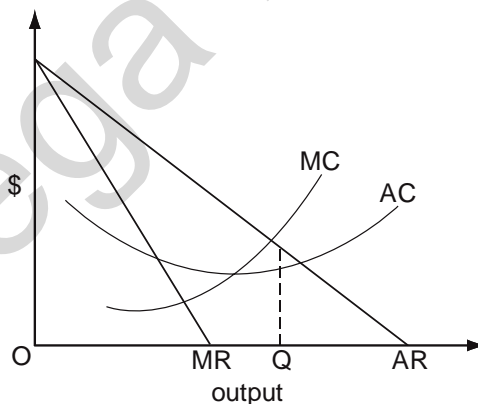


J/10/3/09

- 11** In the absence of regulation, why is it likely that the market for air travel on the Singapore-Sydney route would be highly contestable?
- A** An airline entering the market would lose little if it later exited that market.
  - B** The airline industry's capacity to expand its operations in the short-run is limited.
  - C** The demand for air travel on the Singapore-Sydney route is price-elastic.
  - D** There is no effective substitute for air travel for journeys between Singapore and Sydney.

N/10/3/09

- 12** The diagram shows a firm's cost and revenue curves.



What could explain why the firm produces output OQ?

- A** It is operating in a contestable market.
- B** It is operating in a perfectly competitive market.
- C** It is seeking to maximise profits.
- D** It is seeking to maximise sales revenue.

J/11/32/08

**13** What is the likely outcome for producers and consumers when a market moves from being non-contestable to being a contestable market?

	producers	consumers
<b>A</b>	gain from higher prices	gain from a wider choice of products
<b>B</b>	gain from likely higher profits	lose from likely higher prices
<b>C</b>	lose from likely lower output	lose from a reduced choice of products
<b>D</b>	lose from likely lower profits	gain from likely lower prices

Mega Lecture

**Section: 16** **Factor Market**

So far, we have familiarized ourselves with output markets where firms supply goods and services to households and households demand them. This section sheds light on factor markets, where factor services such as labour and capital are traded. Here firms purchase factor services whereas households supply them.

**Marginal Revenue Productivity Theory**

Marginal Revenue Productivity (MRP) theory helps determine the quantity of factors of production hired at a certain factor price. The theory applies to all production factors but the following discussion focuses exclusively on labor.

MRP theory assumes perfect competition in both product and factor markets. With regards to factor markets, it implies a large number of buyers (employing firms) and suppliers i.e. laborers. All firms are small sized so that their decisions to hire fewer or more workers do not influence the market wage. There are no trade unions and workers make their decisions regarding supply of labor hours independently. Workers are assumed to be “homogenous”, meaning that all workers are identical in terms of abilities, qualifications, experience and attitudes towards work. Needless to mention, such an assumption is unlikely to hold in the real world. Entry and exit is easy and more workers can quickly be attracted from alternative occupations. This is because the level of skills and qualifications required is low and can be acquired quickly.

Given a perfectly competitive labor market, the supply curve for labor is straight horizontal line showing that an individual firm can buy any quantity of labour hours at the prevailing wage rate. In other words, the cost of hiring an additional unit of labour i.e. Marginal Input Cost (MIC) equals the wage rate. The latter is always equal to Average Input Cost (AIC).

$$AIC = \frac{TIC}{L}$$

$$TIC = W \cdot L$$

$$AIC = \frac{W \cdot L}{L}$$

$$AIC = Wage$$

TIC = Total Input Cost  
 AIC = Average Input Cost  
 L = Total labour hours  
 W = wage rate per hour

Table 16.1 shows the revenues and costs of a firm hiring labour hours and selling goods in competitive markets. The firm can hire additional labour hours without offering a higher wage and sell more units without reducing prices. Thus, cost incurred to hire an extra input, MIC equals the wage rate, w and revenue generated from selling an extra unit, MR equals sale price, P.

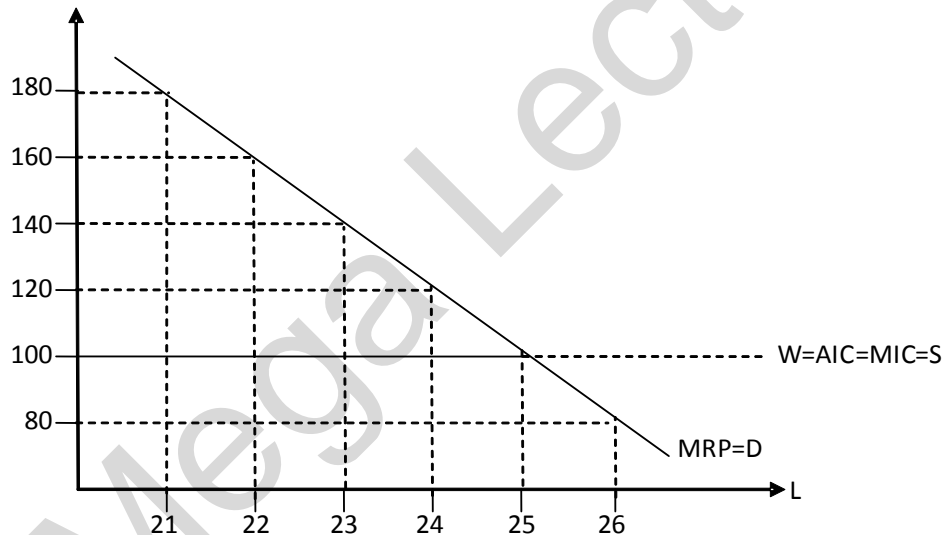
No of labour hours (L)	Wage = AIC	TIC	MIC	MP	Price = MR	MRP
21	100	2100	100	18	10	180
22	100	2200	100	16	10	160
23	100	2300	100	14	10	140
24	100	2400	100	12	10	120
25	100	2500	100	10	10	100
26	100	2600	100	8	10	80

In the given example, labour hours beyond 21 give diminishing returns i.e. additional inputs of labour increase total output but at a diminishing rate (MP is falling). Marginal Product, MP, is the number of extra units obtained by hiring an extra labour hour. Marginal revenue product (MRP) is the additional revenue generated by hiring an additional unit of labour. MRP is the product of MP (which physically measures changes in output) and Marginal Revenue (MR). In case of perfectly competitive product markets, price equals Marginal Revenue (MR) and MRP can be calculated by multiplying MP with sale price. MRP of monopoly is steeper than the MRP of a perfectly competitive firm since monopolist has to decrease price to sell more whereas more units can be sold at the same price by a perfectly competitive firm.

MRP slopes downwards due to diminishing returns. The profit maximizing rule suggests that the firm be hiring all labour hours contributing more to revenues (MRP) and less to costs (MIC) so that labour hours whose MIC exceeds MRP should not be employed. The equilibrium is where the MRP of the last labour input equals MIC.

Diagram 16.1 shows the horizontal labour supply curve, which also shows wage rate,  $w$ , Average Input Cost, AIC, and Marginal Input Cost, MIC. The firm hires 25 labour hours (determined by the intersection of MRP and MIC) at the wage rate of 100/hour. In case wage rate increases to 120, the firm demands only 24 labour hours and so on. Thus, the MRP is also the demand curve for labour.

Diagram 16.1



Increased productivity i.e. increased Marginal Product and/or increased price of the final product raises MRP and hence the demand for labour.

## Labour Supply Curve

Having studied the components of total price effect, we now move on to the derivation of the labor supply curve. The impacts of changes in wage rate on the supply of labour hours are studied by separating the income and substitution effects of wage change. Workers allocate 24 hours between labour and leisure such that any hour not spent on work is spent on leisure.

Increase in hourly wage rate increases the opportunity cost of leisure and induces workers to substitute leisure for work, increasing the number of hours spent working. Substitution effect of a wage change is always negative, meaning workers demand less leisure and supply more labour hours when wage rate rises.

Increased hourly wage rate also raises real income and purchasing power. Assuming leisure is inferior, the real income effect is negative meaning that increased wage rate reduces the demand for leisure and raises the supply of labour.

Negative substitution effect and negative income effect of a wage change operate in same direction- labour supply curve slopes upward for workers who perceive leisure to be inferior.

However, leisure can't be an inferior good. Workers affording luxuries also demand free time to enjoy them. Assuming leisure is normal, the real income effect of the wage is positive meaning increased hourly wage rate raises the demand for leisure and hence reduces the supply of labour hours.

Negative substitution effect and positive income effect work in opposite directions. Where substitution effect outweighs the real income effect, labour supply curve slopes upward. It is backward bending where the income effect turns out to be stronger than the substitution effect.

	Substitution effect SE	Income effect IE	Wage effect WE	Supply curve of labour
Leisure is inferior	SL ↑	SL ↑	SL ↑	Upward rising supply curve
Leisure is normal	SL ↑	SL ↓	SL ↑	Upward rising supply curve
	SL ↑	SL ↓	SL ↓	Backward bending supply curve

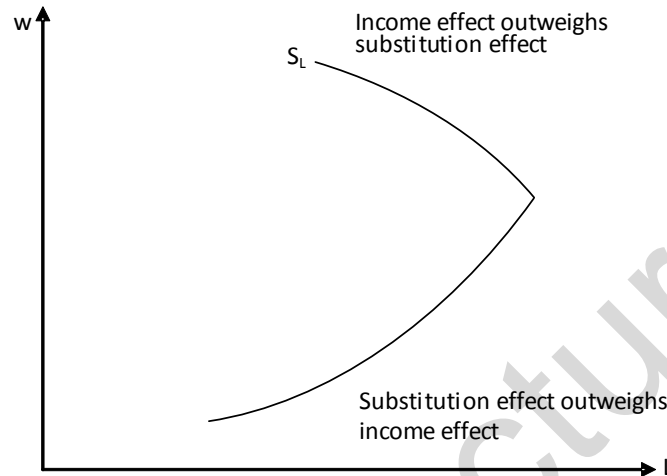
Diagram 16.1 shows an initially upward rising supply curve where increased wage rate incentives workers to supply more work hours. However, after a certain point, the curve bends backwards, showing that workers reduce the supply of labour hours with further increases in wage rate.

Labour supply curve is upward rising in a highly unlikely case of leisure being inferior. However, if leisure is normal, labour supply curve could either be backward bending or slope upward, depending upon the relative strength of income and substitution effects.

Substitution effect is initially stronger. A worker working 4 hours a day finds it easy to substitute leisure for work compared to one working 10 hours a day. Thus, substitution effect is weaker for workers with longer working hours and increased wage rate in their case implies a relatively strong income effect.

Consider the example of a fresh medical graduate who initially takes up more than one job to earn his livelihood and establish his name. Substitution effect is stronger and increased wage rate induces him to work for longer hours. This makes leisure relatively scarce and over time, he begins to demand more time at his disposal to enjoy the luxuries of life which he may very well be affording then. Substitution effect becomes increasingly weak compared to income effect, reducing the supply of labour hours with increases in the wage rate.

Diagram 16.2



### Shifts in Labour Supply Curve

Labour supply increases and supply curve of labour shifts towards right because of:

- a fall in wages paid in similar occupations
- a weakening of trade union influence in the industry
- an increase of the rate of female participation
- an increase in the wages of male workers
- an increase in immigration
- a decreased preference for leisure
- a decrease in the level of unemployment benefits



## Multiple Choice Questions (Section 16)

### Labour Supply Curve

J/02/3/06

- 1 What could cause a perfectly competitive firm's marginal revenue product of labour curve to shift to the right?
- A an increase in wages
  - B a higher rate of sales tax
  - C an increase in labour supply
  - D a rise in the price of the final product

N/02/3/05

- 2 An individual works 40 hours per week when the wage rate is \$7 per hour. When the wage rate is increased to \$9 per hour, the individual works 36 hours per week. What explains the change in the number of hours worked?
- A a negative income elasticity of demand for leisure
  - B an income effect offsetting a substitution effect
  - C an income effect reinforcing a substitution effect
  - D a zero income effect

J/03/3/05

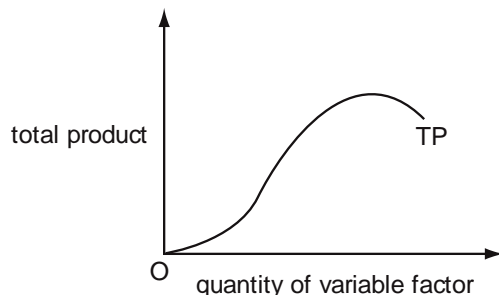
- 3 Which of the following will necessarily cause the supply curve of labour in a particular industry to shift to the right?
- A a fall in wages paid in similar occupations
  - B a greater use of machinery
  - C an increase in demand for the product
  - D a strengthening of trade union influence in the industry

J/03/3/06

- 4 The introduction of equal pay legislation in a country increases the wages of female workers. What will be the most likely effect of this increase?
- A a reduction of the rate of female unemployment
  - B a reduction in the wages of male workers
  - C an expansion in the supply of female workers
  - D substitution of female workers for male workers

N/03/3/04

- 5 The diagram shows the total product curve for a single variable factor, assuming all other factor inputs are held constant.



In which order do the total product (TP), average product (AP) and marginal product (MP) begin to decrease as the input of the variable factor is increased?

	first	second	third
<b>A</b>	AP	MP	TP
<b>B</b>	AP	TP	MP
<b>C</b>	MP	AP	TP
<b>D</b>	MP	TP	AP

N/03/3/05

- 6 The table shows the marginal revenue product of labour schedule of a profit-maximising firm producing under conditions of perfect competition.

number of workers	1	2	3	4	5	6	7
marginal revenue product (\$)	135	140	145	150	145	140	135

If the wage is \$140, what is the maximum number of workers the firm will employ?

- A** 2                      **B** 4                      **C** 5                      **D** 6

J/04/3/03

- 7 A firm is operating in an imperfectly competitive market. Why does the marginal revenue product of a factor of production employed by the firm fall as more of the factor is employed?
- A** Its marginal physical product alone falls.  
**B** Its marginal revenue alone falls.  
**C** Its marginal physical product and its marginal revenue both fall.  
**D** The supply price of the factor rises.

J/04/3/05

- 8 There is an increase in the supply of female labour. What will be the likely effect on male and female wages?

	male wages	female wages
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

N/04/3/06

9 What will cause the demand curve for labour to shift to the right?

- A a fall in the money wage rate
- B a rise in real wages
- C an increase in immigration
- D an increase in labour productivity

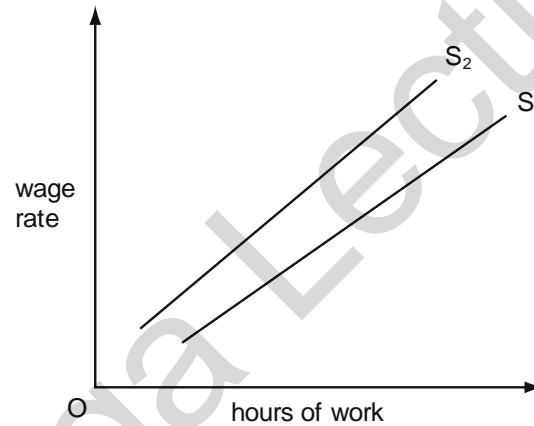
N/04/3/07

10 A worker responds to an increase in his hourly wage rate by reducing the number of hours he works per week. What would explain this?

- A The income effect of the wage rate increase outweighs the substitution effect.
- B The opportunity cost of leisure has increased.
- C The worker prefers leisure to work.
- D The worker's supply of labour is wage inelastic.

J/05/3/06

11 In the diagram  $S_1$  is an individual worker's initial supply of labour curve.



What could cause the curve to shift to  $S_2$ ?

- A an increase in the hourly wage rate
- B an increased preference for leisure
- C an increase in the opportunity cost of leisure
- D an increase in work satisfaction

J/05/3/07

12 Wages in industry X are significantly higher than in industry Y. What could explain this difference?

- A Workers in industry Y are highly mobile.
- B Trade union organisation in industry Y is relatively strong.
- C Industries X and Y compete with each other for workers.
- D There are non-pecuniary advantages to working in industry Y.

N/05/3/05

**13** What could cause a perfectly competitive firm's marginal revenue product of labour curve to shift to the right?

- A** an increase in wages
- B** a higher rate of sales tax
- C** an increase in labour supply
- D** a rise in the price of the final product

N/05/3/06

**14** What is likely to be the direction of the income and substitution effects of a wage rate increase on the number of hours workers will choose to work?

	income effect	substitution effect
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

J/06/3/03

**15** 'The addition to revenue which results from employing one additional unit of a factor of production, the quantities of all other factors of production remaining constant'. What does this define?

- A** marginal factor cost
- B** marginal revenue
- C** marginal revenue product
- D** the law of diminishing returns

J/06/3/05

**16** The table shows the main characteristics of employment in two occupations.

	occupation A	occupation B
average annual wage	\$ 100 000	\$60 000
number of weeks annual leave	5 weeks	10 weeks
average length of working week	48 hours	44 hours
job security	low	high
length of training course to obtain job qualification	1 year	2 years

What can be deduced from the table?

- A** Those employed in occupation B attach greater importance to job security.
- B** Those employed in occupation A attach less importance to leisure activities.
- C** There will be more competition for places on training courses to enter occupation A than Occupation B.
- D** Occupation B has greater non-pecuniary advantages than occupation A.

N/06/3/04

- 17** A firm working in perfect competition sells its product for \$1. The table gives the average physical product with different numbers of workers.

number of workers	average physical product
1	20
2	18
3	16
4	14

Which wage rise would cause the firm to employ two instead of three workers?

- A** \$8 to \$10      **B** \$10 to \$14      **C** \$14 to \$18      **D** \$16 to \$18

N/06/3/05

- 18** An individual works 40 hours per week when the wage rate is \$7 per hour. When the wage rate is increased to \$9 per hour, the individual works 36 hours per week. What explains the change in the number of hours worked?

- A** a negative income elasticity of demand for leisure  
**B** an income effect outweighing a substitution effect  
**C** an income effect reinforcing a substitution effect  
**D** a zero income effect

J/07/3/05

- 19** For a firm in imperfect competition, the marginal revenue product of labour at any given level of employment is equal to
- A** marginal revenue divided by the number employed.  
**B** marginal revenue divided by the wage rate.  
**C** the marginal physical product of labour multiplied by marginal revenue.  
**D** the marginal physical product of labour multiplied by the wage rate.

N/07/3/05

- 20** The introduction of equal pay legislation in a country increases the wages of female workers. What will be the most likely effect of this increase?
- A** a reduction of the rate of female unemployment  
**B** a reduction in the wages of male workers  
**C** an expansion in the supply of female workers  
**D** substitution of female workers for male workers

J/08/3/27

- 21** The number of people employed in a country and the level of unemployment both increase. What could make this possible?
- A** net inward immigration  
**B** a decrease in the level of unemployment benefits  
**C** a decrease in the age at which state pensions are payable  
**D** an increase in the number of students

N/09/3/04

**22** What could cause a perfectly competitive firm's marginal revenue product of labour curve to shift to the right?

- A** an increase in wages
- B** a higher rate of sales tax
- C** an increase in labour supply
- D** a rise in the price of the final product

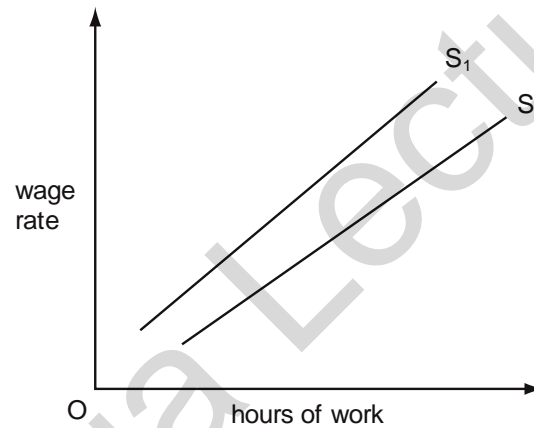
J/10/3/03

**23** What could cause the demand curve for labour to shift to the left?

- A** a decrease in immigration
- B** a decrease in labour productivity
- C** a fall in real wages
- D** a rise in the money wage rate

J/10/3/04

**24** In the diagram  $S_1$  is an individual worker's supply of labour curve.



What could cause the curve to shift from  $S_1$  to  $S_2$ ?

- A** a decrease in the hourly wage rate
- B** a decrease in work satisfaction
- C** a decrease in the opportunity cost of leisure
- D** a decreased preference for leisure

N/10/3/15

**25** What is meant by 'real wages'?

- A** the marginal physical product of labour
- B** the opportunity cost of labour
- C** the purchasing power of money wages
- D** wages net of tax

J/11/32/03

**26** The table shows the main characteristics of employment in two occupations.

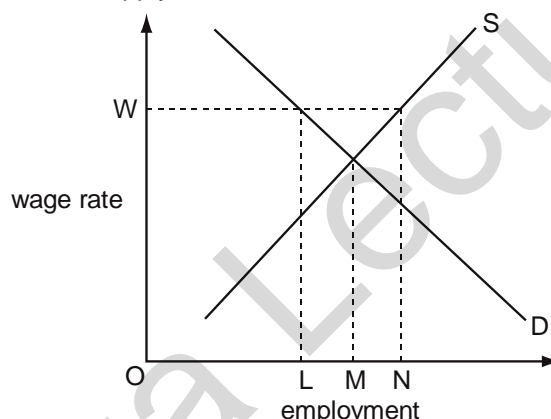
	occupation X	occupation Y
average annual wage	\$100 000	\$60 000
number of weeks annual leave	5 weeks	10 weeks
average length of working week	48 hours	44 hours
job security	low	high
length of training course to obtain job qualification	1 year	2 years

What can definitely be deduced from the table?

- A** Those employed in occupation Y attach greater importance to job security.
- B** Those employed in occupation X attach less importance to leisure activities.
- C** There will be more competition for places on training courses to enter occupation X than occupation Y.
- D** Occupation Y has greater non-pecuniary advantages than occupation X.

J/11/32/06

**27** The diagram shows the supply and demand for labour in an industry.



Initially the industry's labour market is in equilibrium.

What effect will the introduction of a minimum wage  $OW$  have on the level of employment in the industry?

- A** It will decrease by an amount  $LM$ .
- B** It will decrease by an amount  $LN$ .
- C** It will increase by an amount  $LN$ .
- D** It will increase by an amount  $MN$ .

J/11/32/12

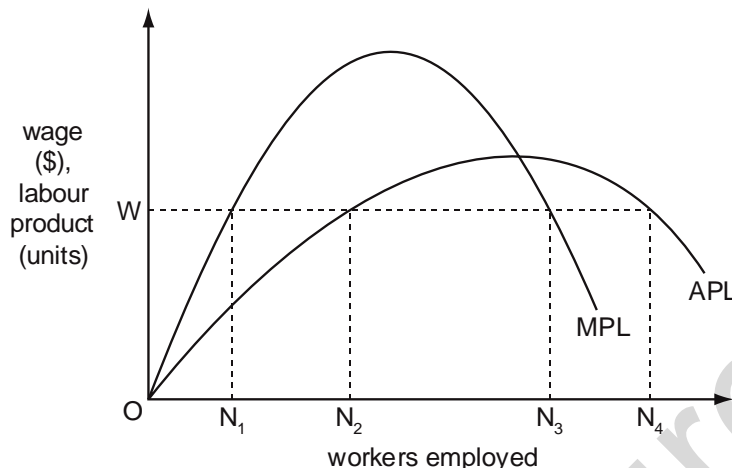
**28** Individuals are free to choose the number of hours they work, how much of their income they save and which goods and services they buy.

Which type of tax will not distort the choices individuals make?

- A** a tax levied on the wealth accumulated by individuals
- B** a uniform tax which raises the same fixed amount from all individuals
- C** indirect taxes on specific goods
- D** proportional income taxes

J/12/32/04

29 The diagram shows a perfectly competitive firm's average product of labour (APL) and marginal product of labour (MPL) curves.

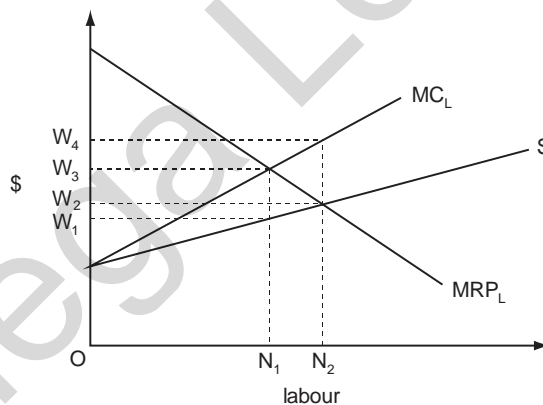


The market price of the firm's product is \$1.  
How many workers will the firm employ at a wage of OW?

- A  $ON_1$                       B  $ON_2$                       C  $ON_3$                       D  $ON_4$

N/12/32/04

30 In the diagram, MRPL is a firm's marginal revenue product of labour curve, S is its supply of labour curve, and MCL its marginal cost of labour curve.



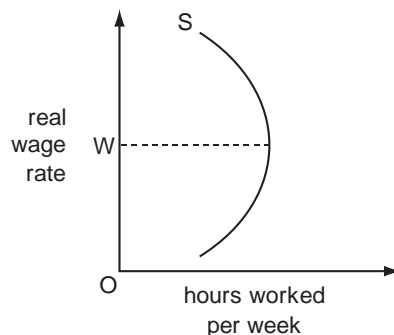
Assuming profit maximisation, how many workers will the firm employ and what wage will it pay?

	number employed	wage
A	$N_1$	$W_1$
B	$N_1$	$W_3$
C	$N_2$	$W_2$
D	$N_2$	$W_4$



N/12/32/05

31 The diagram shows a backward sloping supply curve of labour.



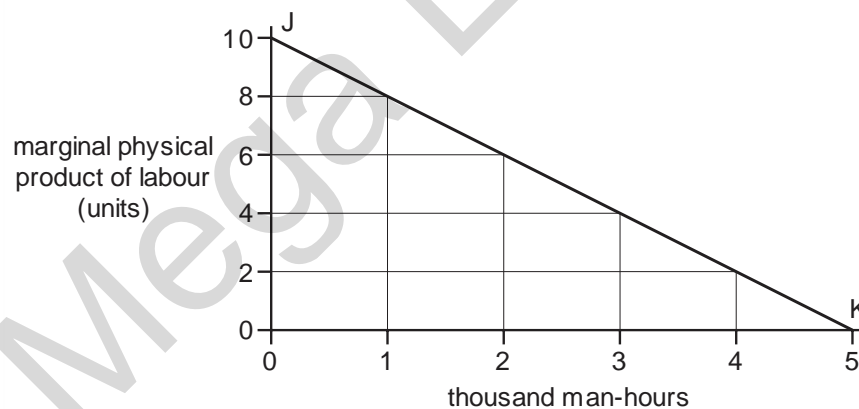
What is correct about the substitution effect and the income effect when the real wage rises above OW?

	substitution effect	income effect
<b>A</b>	negative	negative
<b>B</b>	negative	positive
<b>C</b>	positive	negative
<b>D</b>	positive	positive

J/13/32/05

32 A firm operates under perfect competition in both product and factor markets with labour as the only variable factor input.

In the diagram, the line JK shows the relationship between the marginal physical product of labour and the man-hours hired.

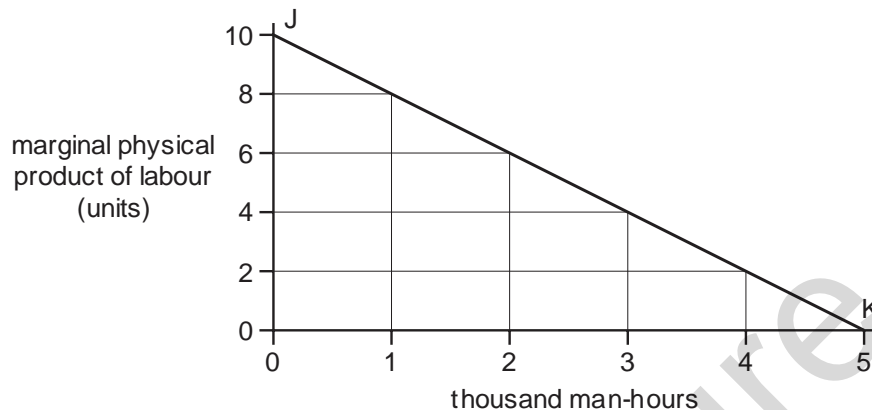


When the hourly wage is \$3.20, the firm employs 4000 man-hours per day. What is the price of the product?

- A** \$1.60      **B** \$2.00      **C** \$3.20      **D** \$6.40

N/13/32/04

- 33** A firm operates under perfect competition in both product and factor markets with labour as the only variable factor input. In the diagram, the line JK shows the relationship between the marginal physical product of labour and the man hours hired.



The price of the product is \$1.60.  
 What will be the number of man-hours hired by the firm if the hourly wage is \$6.40?

- A** 1000                      **B** 2000                      **C** 3000                      **D** 4000

J/14/32/04

- 34** In the diagram  $S_1$  is an individual worker's supply of labour curve.



What could cause the curve to shift from  $S_1$  to  $S_2$ ?

- A** a decrease in the hourly wage rate  
**B** a decrease in work satisfaction  
**C** a decrease in the opportunity cost of leisure  
**D** a decreased preference for leisure

J/14/32/05

**35** The table shows the marginal revenue product of labour schedule of a profit-maximising firm producing under conditions of perfect competition.

number of workers	1	2	3	4	5	6	7
marginal revenue product (\$)	125	130	135	140	135	130	125

If the wage is \$135, what is the maximum number of workers the firm will employ?

- A** 3                      **B** 4                      **C** 5                      **D** 6

N/14/32/05

**36** To increase its labour force from 100 to 101 workers, a firm has to increase its daily wage rate from \$500 to \$502.

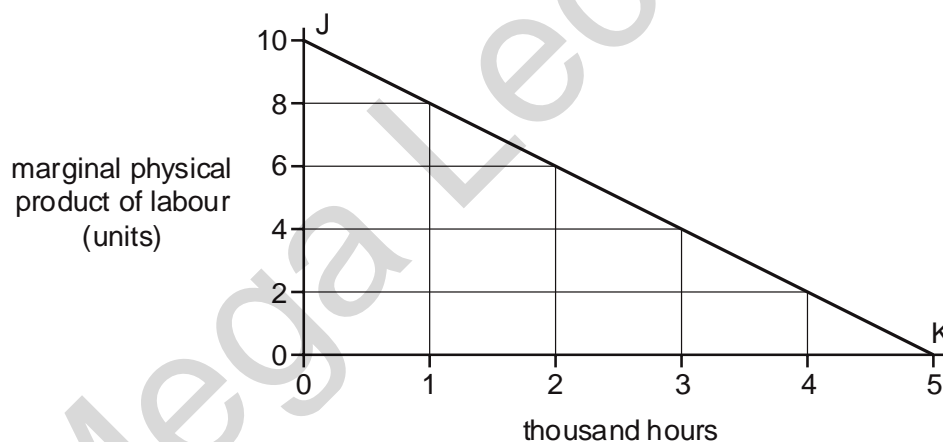
What is the marginal cost of labour per day?

- A** \$2                      **B** \$200                      **C** \$202                      **D** \$702

J/15/32/05

**37** A firm operates under perfect competition in both product and factor markets with labour as the only variable factor input.

In the diagram, the line JK shows the relationship between the marginal physical product of labour and the hours worked:

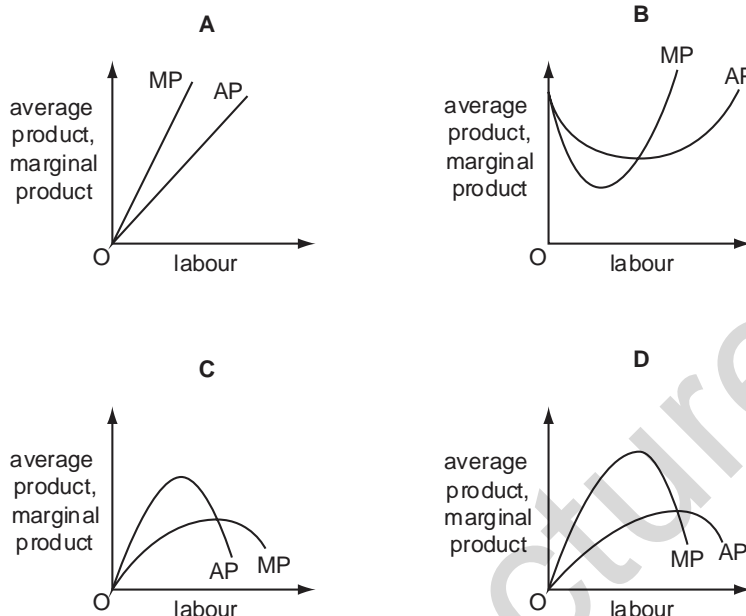


When the price of the product is \$1.60, the firm uses 3000 hours of labour. What is the hourly wage?

- A** \$0.40                      **B** \$2.40                      **C** \$5.60                      **D** \$6.40

N/15/32/05

**38** Which diagram correctly shows the relationship between the average product (AP) and the marginal product (MP) of labour, given that the quantities of other factor inputs remain constant?



J/16/32/14

**39** A firm employs a worker who adds less to output than the previous worker employed. What does this illustrate?

- A** decreasing marginal costs      **B** diseconomies of scale  
**C** increasing returns to scale      **D** the law of diminishing returns

J/16/32/15

**40** To increase the number of cleaners at a local school from 10 to 11, the employer has to raise the hourly rate of pay from \$8.00 to \$8.50. What is the marginal cost of labour per hour to the employer?

- A** \$0.50      **B** \$13.50      **C** \$88.50      **D** \$93.50

J/16/32/16

**41** For a firm in imperfect competition, the marginal revenue product of labour at any given level of employment is equal to

- A** marginal revenue divided by the number employed.  
**B** marginal revenue divided by the wage rate.  
**C** the marginal physical product of labour multiplied by marginal revenue.  
**D** the marginal physical product of labour multiplied by the wage rate.

**Section: 17** **Monopsony**

Just as monopoly means single seller, monopsony means single buyer. It can either pay low wages to workers or hire more workers but can not control both wages and labour hours simultaneously. The supply curve of labour for monopsony is upward rising as more labour hours can only be hired by offering higher wages.

As different workers cannot be offered different wages and increasing wage for one means increasing it for all, the cost of hiring an additional input (MIC) always exceeds the wage rate. Consider Table 17.1 which shows the costs of hiring labor hours for a monopsony. In order to hire the second labour hour, wage rate has to be increased to 60. Marginal Input Cost, MIC for hiring second labour hour is 70 i.e. greater than the wage rate, 60, since wages are increased for both the first and second labour hours. Apart from 60 being paid to the second labour hour, an additional 10 has to be paid to the 1st labour hour.

Table 17.1

AIC = w	L	TIC	MIC
50	1	50	50
60	2	120	70
70	3	210	90
80	4	320	110
90	5	450	130
100	6	600	150

Diagram 17.1

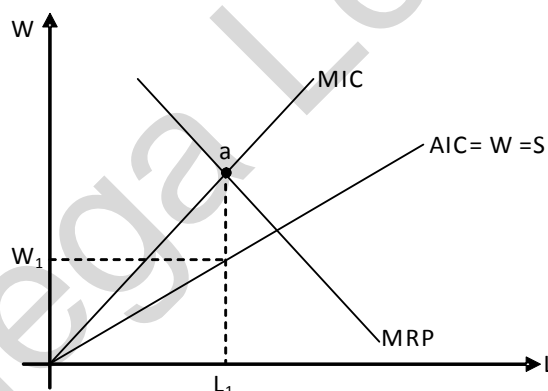


Diagram 17.1 shows quantity of labour hours, L along the x-axis and hourly wage rate, w along y-axis. Supply curve (showing wage and Average Input Cost) slopes upward showing higher wage rates being offered to induce workers to work for a higher number of hours. As stated earlier, Marginal Input Cost, MIC is higher than supply curve of labour as hiring more labour hours requires wages to be increased for all labour hours.

Marginal Revenue Product (MRP) slopes downward and intersects MIC at point 'a'. The intersection of MRP and MIC determines the number of labour hours to be employed by monopsony. Monopsony hires  $L_1$  labour hours and pays them the lowest possible wage,  $w_1$  given

by the height of the supply curve. Compared to perfect competition, monopsony hires too few labour hours and pays low wages.

Whereas the Marginal Revenue Product (MRP) curve shows demand for labor under perfect competition, the demand curve for labour doesn't exist under monopsony. Unlike perfect competition, wages and MIC diverge in monopsony so determining the number of labour hours firms demand at a certain wage rate is not possible.

## Trade Unions

Given the weak bargaining power of workers, wages determined through free, unrestricted movements of demand and supply curves are likely to be low. Such weak bargaining power may be due to the fact that:

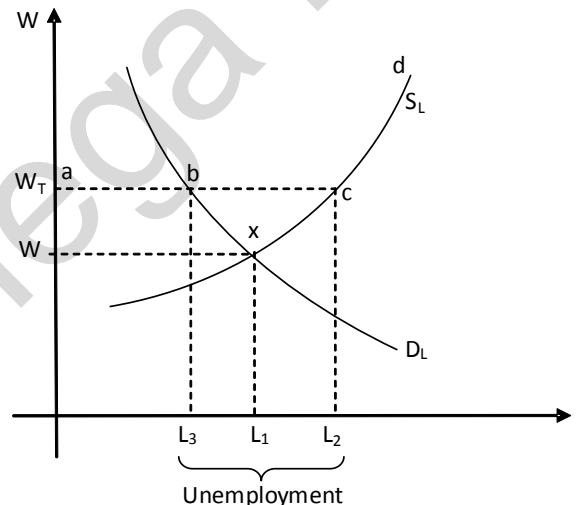
- Workers sell the most perishable thing- time. Thus workers have no option but to accept lower wages.
- Workers, in the absence of trade unions, negotiate wages individually and independently of each other. An individual worker can not influence the prevailing wage rate.
- Workers, compared to employers (firms), are large in number and less likely to have a uniform demand regarding wages and working conditions.
- Firms are fewer in number and large in size, hence more likely to dictate the labour market.

A trade union is a workers' body aiming to win a fair day's pay for a fair day's work through collective bargaining. Trade unions can restore some bargaining power for workers and help them collectively negotiate wages and working conditions with firms.

### Trade union in a perfectly competitive labour market

Diagram 17.2 shows quantity of labour (L) along x-axis and wage rate (w) along y axis. Point x i.e. the point of intersection of demand and supply curves for labour determines the equilibrium wage,  $W_1$  and employment level,  $L_1$ .

Diagram 17.2



Trade unions are expected to demand a wage higher than  $W_1$ . Assuming they demand wage  $W_T$ , the supply curve of labour becomes abcd. The straight horizontal portion of supply curve of labour,

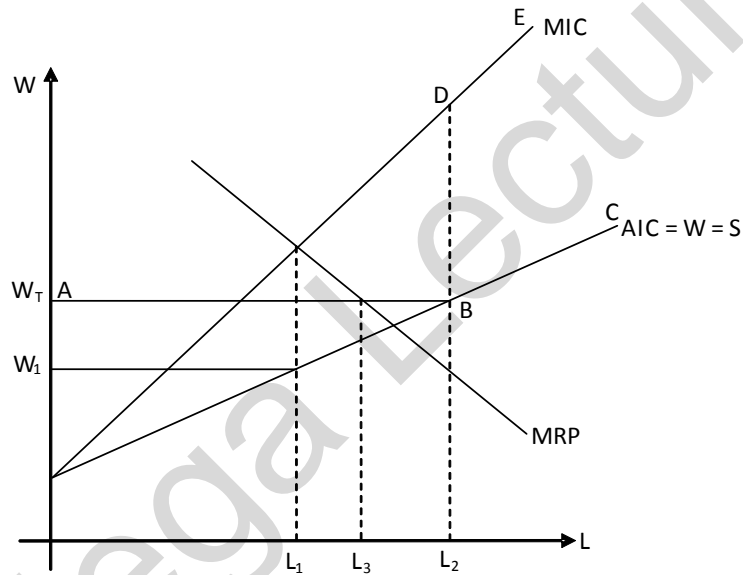
abc, shows that firm can hire labour hours till  $L_2$  without raising wages. However, hiring labour hours beyond  $L_2$  requires a wage increase, shown by the upward rising portion of the supply curve, cd.

The new equilibrium is established at b, where firm hires fewer labour hours,  $L_3$  at a higher wage rate,  $W_T$ . Although the trade union wins a wage increase for its members, the number of employment opportunities decreases from  $L_1$  to  $L_3$ . Trade unions may decide to settle this trade off in favor of higher wages i.e. choose to win higher wages for members (insiders,  $L_3$  workers who succeed in retaining their jobs) and ignore the costs of reduced employment opportunities on those forced out of work (outsiders). This insider/outsider theory supports the view of few economists who believe that unemployment results from unions' insistence on high real wages.

### Trade union is monopsony

Trade unions under monopsony can win both an increase in wages and employment opportunities simultaneously. Consider diagram 17.3 where the intersection of MRP and MIC curve determines number of labour hours,  $L_1$  and wage,  $W_1$ , given by the height of labour supply curve.

Diagram 17.3



When trade unions demand a higher wage rate  $W_T$ , the firm continues to hire workers till  $L_2$  without raising wages and the supply curve of labour equals MIC. This is shown by the straight horizontal portion of supply curve, AB. The wage rate must be raised to attract workers beyond  $L_2$ , shown by upward sloping supply curve, BC. For the upward sloping labour supply curve, MIC i.e. DE is higher than the supply curve. The complete MIC curve is ABDE with the vertical line BD showing a mathematical discontinuity connecting AB and DE. The intersection of new MIC and MRP determines the new number of labour hours,  $L_3$  and wage rate,  $W_T$ . Thus, intervention by a trade union wins both an increase in the wage rate and employment opportunities.

### Powers of trade union

A trade union is more likely to win higher wages for its members when:

- The economy is booming and businesses are growing
- Substituting labour with capital is difficult

- Trade unions have the support and representation of a majority of workers
- Demand for firm's product is price inelastic
- The firm faces lower competition, both domestically and internationally
- Labour costs are a small proportion of total costs
- The firm is a monopsony
- The government is following a flexible exchange rate system
- Weak national currency

Where labor costs constitute a small proportion of total costs, for instance in capital intensive industries like shipbuilding, higher wages don't have a significant impact on the firm's budget. This "importance of being unimportant" enables worker to command higher wages.

## Wage Differentials

Wage differentials are a pervasive phenomenon in our everyday lives. We may be forced to wonder why a stock market analyst earns a higher salary than a school teacher or a nurse, who can save a human life is paid less than an accountant. Showbiz celebrities, football and tennis players, rock stars etc all earn unusually higher salaries than people working in other occupations. Wage differentials may very often base themselves on discrimination, with females being paid relatively lower salaries than male counterparts and white Americans enjoying higher pays and benefits than Blacks and Hispanics. We would thus want to explore what explains these occupational, gender and ethnic wage differentials?

The answer, to some extent, lies in the MRP theory. Demand for labour is a derived demand i.e. we don't demand labour but the goods and services it helps to produce. Any increase in the demand for goods and services raises the demand for workers and hence their wages. Marginal Revenue Product (MRP), the product of sale price and Marginal Product shows the demand for labour. Workers whose products can fetch a higher price in the market have higher MRP, higher demand and hence higher wages. For example, tickets for a famous rockstar's concert sell at a higher price, enabling him to command a higher fee for his performance. Likewise, workers with a higher Marginal Product also have a higher MRP and higher wages. In the given example, Marginal Product of a rock star is high since very few people possess the talent and ability to entertain people. By virtue of this innate ability, the number of successful rock stars is automatically restricted leading to higher MP, higher MRP, higher demand and higher wages.

However, other factors like trade unions, government regulations, non financial incentives and learning opportunities for workers etc also play a role in wage determination. Wage differentials between men and women may exist for a host of reasons as specified below:

- Women cannot take up highly rewarding jobs involving long working hours and excessive traveling. This decreases the average wage earned by female workers.
- Women may have to exit the labor market while developing their families, thus losing out years of work experience and earning lower wages on re entry.
- Women usually don't join trade unions and this reduces their average wage.
- Women prefer part time job opportunities, resulting in lower average wages for them.



## Economic Rent

Economic rent refers to the payment made to a factor of production over and above the minimum payment required by it to stay in its current use. The latter equals the earning possible from the next best occupation, also known as the opportunity cost or transfer earning.

Economic rent may thus be defined as the excess of actual payment made to a production factor over and above transfer earning.

$$\text{Economic rent} = \text{Actual payment} - \text{transfer earning}$$

Economic rent possesses three key characteristics: it arises due to scarcity, it is a surplus payment and marginal input does not yield any economic rent. The following discussion explores how different factors of production-land, labour and capital earn economic rent.

### Land

Assume that a farmer may grow either wheat or rice on the land he possesses. The table below shows the output of wheat obtained for different pieces of land:

Piece of land	A	B	C	D	E
Output (wheat) tones	100	80	60	40	20

The opportunity cost of growing wheat is the forgone output of rice. Market prices of both wheat and rice are assumed to be the same. Assuming that the farmer could have obtained 40 tones of rice the opportunity cost of using land for growing wheat is 40 tones of rice. A, B and C yield more output if used for growing wheat whereas E is more suited to rice production. E is 'marginal land' and does not yield a 'surplus', hence it may be used for growing either wheat or rice. A, B and C generate economic rent i.e. they produce a surplus over and above the opportunity cost equaling 60 tones (100 – 40), 40 tones (80 – 40) and 20 tones (60 – 40) respectively. Increase in the price of wheat increases economic rent whereas increased price of rice lowers it.

### Labour

The following table shows quantities of labour hours workers are willing to supply at different wage rates.

No of labour hours (L)	1	2	3	4	5
Wage rate (w) Rs.	100	110	120	130	140

First labour hour will only be supplied if wage equals Rs.100 and the minimum payment needed to supply 2<sup>nd</sup> labour hour is Rs. 110. Assuming the firm hires 4 labour hours at an hourly wage rate of Rs.140, the economic rent produced by different labour hours is given as:

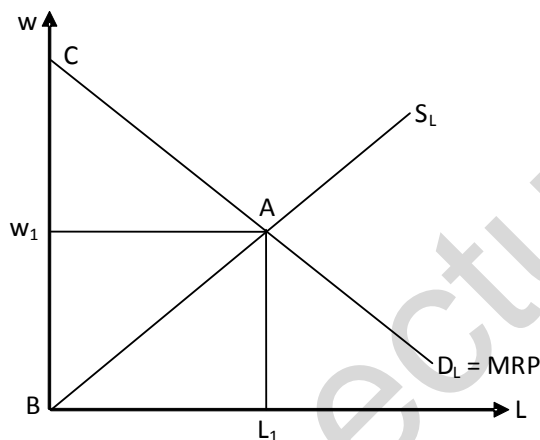
Labour hours	1	2	3	4	5
Actual wage	140	140	140	140	140
Transfer earning	100	110	120	130	140
Economic rent	40	30	20	10	0

Diagram 17.4 is a graphical representation of economic rent where the firm employs  $L_1$  labour hours at wage rate,  $W_1$ . The total payment made to hire all labour hours equals  $W_1AL_1B$  (i.e. wage rate  $w_1$  times labour hours  $L_1$ ). Height of the supply shows the minimum acceptable payment needed by workers, therefore, the entire area below the supply curve upto  $L_1$  number of labour hours ( $ABL_1$ ) shows total transfer earnings. The difference between actual payments made

to workers ( $W_1AL_1B$ ) and transfer earnings ( $ABL_1$ ) gives economic rent i.e. area  $W_1AB$ . Economic rent is thus given by the area below wage and above supply curve.

The height of the demand curve for labour shows Marginal revenue product (MRP), additional revenue generated from hiring an extra labour input. The firm hires workers as long as their contribution to revenues exceeds the costs of employing them (i.e. MRP exceeds MIC). Thus, the minimum requirement from a firm's point of view for hiring an extra labour input is the wage rate paid (i.e. equal to MIC if more workers are employed at the same wage). The excess of MRP over wage is firm's surplus which it may use to hire other factors of production. Area below demand curve and above wage rate is buyers' or consumers' surplus. This is given by  $CW_1A$  in diagram 17.4.

Diagram 17.4



**Price elasticity of supply and Economic Rent**

As stated earlier, economic rent arises due to scarcity in factors of production. Thus, factors with a low price elasticity of supply, PES are more likely to earn economic rent. Diagram 17.5(a) shows a straight horizontal supply curve or perfectly price elastic supply and 17.5(b) shows a straight vertical line exhibiting perfectly price inelastic supply.

Diagram 17.5(a)

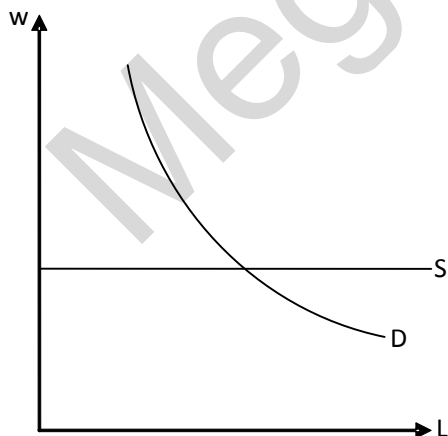
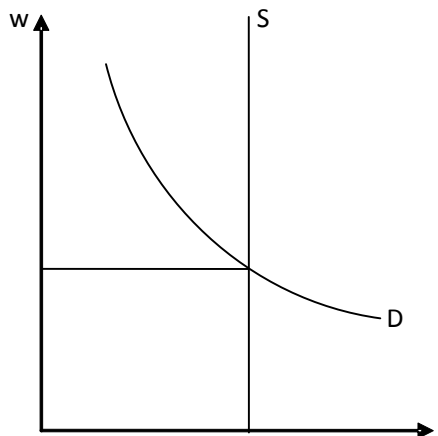


Diagram 17.5(b)



Even a marginal decrease in wages in diagram 17.5(a) forces all workers to leave the labour market. In this case, payment earned by workers exactly equals their transfer earnings and economic rent is zero. In diagram 17.5(b), workers continue to supply the same number of labour hours irrespective of the wage offered. Thus, transfer earnings are zero and economic rent is maximized equaling the entire actual payment. It is thus concluded that economic rent is lower for production factors whose supply is price elastic.

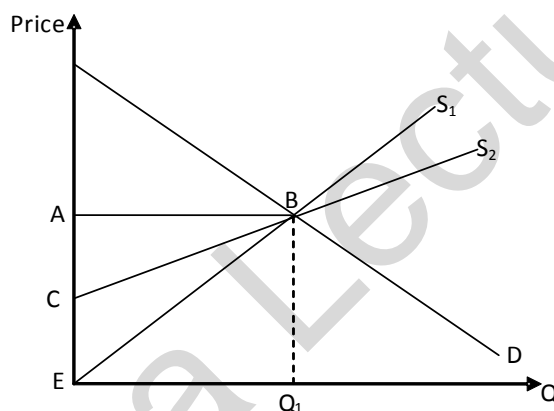
**Economic Rent (Short Run v/s Long Run)**

As more options and substitutes can be developed in the long run, elasticity of supply increases in the long run and decreases economic rent. For example, a doctor may earn economic rent in the short run by opening his clinic in a small town but entry by competitors i.e. springing up of other clinics in the long run reduces his ability to earn rents.

Diagram 17.6 compares economic rent in the short and long run. Supply curve  $S_1$  is the short run supply curve, steeper than the long run supply curve,  $S_2$ . Economic rent decreases from ABE to ABC and transfer earnings increase from  $BEQ_1$  to  $BCEQ_1$  in the long run.

The portion of economic rent which becomes transfer earning in the long run is termed Quasi Rent. Put differently, Quasi Rent is that portion of economic rent which can only be earned in the short run. This is shown by EBC in diagram 17.6.

Diagram 17.6



Given that the minimum requirement for a firm to continue operating in the long run is normal profit, it can be said that transfer earnings are the same as normal profit and super-normal profit is economic rent.

A monopoly can earn economic rent in the long run because entry of new firms is impossible whereas economic rent disappears for perfectly and monopolistically competitive firms in the long run.

Students are encouraged to prepare following essays:

J/02/4/05	J/05/4/02	N/08/4/05	J/10/42/04
J/03/4/03	N/05/4/03	J/09/4/03	N/10/42/04
N/03/4/03	J/06/4/07	N/09/41/04	N/10/43/04
J/04/4/04	J/07/4/03	N/09/42/03	
N/04/4/04	J/08/4/08	J/10/41/04	

### Multiple Choice Questions (Section 17)

N/03/3/06

1 To increase the labour force from 30 to 31 workers, an entrepreneur is forced to increase the daily wage rate from \$40 to \$42.

What is the marginal cost of labour per day?

- A \$2                      B \$42                      C \$62                      D \$102

J/04/3/04

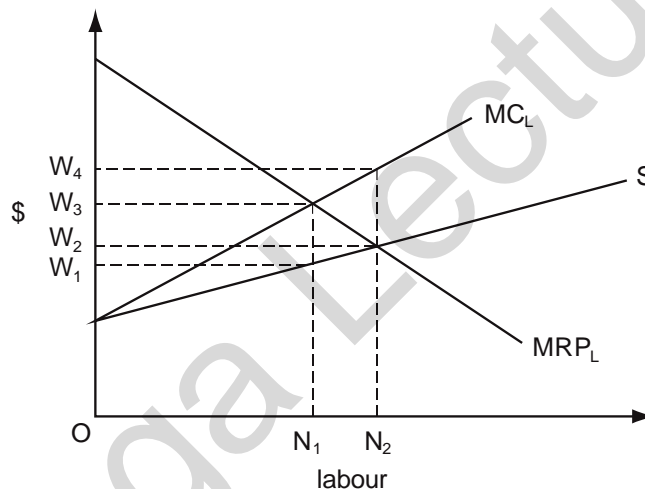
2 To increase its labour force from 50 to 51 workers, a firm has to increase the daily wage rate from \$600 to \$610.

What is the marginal cost of labour per day?

- A \$10                      B \$510                      C \$610                      D \$1110

J/04/3/06

3 In the diagram,  $MRP_L$  is a firm's marginal revenue product of labour curve,  $S$  is its supply of labour curve, and  $MCL$  its marginal cost of labour curve.



Assuming profit maximisation, how many workers will the firm employ and what wage will it pay?

	Number employed	Wage
A	$N_1$	$W_3$
B	$N_1$	$W_1$
C	$N_2$	$W_2$
D	$N_2$	$W_1$

N/08/3/05

4 A firm currently employs 30 workers at a daily wage rate of \$40. It calculates that the marginal cost per day of hiring an additional worker would be \$102. By how much would the daily wage rate have to be increased to attract an extra worker?

- A \$2                      B \$42                      C \$62                      D \$102

J/09/3/04

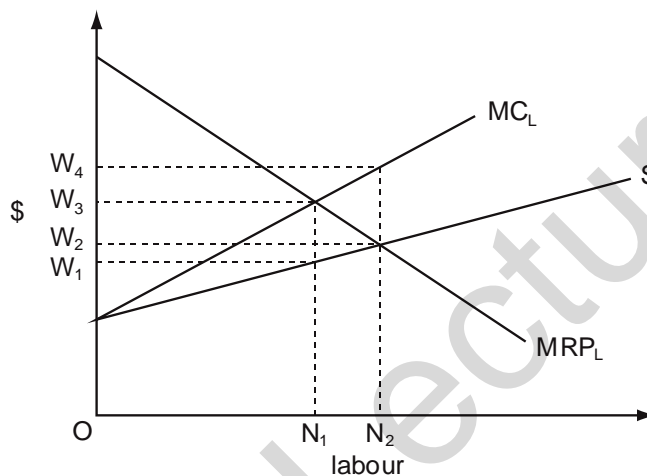
5 To increase its labour force from 100 to 101 workers, a firm has to increase its daily wage rate from \$400 to \$405.

What is the marginal cost of labour per day?

- A \$5
- B \$405
- C \$905
- D \$40 905

N/09/3/05

6 In the diagram, MRPL is a firm's marginal revenue product of labour curve, S is its supply of labour curve, and MCL its marginal cost of labour curve.



Assuming profit maximisation, how many workers will the firm employ and what wage will it pay?

	number employed	wage
A	N <sub>1</sub>	W <sub>3</sub>
B	N <sub>1</sub>	W <sub>1</sub>
C	N <sub>2</sub>	W <sub>2</sub>
D	N <sub>2</sub>	W <sub>4</sub>

N/10/3/06

7 To increase its labour force from 100 to 101 workers, a firm has to increase the daily wage rate from \$300 to \$302.

What is the marginal cost of labour per day?

- A \$2
- B \$202
- C \$302
- D \$502

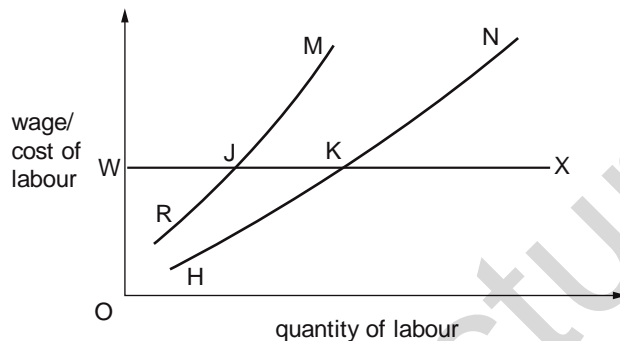
### Trade Unions

J/02/3/07

- 8** The workers in a firm have not previously belonged to a trade union but now join one. In which circumstance is this most likely to raise their wages?
- A** Capital is highly substitutable for labour.
  - B** Labour costs constitute a large fraction of the firm's costs.
  - C** The demand for the firm's product is price-elastic.
  - D** The firm has enjoyed monopsony power in the market for its labour.

N/02/3/04

- 9** In the diagram, HN is the initial supply of labour curve faced by a firm, and RM is its initial marginal cost of labour curve.

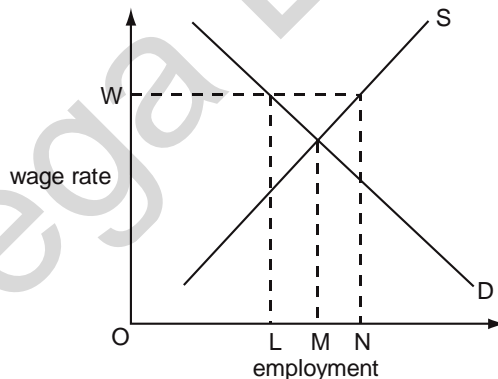


What will be the firm's new labour supply curve, if the workers join a trade union and achieve a union negotiated wage, OW?

- A** RJX
- B** HKX
- C** WJM
- D** WKN

N/03/3/07

- 10** The diagram shows the supply and demand for labour in an industry.



Initially the industry's labour market is in equilibrium.

What effect will the introduction of a minimum wage OW have on the level of employment in the industry?

- A** It will decrease by an amount LM.
- B** It will decrease by an amount LN.
- C** It will increase by an amount LN.
- D** It will increase by an amount MN.

J/05/3/05

11 When would a trade union be **most** likely to secure a wage rise for its members?

- A when labour costs are a small proportion of total costs
- B when the demand for the product is price-elastic
- C when there are a large number of small producers
- D when the supply of labour is elastic

N/05/3/07

12 A trade union seeks to increase the wages that a firm pays to its workers while at the same time preserving jobs.  
What will strengthen the union's negotiating position?

- A Capital and labour are perfect substitutes.
- B The firm operates in a competitive market.
- C The demand for the good produced by the firm is price-inelastic.
- D The supply of labour to the firm is perfectly elastic.

J/06/3/04

13 In which situation is it likely that the demand for labour would be inelastic?

- A Labour and capital are close substitutes.
- B Labour costs are only a small proportion of total costs.
- C Demand for the final product that the labour produces is elastic.
- D A large quantity of unemployed labour is available in the economy.

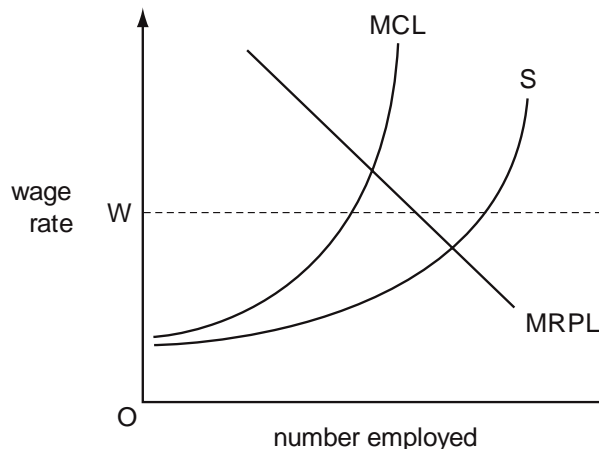
J/06/3/15

14 The introduction of a minimum hourly wage for all workers over 21 years of age is expected to increase the average wages of these workers.  
What will be the likely effect on workers under 21?

	unemployment for under 21s	average wages for under 21s
A	falls	fall
B	rises	fall
C	falls	rise
D	rises	rise

J/07/3/07

15 In the diagram, S is a monopsonist's supply of labour curve, MCL its marginal cost of labour curve and MRPL its marginal revenue product of labour curve.

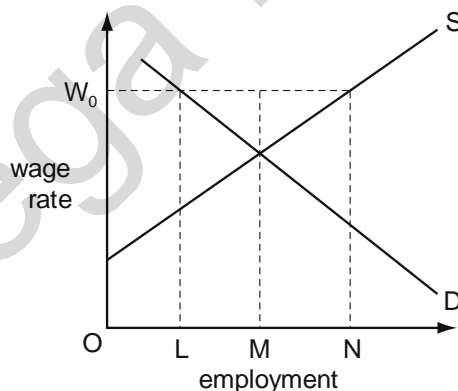


The firm's workers join a trade union which negotiates a wage rate,  $OW$ , with the firm's owners.  
What will be the effect on the firm's total wage bill and on the number of workers employed?

	Total wage bill	Number employed
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	increase
<b>D</b>	decrease	decrease

N/07/3/06

16 The diagram shows an industry's demand for and supply of labour.



Initially the labour market is in equilibrium. The workers then form a trade union which negotiates a wage equal to  $OW_0$  with the employers.

What will be the effect on the level of employment in the industry?

- A** an increase equal to  $MN$       **B** an increase equal to  $LM$   
**C** a decrease equal to  $LN$       **D** a decrease equal to  $LM$



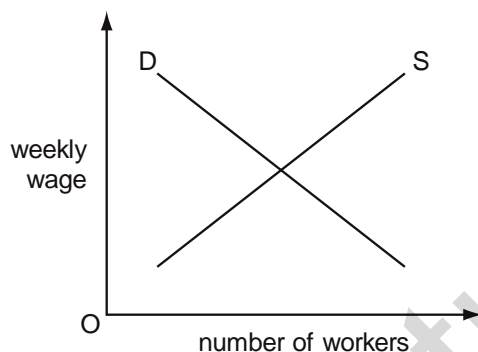
N/08/3/06

**17** In which circumstances is a trade union most likely to be successful in raising wage rates?

- A** The demand for the good produced is price-elastic.
- B** The industry faces substantial foreign competition.
- C** The industry's cost structure is capital-intensive.
- D** The workers are unskilled.

N/09/3/07

**18** The diagram shows the initial position of a labour market.



The government introduces a law reducing the statutory working week from 39 hours to 36 hours.

How will this affect the supply and demand curves in the diagram?

	employers' demand curve	workers' supply curve
<b>A</b>	shifts to right	shifts to left
<b>B</b>	shifts to right	shifts to right
<b>C</b>	shifts to left	shifts to left
<b>D</b>	shifts to left	shifts to right

J/10/3/05

**19** A firm's workers join a trade union which negotiates an increase in the workers' wage rate.

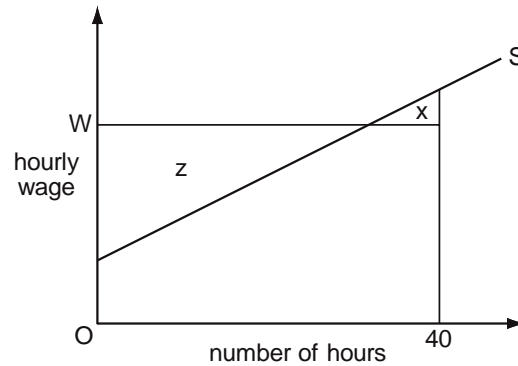
The increase in the wage rate results in an increase in the number employed by the firm. What could explain this?

- A** The demand for the firm's product is price-elastic.
- B** The firm is a monopsonist within its local labour market.
- C** The firm operates in a perfectly competitive labour market.
- D** There is a high degree of substitutability between capital and labour.

**Wage Differentials  
Economic Rent**

N/04/3/08

**20** The diagram shows an individual worker's supply curve of labour.

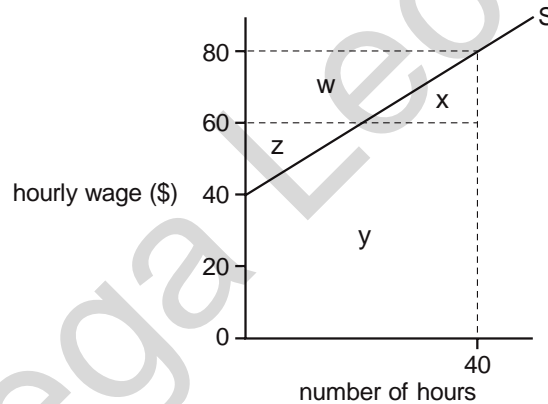


The hourly wage is OW and the worker is required to work a standard 40-hour week. Which area measures the difference between the total amount the worker is paid per week and the minimum amount he would be willing to accept?

- A** x                      **B** z                      **C** x + z                      **D** z - x

J/07/3/06

**21** The diagram shows an individual's supply of labour curve.



He is offered a job which would require him to work a standard 40-hour week. Which area measures the lowest amount he would have to be paid per week to get him to accept this job offer?

- A** w + z                      **B** x + y                      **C** x + y - z                      **D** w + x + z + y

J/08/3/05

**22** The government imposes a maximum earnings limit on recording artists. What must result in the short run if the measure is effective?

- A** a decrease in the economic rent earned by recording artists  
**B** a decrease in the transfer earnings of recording artists  
**C** a decrease in the supply of recording artists  
**D** a decrease in the profits of record companies

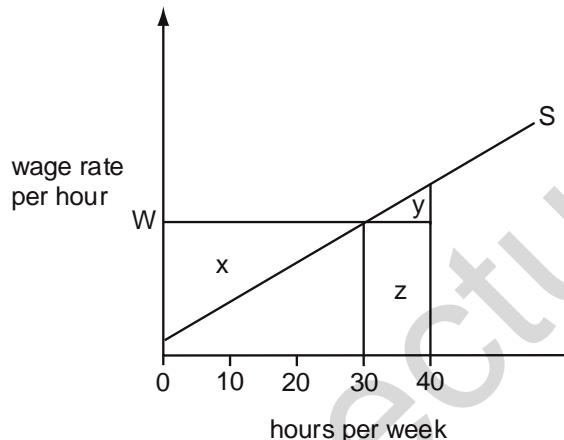
N/09/3/06

**23** What is an example of a wage differential that compensates for the disadvantages associated with particular jobs?

- A** male workers earning more than female workers in the same job
- B** the tendency for wage rates negotiated by trade unions to exceed those for non-unionised labour
- C** labourers on off-shore oil rigs earning more than those employed on-shore
- D** government office workers being paid more than private sector office workers

N/10/3/07

**24** The diagram shows a worker's supply of labour curve.



The worker is required to work a minimum of 40 hours a week at the hourly wage,  $0W$ . Which area measures the economic rent obtained by the worker?

- A**  $x - y$
- B**  $x + y$
- C**  $y - x$
- D**  $y + z$

N/11/32/05

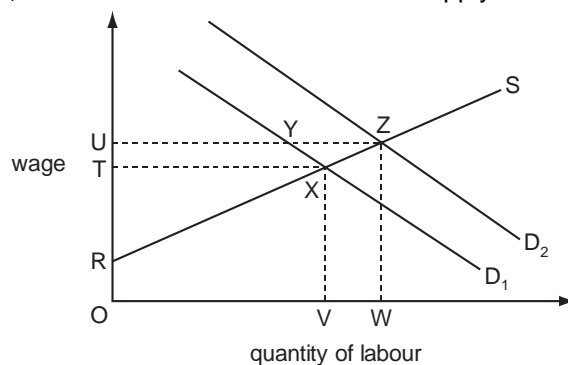
**25** An actor is paid \$100 000 a year. The next best paid job he could get is as a lecturer at \$60 000 a year.

What are his transfer earnings and his economic rent?

	transfer earnings	economic rent
<b>A</b>	\$60 000	\$40 000
<b>B</b>	\$60 000	zero
<b>C</b>	\$40 000	\$60 000
<b>D</b>	\$40 000	zero

N/12/32/06

**26** In the diagram  $D_1$  and  $S$  are the initial demand and supply curves for building workers.

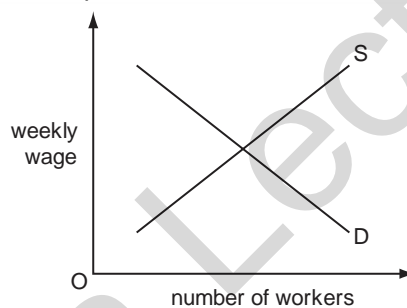


If the demand for building workers increases to  $D_2$  by how much does the economic rent earned by building workers rise?

- A** RZU      **B** TXZU      **C** VWZX      **D** XZY

N/13/32/05

**27** The diagram shows the initial position of a labour market.



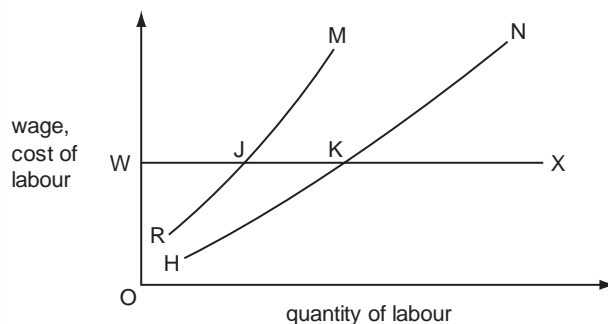
The government increases the number of statutory paid holidays to which workers are entitled from 10 days a year to 15 days a year.

How will this affect the supply and demand curves in the diagram?

	employers' demand curve	workers' supply curve
<b>A</b>	shifts to left	shifts to right
<b>B</b>	shifts to left	shifts to left
<b>C</b>	shifts to right	shifts to right
<b>D</b>	shifts to right	shifts to left

N/13/32/06

**28** In the diagram, HN is the initial supply of labour curve faced by a firm, and RM is its initial marginal cost of labour curve.



What will be the firm's new labour supply curve, if the workers join a trade union and achieve a union negotiated wage, OW?

- A** RJX                      **B** HKX                      **C** WJM                      **D** WKN

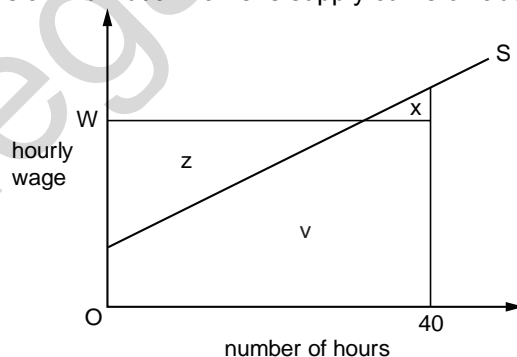
J/14/32/06

**29** In 2004 union officials and businessmen in Argentina agreed to increase the minimum wage from 350 to 450 pesos. In which circumstances would such a rise increase employment?

- A** Investment increases at a more rapid rate than consumption.  
**B** Labour and product markets are competitive.  
**C** The higher wage rate produces a proportionately greater rise in labour productivity.  
**D** The minimum wage is set above the equilibrium level.

J/14/32/08

**30** The diagram shows an individual worker's supply curve of labour.

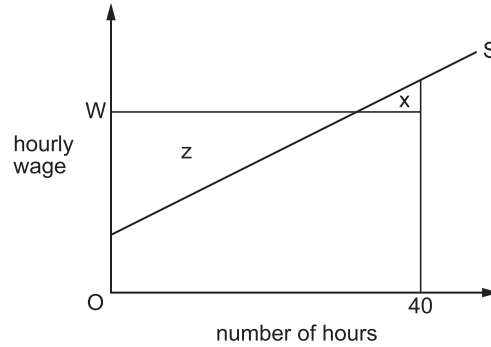


The hourly wage is W and the worker is required to work a standard 40-hour week. Which area measures the minimum amount per week he would be willing to accept?

- A** v                      **B** v + x                      **C** v - x                      **D** z - x

N/14/32/06

**31** The diagram shows an individual worker's supply curve of labour.



The hourly wage is  $W$  and the worker is required to work a standard 40-hour week. Which area measures the net improvement in the worker's welfare if he were allowed to choose the number of hours he wished to work per week?

- A**  $x$                       **B**  $z - x$                       **C**  $z + x$                       **D**  $z$

N/14/32/07

**32** A firm's workers join a trade union which negotiates an increase in the workers' wage rate.

The increase in the wage rate results in an increase in the number employed by the firm. What could explain this?

- A** The demand for the firm's product is price-elastic.  
**B** The firm is a monopsonist within its local labour market.  
**C** The firm operates in a perfectly competitive labour market.  
**D** There is a high degree of substitutability between capital and labour.

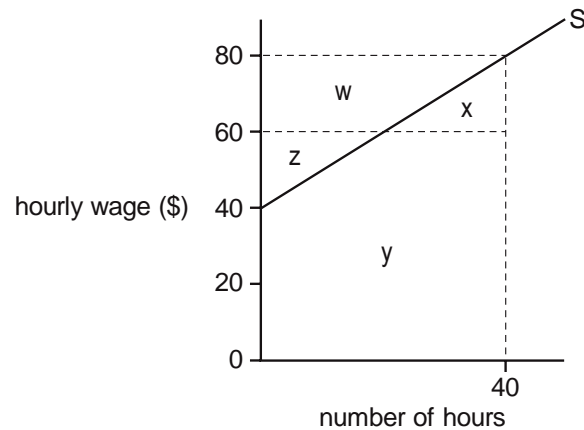
N/14/32/16

**33** The introduction of a minimum hourly wage for all workers over 21 years of age is expected to increase the average wages of these workers. What will be the likely effect on workers under 21?

	unemployment for under 21s	average wages for under 21s
<b>A</b>	falls	fall
<b>B</b>	falls	rise
<b>C</b>	rises	fall
<b>D</b>	rises	rise

J/15/32/06

34 The diagram shows an individual's supply of labour curve.



He is offered a job which would require him to work a standard 40-hour week. Which area measures the lowest amount he would have to be paid per week to get him to accept this job offer?

- A  $w + z$     B  $x + y$     C  $x + y - z$     D  $w + x + z + y$

J/15/32/15

35 The government introduces a minimum wage above the equilibrium market wage rate. How will this affect low-paid workers?

- A All those initially in employment will receive the new guaranteed minimum wage.  
B Fewer of those not already in employment will enter the labour force.  
C There will be an increase in the number of low-paid workers in employment.  
D Some low-paid workers will lose their job.

N/15/32/04

36 What will result from the differences in the non-pecuniary advantages of various occupations?

- A disequilibrium in the labour market  
B long-term differentials in wage rates  
C monopsony in particular labour markets  
D shortages of labour in particular occupations

N/15/32/06

**37** A firm currently pays its employees on an hourly basis. Even though the management acknowledges that its employees work to the best of their ability and could not work any harder, the firm decides to switch to a piece-rate system of remuneration whereby the wage paid to each employee depends on their level of output. Why might this new system of remuneration result in a significant improvement in labour productivity?

- A** It will dispense with the need for management to monitor the actions of its employees.
- B** It will increase the losses that workers will incur if they are dismissed for not working hard enough.
- C** It will lead to the recruitment and retention of more highly talented workers.
- D** It will strengthen the incentives for workers to increase their earnings.

N/15/32/07

**38** A fashion model is paid \$500 000 a year. If the next best paid job he could get is as a teacher at \$100 000 a year, what are his transfer earnings and his economic rent?

	transfer earnings \$	economic rent \$
<b>A</b>	zero	400 000
<b>B</b>	100 000	400 000
<b>C</b>	400 000	zero
<b>D</b>	400 000	100 000



## Section: 18 National Income Accounting

National income statistics are of crucial importance in helping governments plan for the future, identify required changes in policies, ascertain overall growth rates and those in different sectors of the economy and compare them with previous years and other countries. National income may be calculated employing any of the following methods:

- (i) Expenditure method
- (ii) Income method
- (iii) Output method

(i) **Expenditure method:** All expenditures incurred within the geographical borders of a country during a year's time are added up to measure national income. These include consumer expenditures (C), investment expenditures (I), government expenditures (G) and export revenues (X) (less import expenditures, M).

(ii) **Income method:** This approach calls for adding up incomes earned by all production factors in a country in a certain year i.e. wages, interest, rent and profits. Wages also include salaries, fees, commissions and royalties paid to labour against their contribution towards production. Interest payments are payments received on bank deposits and from other interest bearing financial documents. Rent is income from immovable property and profits include those of sole proprietorships, partnerships, limited companies and the public sector i.e. government owned businesses.

(iii) **Output method:** National income is calculated by adding up the market value of all goods and services produced in a country within a year's time. Double counting is avoided by counting 'value added' portions only so that the value of a product is not included in national income statistics more than once. Alternatively, only the market value of the final product is taken into consideration.

Consider the example of cotton bales that pass through several stages (conversion to yarn, grey cloth and cloth) before getting converted into a shirt. Assume that cotton bale is valued at \$20, yarn at \$100 (value addition worth \$80) and grey cloth at \$260 (value addition of \$160). National income is determined by adding up the value added portions only:  $\$20 + \$80 + \$160$  i.e. \$260, instead of adding up \$20, \$100 and \$260.

There may exist differences between the incomes calculated through expenditure and income approaches which are discussed in greater detail below.

### Gross Domestic Product (GDP)

Gross Domestic Product is the total value of final goods and services produced within a territorial boundary over a period of time.

Consumers' (C), investment (I) and Government (G) expenditures together show expenditures by a country's citizens on the goods and services produced within it. This figure could equal Gross Domestic Product (GDP) for a completely closed economy. A close economy is one which does not allow free movement of goods and services across borders- net exports i.e. export revenues less import expenditures are zero. Open economies on the other hand, allow free and unrestricted movements of goods and services. For such economies, export revenues i.e.

foreigners' expenditures on locally made goods are included in National Income and import expenditures are excluded.

However, all expenditure components could have a portion relating to imports. Consumers for instance, spend a portion of their income on buying imported items such as automobiles, cosmetics, cellular phones, tinned food items etc. Investment by firms may also focus on imported machinery and equipment. Governments such as that of Pakistan spend a hefty amount on importing a variety of significant items like defence equipment. Even exported items may have much to do with imports, in the form of raw materials, oil etc. Import expenditures are therefore deducted to arrive at an accurate figure for Gross Domestic Product (GDP).

$$\begin{array}{l} \text{Consumers' expenditures (C)} \\ + \text{Gross investment expenditures (I)} \\ + \text{Government expenditures (G)} \\ + \text{Export revenues (X)} \\ - \text{Import expenditures (M)} \\ \hline \text{Gross Domestic Product (GDP)} \end{array}$$

### Gross National Product (GNP)

It is common that a country's factors of production get employed in production activities outside its borders e.g. many Pakistani labourers successfully find work elsewhere, say in the United States or East Asian economies. Foreign remittances (or property income) i.e. income remitted by these workers to their families in Pakistan is not included in GDP as it is not earned from domestic production activities. However, since such income streams are generated by a country's own citizens, they are included in Gross National Product (GNP).

Property income includes salaries and wages, interest payments on bonds and foreign bank deposits, rent on properties and dividends and profits from business activities carried out in other countries. However, gross values for property income lead to imprecise results- they must be netted off so that property income sent abroad from the home country is also accounted for. A positive figure for net property income indicates that Pakistani residents receive more profits from assets owned in other countries, than overseas residents receive from assets they own in Pakistan. Gross National Product could be smaller than Gross Domestic Product in case net property income is negative.

$$\begin{array}{l} \text{Gross Domestic Product (GDP)} \\ + \text{Net property income} \\ \hline \text{Gross National Product (GNP)} \end{array}$$

Gross National Product therefore captures incomes accruing to a country's factors of production from production activities performed within or outside its geographical borders.

### Net National Product (NNP)

Capital goods such as machinery and plant have a finite life and must be replaced after few years. Depreciation is an accounting method which spreads the cost of an asset over its useful life e.g. assets whose expected useful life is five years lose 20% of their value after one year, 40% after 2 years and 60% after 3 years. Simply put, depreciation is the value of capital goods consumed and therefore, a non-cash expense- unlike other expenses, it does not become anyone's income. This is why it is deducted from GNP while measuring national Income through the income approach. Net National Product (NNP) is Gross National Product (GNP) less depreciation (capital consumption).

Whereas gross investment captures investment expenditures in full (Ig), net Investment (In) is the net addition in a country's capital stock i.e. it is obtained after a depreciation allowance (R) from Gross Investment.

**Example:** Assume a country possesses 100 machines in capital stock at a year's start, of which 10 are worn out and need replacement. Capital stock remains unchanged (In is zero) if new investments during the year exactly equal 10 machines as both Gross Investment (Ig) and replacement/depreciation (R) are equal. Such an economy neither grows nor declines and is thus static- there is no change in the capital stock of the economy.

Economies grow when gross investment exceeds replacement and net investment is positive. Growth rate is negative when gross investment falls short of replacement and net investment is negative. For such economies, capital stock decreases and the Production Possibility Curve shifts inwards or leftwards.

$$\begin{array}{r} \text{Gross National Product (GNP)} \\ - \text{Capital consumption (Depreciation)} \\ \hline \text{Net National Product (NNP)} \end{array}$$

Net Domestic Product (NDP) is Gross Domestic Product less depreciation

#### NNP at factor cost

Expenditures are measured at market value i.e. prevailing market prices. The market value of a product equals the payments of wages, interest, rent and profit, or the income accruing to factors of production involved in making that good or service. Profits act as a balancing item and are negative (losses) if the market value falls short of the cost incurred on making the product.

However, there may be cases where payments received by factors of production differ from market value. For instance, indirect taxes imposed on expenditures and paid to governments (which are not a factor of production!) are deducted whereas subsidies are added to market value to calculate national income at factor cost. Subsidies are negative indirect taxes and encourage producers to increase production.

$$\begin{array}{r} \text{Net National Income (NNP) at market value} \\ - \text{Indirect taxes} \\ + \text{Subsidies} \\ \hline \text{NNP at factor cost i.e. National Income} \end{array}$$

#### Personal Income

There is a portion of income that is earned but not received e.g. corporate taxes, retained profits, tax deductions at source and social security payments.

Limited companies are recognized by law as having independent legal identities and hence have their incomes taxed, so that taxes are deducted from profits before being distributed among owners. A portion of profit can be retained and reinvested in the business. Thus, corporate taxes (i.e. taxes paid by incorporated businesses such as private and public limited companies) and retained profits are earned but not received by their owners and are hence deducted to calculate Personal Income. Transfer payments such as pensions, unemployment allowances, old age benefits and social security payments are payments received but not earned. They are excluded from national income as no production activity takes place against such payments.

NNP at factor cost i.e. National Income  
 – Payments earned but not received  
 + Payments received but not earned  
 \_\_\_\_\_  
 Personal Income

**Disposable Income**

Disposable income measures income at the disposal of the person who earns it. Direct taxes (e.g. income taxes) are deducted to calculate disposable income.

Personal Income  
 – Direct taxes  
 \_\_\_\_\_  
 Disposable Income

The following table summarizes the formulas for various types of national income statistics.

Consumers' expenditures (C)  
 + Gross investment expenditures (I)  
 + Government expenditures (G)  
 \_\_\_\_\_  
 Total expenditures incurred domestically  
 + Export revenues (X)  
 – Import expenditures (M)  
 \_\_\_\_\_  
 Gross Domestic Product (GDP)  
 + Net property income  
 \_\_\_\_\_  
 Gross National Product (GNP)  
 – Capital consumption (Depreciation)  
 \_\_\_\_\_  
 Net National Product (NNP) at market value  
 – Indirect taxes  
 + Subsidies  
 \_\_\_\_\_  
 NNP at factor cost i.e. National Income  
 – Payments earned but not received  
 + Payments received but not earned  
 \_\_\_\_\_  
 Personal Income  
 – Direct taxes  
 \_\_\_\_\_  
 Disposable Income

**Real National Income**

Money value of national income shows the market value of goods and services produced in a country whereas real national income is measured in terms of goods and services. Increased price level raises money income but real national income increases only if money income increases at a faster rate than the price level. From an individual's point of view (in micro economics) real income decreases whenever price level rises but changes in price level have no impact on the real income of the economy (i.e. macro economics).

Nominal national income measures national income at current prices and thus takes no account of inflation. Real national income on the other hand, measures national income at constant prices that ruled in some particular year i.e. base year. To discard the element of prices or calculate real income, we need to multiply nominal national income by a GDP deflator, the ratio of price indices of base year and current year.

**Question:** Calculate change in real national income for a country whose money income rises by 10% and price level rises by 4%.

**Answer:** Assuming money income and price level were initially 100, a 10% and 4% increase raises them to 110 and 104 respectively. Base year price level is 100.

$$\begin{aligned}\text{Real income} &= \text{Money income} \times \frac{\text{Price index of base year}}{\text{Price index of current year}} \\ &= 110 \times \frac{100}{104} \\ &= 105.77\end{aligned}$$

Increase in real national income is 5.77% i.e. almost 6%.

### Per Capita Real Income

Per capita real income for a country is obtained by dividing real national income by its total population.

$$\text{Per capita real income} = \frac{\text{Real national income}}{\text{Population}}$$

Per capita real income decreases when increases in population outweigh an increase in real national income. For example, per capita real income falls by 2% if real national income increases by 4% and population, by 6%.

### Difficulties in measuring national income

Calculating national income with precision is an uphill task, particularly for developing countries. Apart from coping with low literacy rates and concealed incomes for tax evasion, countries find it hard to track down and measure non documented or 'informal' economic activities. Large countries with geographically dispersed populations find data collection a lengthy, tedious and time consuming job. Errors, omissions and staff incompetence reduce the accuracy and reliability of national income statistics.

The presence of parallel economy (i.e. illegal trade) understates the figures of national income.

## Multiple Choice Questions (Section 18)

J/02/3/17

- 1 Over a given period, the nominal value of a country's national income increased by 20% and the rate of inflation was 10%.  
Which of the following statements is correct?
- A There was an increase in the volume of output.
  - B There was an increase in the income velocity of circulation.
  - C There was a reduction in the demand for money.
  - D The country's money supply increased by 10%.

N/02/3/14

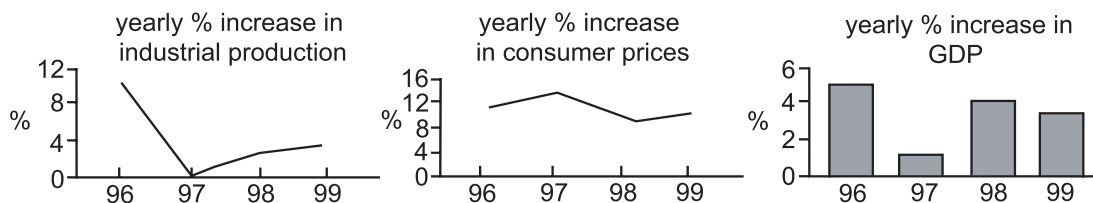
- 2 Assuming that all indexes have 1990 as 100, the national income figures for 2000 at 1990 prices may be obtained by multiplying 2000 national income at current prices by
- A  $\frac{\text{the index for 2000 prices}}{\text{the index for 1990 prices}}$
  - B  $\frac{\text{the index for 2000 prices}}{\text{the index for 1990 output}}$
  - C  $\frac{\text{the index for 1990 output}}{\text{the index for 2000 output}}$
  - D  $\frac{\text{the index for 1990 prices}}{\text{the index for 2000 prices}}$

N/02/3/15

- 3 During a year, a country's national income in money terms increased by 6%, prices increased by 4% and total population increased by 2%.  
What was the approximate change in real income per head?
- A a decrease of 2%
  - B nil
  - C an increase of 2%
  - D an increase of 4%

J/03/3/18

4 The graphs indicate economic performance in a country between 1996 and 1999.



Which conclusion may be drawn from the graphs?

- A Between 1996 and 1997 industrial production and GDP fell but prices rose.
- B Between 1997 and 1998 the rates of growth of industrial production, GDP and prices all increased.
- C GDP and industrial production were at their lowest in 1997.
- D At no time did industrial production, GDP or prices fall.

N/03/3/19

5 Over a given period the nominal value of a country's national income increased by 10% and its value of output by 12%.  
What could explain this?

- A The country's money supply fell by 2%.
- B There was an increase in the income velocity of circulation.
- C There was an increase in the balance of trade deficit.
- D The country's general price level fell by 2%.

N/04/3/18

6 Which of the following will directly result in an increase in China's Gross National Product?

- A increased wages earned in a Malaysian-owned factory in China
- B increased imports of goods and services
- C increased outflows of net property income
- D increased taxes on domestic expenditure

J/05/3/16

7 The information in the table is taken from a country's national income accounts.

	\$ million
national income	500
consumer spending	200
investment spending	75
government spending	150
taxation	140
exports	125

What is the value of imports?

- A \$125 million
- B \$75 million
- C \$50 million
- D \$25 million

N/05/3/16

- 8** Over a given period, money income in an economy increased by 8 %. Over the same period, prices rose on average by 6 %.  
What can be deduced from this?
- A** Real income decreased by 2 %.
  - B** The income velocity of circulation decreased by 2 %.
  - C** The money supply increased by 14 %.
  - D** The volume of output increased by 2 %.

J/06/3/16

- 9** The table gives data for an economy.

	2000	2001	2002	2003	2004
Gross Domestic Product (GDP) at current prices (\$ billion)	200	220	240	300	320
GDP deflator	100	109	118	149	154

In which year did real GDP decline compared with the previous year?

- A** 2001
- B** 2002
- C** 2003
- D** 2004

N/06/3/16

- 10** Over a given period, the nominal value of a country's national income increased by 20 % and the rate of inflation was 10 %.  
Which statement is correct?
- A** There was an increase in the volume of output.
  - B** There was an increase in the income velocity of circulation.
  - C** There was a reduction in the demand for money.
  - D** The country's money supply increased by 10 %.

N/06/3/17

- 11** The table shows data on a country's gross national product at market prices and on domestic spending.

	year 1 (\$m)	year 2 (\$m)	year 3 (\$m)
GNP at market prices	400	480	560
private consumption	200	260	300
government consumption	120	120	140
gross investment	90	80	130

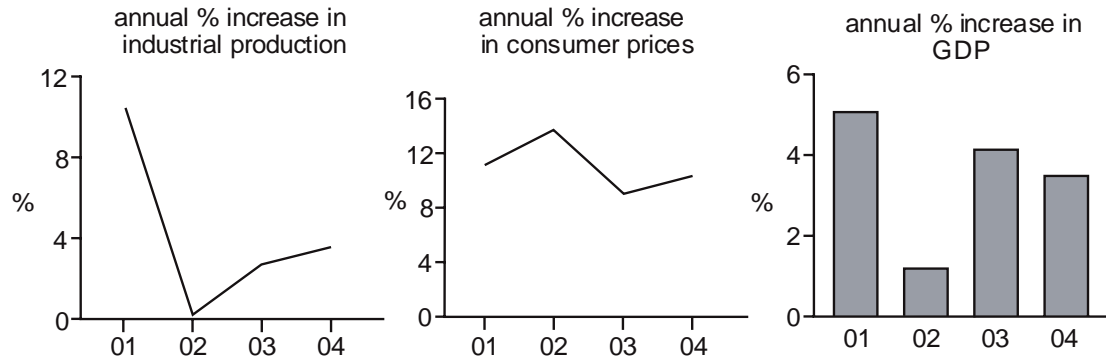
In which of these years will the country be faced with a deficit on the current account of the balance of payments?

	year 1	year 2	year 3
<b>A</b>	✓	✗	✗
<b>B</b>	✗	✓	✓
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✓	✗



J/07/3/18

**12** The graphs indicate economic performance in a country between 2001 and 2004.



Which conclusion may be drawn from the graphs?

- A** Between 2001 and 2002 industrial production and GDP fell but prices rose.
- B** Between 2002 and 2003 the rates of growth of industrial production, GDP and prices all increased.
- C** GDP and industrial production were at their lowest in 2002.
- D** At no time did industrial production, GDP or prices fall.

N/07/3/18

**13** What will directly result in an increase in China's Gross National Product?

- A** increased wages earned in a Malaysian-owned factory in China
- B** increased imports of goods and services
- C** increased outflows of net property income
- D** increased taxes on domestic expenditure

N/07/3/19

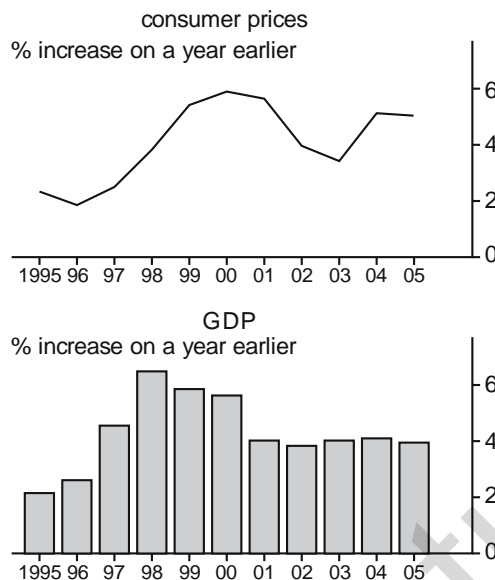
**14** Over a given period, the nominal value of a country's national income increased by 10 % and the average price level increased by 20 %.

What can be deduced from this information?

- A** The country's money supply increased by 10 %.
- B** There was an increase in the income velocity of circulation.
- C** There was a reduction in the demand for money.
- D** There was a reduction in the volume of output.

J/08/3/16

15 The graphs show how consumer prices and real GDP changed in a country between 1995 and 2005.



Which conclusion may be drawn from the graphs?

- A Living standards remained roughly constant between 1995 and 2005.
- B The country experienced continuous economic growth between 1995 and 2005.
- C The level of GDP was lower in 2005 than in 2000.
- D The price level fell between 2000 and 2003.

J/08/3/17

16 During a year, a country's national income in money terms increased by 8 %, prices increased by 4 % and total population increased by 2 %.

What was the approximate change in real income per head?

- A a decrease of 2 %
- B nil
- C an increase of 2 %
- D an increase of 4 %

J/08/3/18

17 The table shows data on a country's gross domestic product at market prices and on domestic spending.

	year 1 (\$m)	year 2 (\$m)	year 3 (\$m)
GDP at market prices	630	650	680
private consumption	480	470	480
government consumption	160	160	150
gross investment	20	30	40

In which of these years will the country be faced with a balance of trade deficit?

	year 1	year 2	year 3
A	no	no	yes
B	yes	yes	no
C	no	yes	yes
D	yes	no	no

J/08/3/26

- 18** The table shows the figures for consumption, capital formation and depreciation in four economies, all measured in US \$.  
 Assuming that the state of technology remains unchanged, which economy is most likely to experience economic growth?

	consumption (\$ m)	capital formation (\$ m)	depreciation (\$ m)
<b>A</b>	100	20	10
<b>B</b>	500	200	200
<b>C</b>	1000	1200	1400
<b>D</b>	20 000	5 000	6 000

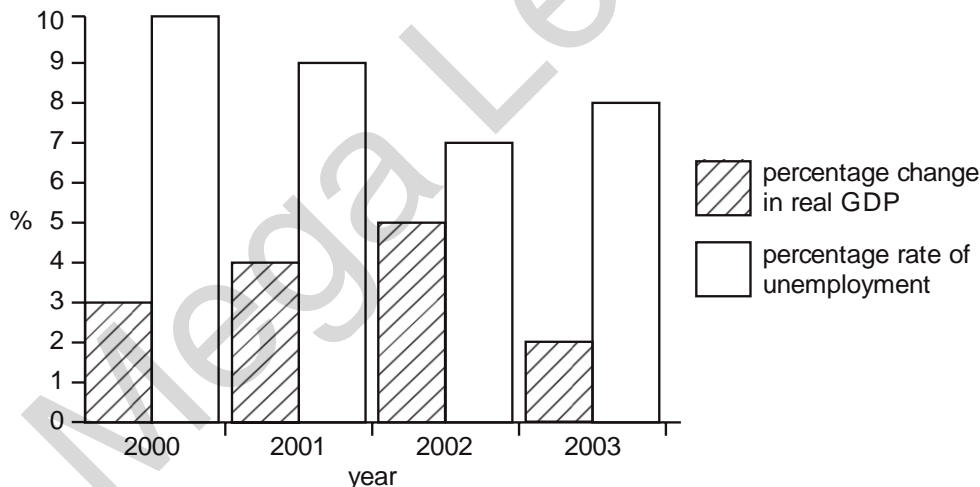
N/08/3/14

- 19** During a year, a country's national income in money terms increased by 6 %, prices increased by 4 % and total population increased by 2 %.  
 What was the approximate change in real income per head?

- A** a decrease of 2 %
- B** nil
- C** an increase of 2 %
- D** an increase of 4 %

N/08/3/26

- 20** The chart shows the rates of economic growth and unemployment in a country for the period 2000 to 2003.



What does the chart show?

- A** Real GDP was lowest in 2003.
- B** The total labour force declined between 2000 and 2002.
- C** The standard of living fell between 2002 and 2003.
- D** The unemployment rate fell when the growth rate increased.

N/09/3/15

21 The information in the table is taken from a country's national income accounts.

	\$ million
national income	600
consumer spending	400
investment spending	80
government spending on goods and services	100
taxation	90
imports	120

What is the value of exports?

- A \$100 million    B \$120 million    C \$140 million    D \$230 million

J/10/3/14

22 Between 2008 and 2009 a country's national income at current prices increased by 15 %.  
At the same time the country experienced 5 % inflation.  
Which index number most closely represents the country's national income in 2009 at 2008 prices (2008 = 100)?

- A 103                      B 110                      C 115                      D 120

J/11/32/13

23 The table shows data on a country's gross national product at market prices and on domestic spending.

	year 1 (\$m)	year 2 (\$m)	year 3 (\$m)
GNP at market prices	420	440	560
private consumption	200	260	300
government consumption	120	120	140
gross investment	90	80	130

In which of these years will the country be faced with a deficit on the current account of the balance of payments?

	year 1	year 2	year 3
A	x	√	√
B	x	√	x
C	√	x	√
D	√	x	x

N/12/32/10

24 What is most likely to be associated with a firm that is growing rapidly?

- A a high rate of labour turnover  
B a low level of net investment  
C a low percentage of profits paid as dividends to shareholders  
D attainment of the necessary conditions for allocative efficiency

N/12/32/16

**25** Over a given period, the nominal value of a country's national income increased by 20 % and the rate of inflation was 10 %.

What can be deduced from this information?

- A** There was an increase in the volume of output.
- B** There was a reduction in the demand for money.
- C** There was an increase in the income velocity of circulation.
- D** The country's money supply increased by 10 %.

J/14/32/16

**26** Over a given period, money income in an economy increased by 6%. Over the same period, prices rose on average by 4%.

What can be deduced from this?

- A** Real income increased by 2%.
- B** The income velocity of circulation decreased by 2%.
- C** The money supply increased by 10%.
- D** The volume of output decreased by 2%.

N/14/32/20

**27** During a year, a country's national income in money terms increased by 8%, total population increased by 2% and real income per head remained constant.

What was the approximate change in the average price level?

- A** a decrease of 4%
- B** an increase of 4%
- C** an increase of 6%
- D** an increase of 10%

## Section: 19 Per Capita Income and Standard of Living

Per capita income estimates reflect living standards, as higher per capita income means greater purchasing power and access to more goods and services. While making cross country comparisons for living standards, it is advisable that per capita Gross National Product (GNP) be relied upon, rather than Net National Product (NNP). This is because different countries employ different methods to calculate depreciation and over or under state NNP in some cases.

National income statistics however, may still not compare living standards truly and fairly across countries due to certain limitations discussed below. Before anything else, it must be borne in mind that measuring national income with accuracy is difficult and hence any estimates of per capita income can not be relied upon.

Per capita income shows the average income of citizens but because it remains silent on issues regarding income distribution, it may not necessarily reflect the 'average' standard of living. The average income of two households, A earning \$50,000 and B earning \$0 is \$25,000 that is, it fails to account for distributional effects. Countries with wide income inequalities have overrated living standards because in reality, majority of the people are poorer than what is reflected by per capita income.

It is useful to analyze the individual components of GNP, rather than the aggregate. For instance, countries spending a greater portion of national income on debt servicing and defense expenses have a poorer standard of living compared to those where greater proportions are consumed by general public or spent by governments on improving law and order and building infrastructure.

Imports are deducted from national income, but countries with trade deficits (exports falling short of imports) experience better current living standards as they have access to a greater amount of good and services than what they produce. Countries importing machinery, equipment and other capital goods may be sacrificing existing quality of life but experience rapid economic growth and a better standard of living in future years.

Traditional exchange rates are determined by the flow of tradable commodities i.e. exports and imports only. Purchasing power parity theory however, determines exchange rates considering the flow of not just tradable commodities but also non-tradable commodities. Non-tradable commodities such as a hair cut, car repair, dentist's treatment and all services which are provided at an arm's length distance are cheaper in developing countries. The exchange rate moves favourably for developing countries, once non-tradable commodities are also included in exchange rate calculations. Per capita income is usually expressed in US dollars for comparison between different countries. Using purchasing power parity theory to express per capita income in place of traditional exchange rate improves the figure for developing countries. Determining exchange rates this way better reflects the buying potential and hence standard of living. According to the estimates in *The Economist (The World in 2009)* the forecast per capita income of a Pakistani citizen is \$900 when measured using traditional exchange rates and \$2780 using Purchasing Power Parity!

Better law and order conditions resulting in lower crime rate, political and economic stability, access to health and educational services, freedom of expression and speech, entertainment opportunities, supremacy of law, justice and good governance also contribute positively to standard of living but are not covered by per capita income.

Alternatively, standard of living may be measured using Net Economic Welfare (NEW) or the Human Development Index (HDI).

There is no denying the fact that countries whose citizens work for fewer hours and have more leisure time enjoy better living standards than those whose people work for longer hours to earn the same amount of income. Likewise, people living in countries with healthier, cleaner environments experience a better standard of living than those forced to live in polluted and congested areas. Net Economic Welfare (NEW) adds factors to per capita income which improve standard of living such as leisure time and deducts factors that reduce quality of life e.g. negative externalities arising from polluted environments.

NEW: per capita income + leisure – negative externalities

One may still be forced to employ per capita income as an indicator of living standards rather than NEW as assigning exact monetary values to leisure time and negative externalities is a difficult task.

As stated earlier, standard of living may also be measured using the Human Development Index (HDI). Human Development Index measures national socioeconomic development based on measures of life expectancy at birth, educational attainment and adjusted real per capita income. Developed economies where most of the people have access to better educational opportunities and medical care are likely to have a better standard of living than reflected by per capita income.

## Poverty Trap

A mechanism which makes it very difficult for people to escape poverty. A poverty trap is created when an economic system or an individual lacks various forms of capital and resources to escape poverty.

In order to escape the poverty trap, it is argued that individuals in poverty must be given sufficient aid so that they can acquire the critical mass of capital necessary to raise themselves out of poverty and break the vicious cycle of poverty. This theory of poverty helps to explain why certain aid programs which do not provide a high enough level of support may be ineffective at raising individuals from poverty.

## Intergenerational Equity

Intergenerational equity is a concept that says that humans 'hold the natural and cultural environment of the Earth in common both with other members of the present generation and with other generations, past and future. It means that we inherit the Earth from previous generations and have an obligation to pass it on in reasonable condition to future generations.

The idea behind not reducing the ability of future generations to meet their needs is that, although future generations might gain from economic progress, those gains might be more than offset by environmental deterioration. Most people would acknowledge a moral obligation to future generations, particularly as people who are not yet born can have no say in decisions taken today that may affect them.

There are two different ways of looking at the need to ensure that future generations can supply their needs. One is to view the environment in terms of the natural resources or natural capital that is available for wealth creation, and to say that future generations should have the same ability to create wealth as we have. Therefore, future generations will be adequately

compensated for any loss of environmental amenity by having alternative sources of wealth creation. This is referred to as 'weak sustainability'.

During the late 1960s, many economists began to question the over-reliance of governments and agencies on narrow, exclusively GDP-based, measures of economic welfare. It was at this time that the adverse environmental effects of uncontrolled economic growth began to be considered, prompting the search for a wider measure of welfare, not exclusively based on raw GDP figures.

### **Net Economic Welfare (NEW)**

NEW took national output as a starting point, but adjusted it to include an assessment of the value of leisure time and the amount of unpaid work in an economy, hence increasing the welfare value of GDP. They also included the value of the environment damage caused by industrial production and consumption, which reduced the welfare value of GDP. NEW can be seen as the forerunner of later attempts to create a sophisticated index of sustainable development.

### **An Introduction of BRICS**

The BRICS, made up of Brazil, China, India, Russia, and South Africa, are characterized by rapidly growing economies and increasing international influence. With over 40 percent of the world's population, these countries' combined output constitutes more than 20 percent of global GDP. Economists predict that Brazil, China, India, and Russia will join the United States as the five largest economies in the world by 2050.

### **Human Poverty Index**

The United Nations has for some time constructed human poverty indices for developing countries. A recent innovation has been the publication of a new Human Poverty Index (HPI-2) measures poverty in industrial countries. The composite measure focuses on economic deprivation in three separate dimensions:

*% of people likely to die before the age of 60*

*% of people whose ability to read and write is far from adequate*

*proportion of the population with disposable incomes of less than 50% of the medium*

*proportion of long term unemployed (12 months or more)*

### **Multidimensional Poverty Index (MPI)**

The global Multidimensional Poverty Index (MPI) is an international measure of acute poverty covering over 100 developing countries. It complements traditional income-based poverty measures by capturing the severe deprivations that each person faces at the same time with respect to education, health and living standards.

The MPI assesses poverty at the individual level. If someone is deprived in a third or more of ten (weighted) indicators, the global index identifies them as 'MPI poor', and the extent – or intensity – of their poverty is measured by the number of deprivations they are experiencing.

The MPI can be used to create a comprehensive picture of people living in poverty, and permits comparisons both across countries, regions and the world and within countries by ethnic group, urban/rural location, as well as other key household and community characteristics.

The index uses the same three dimensions as the Human Development Index: health, education, and standard of living. These are measured using ten indicators.



Dimension	Indicators
Health	<ul style="list-style-type: none"> <li>• Child Mortality</li> <li>• Nutrition</li> </ul>
Education	<ul style="list-style-type: none"> <li>• Years of schooling</li> <li>• School attendance</li> </ul>
Living Standards	<ul style="list-style-type: none"> <li>• Cooking fuel</li> <li>• Toilet</li> <li>• Water</li> <li>• Electricity</li> <li>• Floor</li> <li>• Assets</li> </ul>

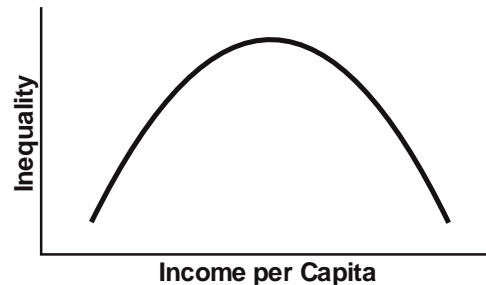
### Kuznets Curve

In economics, a Kuznets curve graphs the hypothesis that as an economy develops, market forces first increase and then decrease economic inequality. The hypothesis was first advanced by economist Simon Kuznets in the 1950s and '60s.

One explanation of such a progression suggests that early in development investment opportunities for those who have money multiply, while an influx of cheap rural labor to the cities holds down wages. Whereas in mature economies, human capital accrual, or an estimate of cost that has been incurred but not yet paid, takes the place of physical capital accrual as the main source of growth; and inequality slows growth by lowering education levels because poorer, disadvantaged people lack finance for their education in imperfect credit-markets.

The Kuznets curve implies that as a nation undergoes industrialization – and especially the mechanization of agriculture – the center of the nation’s economy will shift to the cities. As internal migration by farmers looking for better-paying jobs in urban hubs causes a significant rural-urban inequality gap (the owners of firms would be profiting, while laborers from those industries would see their incomes rise at a much slower rate and agricultural workers would possibly see their incomes decrease), rural populations decrease as urban populations increase. Inequality is then expected to decrease when a certain level of average income is reached and the processes of industrialization – democratization and the rise of the welfare state – allow for the trickle-down of the benefits from rapid growth, and increase the per-capita income. Kuznets believed that inequality would follow an inverted “U” shape as it rises and then falls again with the increase of income per-capita.

Kuznets curve diagrams show an inverted U curve, although variables along the axes are often mixed and matched, with inequality or the Gini coefficient on the Y axis and economic development, time or per-capita incomes on the X axis



## Multiple Choice Questions (Section 19)

J/02/3/19

- 1 Why might GNP per capita of different countries, measured in US\$, be a poor indicator of their comparative standards of living?
- A Their exchange rates are different from purchasing power parities.
  - B Their population growth rates are different.
  - C Their rates of inflation are different.
  - D Their ratios of imports to national income are different.

J/04/3/16

- 2 A country's national income per head falls, but there is a rise in consumption. What could explain this?
- A a decrease in the net property income from abroad
  - B a fall in population
  - C an increase in the trade deficit
  - D a rise in negative externalities

N/04/3/19

- 3 A country's GDP declines but the welfare of its population rises. What could explain this?
- A a fall in leisure time
  - B a fall in the size of the subsistence sector
  - C a rise in positive externalities
  - D a rise in the size of the population

N/05/3/21

- 4 A government uses real personal disposable income as a measure of the standard of living. What does this measure not take into account?
- A the distribution of income
  - B the level of national income
  - C the size of the population
  - D the average price level

J/07/3/19

- 5 Why might GNP per capita of different countries in a given year, measured in US dollars, be a poor indicator of their comparative standards of living?
- A Their exchange rates are different from purchasing power parities.
  - B Their population growth rates are different.
  - C Their rates of inflation are different.
  - D Their ratios of imports to national income are different.

N/07/3/24

- 6** Between 2000 and 2004 Botswana experienced economic growth but there was a fall in its Human Development Index.  
 Which combination of events could explain this apparent paradox?

	aggregate demand	productive capacity	life expectancy
<b>A</b>	increase	increase	increase
<b>B</b>	increase	increase	decrease
<b>C</b>	decrease	decrease	increase
<b>D</b>	decrease	decrease	decrease

J/09/3/15

- 7** A country's national income per head increases.  
 What could explain why this is accompanied by a fall in households' standard of living?
- A** an increase in personal taxes
  - B** an increase in the trade deficit
  - C** an increase in population
  - D** a rise in the exchange rate

N/09/3/25

- 8** An economy's GDP per capita grows over a certain period of time, but its development when measured by the Human Development Index remains unchanged.  
 What could explain the difference?
- A** longer working hours
  - B** increased pollution
  - C** an increased crime rate
  - D** a decline in life expectancy

J/10/3/13

- 9** A government requires all its young citizens to undertake community service for a period of 6 months. The wages paid to those on the community service are below what they would otherwise have earned.  
 What effect will this have on recorded GDP and on national welfare?

	effect on GDP	effect on national welfare
<b>A</b>	reduction	increase
<b>B</b>	reduction	uncertain
<b>C</b>	unchanged	increase
<b>D</b>	unchanged	uncertain

N/10/3/24

- 10** Which feature of the Indian economy could explain why the purchasing power parity exchange rate of the Rupee is much higher than its market exchange rate?
- A** high levels of duty on imported goods
  - B** high levels of rural unemployment
  - C** the relatively low price of goods not traded internationally
  - D** the relatively low rate of inflation

N/11/32/16

11 Which change would directly affect a country's Human Development Index?

- A a change in average hours worked by the labour force
- B a change in life expectancy of the population
- C a change in the level of carbon dioxide emissions
- D a change in the size of the population

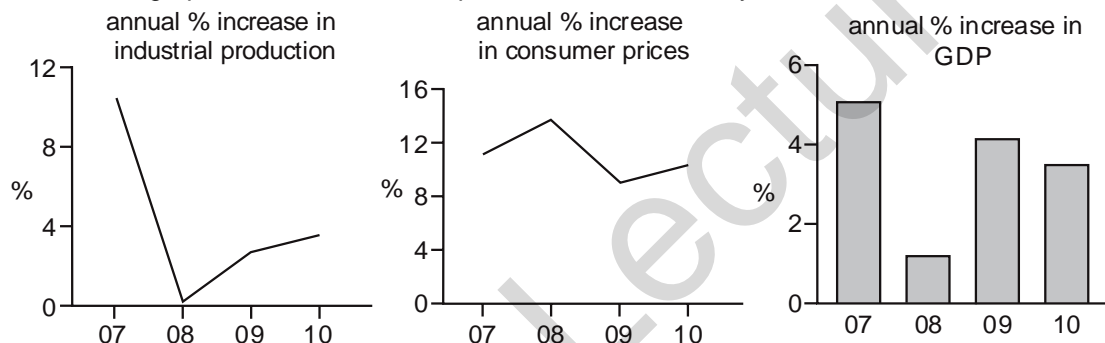
J/12/32/17

12 A government uses real personal disposable income per head as a measure of the standard of living.  
 What does this measure **not** take into account?

- A the distribution of income
- B the level of national income
- C the size of the population
- D the average price level

J/12/32/18

13 The graphs indicate economic performance in a country between 2007 and 2010.



Which conclusion may be drawn from the graphs?

- A Between 2007 and 2008 industrial production and GDP fell but prices rose.
- B Between 2008 and 2009 the rates of growth of industrial production, GDP and prices all increased.
- C GDP and industrial production were at their lowest in 2008.
- D At no time did industrial production, GDP or prices fall.

J/13/32/17

14 National income statistics show that real GDP per head is 25% higher in country X than in country Y.  
 Why might this difference exaggerate the gap in average living standards between the two countries?

- A Country X has a larger population than country Y.
- B Country X has a higher rate of inflation than country Y.
- C The proportion of services people provide for themselves is higher in country Y.
- D The proportion of the country's industry which is owned by foreign firms is higher in country Y.

N/13/32/17

- 15** What might cause the growth of measured GNP to overstate the 'true' rate of economic growth in an economy?
- A** People move from unpaid housework to paid employment.
  - B** The exchange rate is overvalued according to purchasing power parity.
  - C** There is a reduction in environmental pollution.
  - D** There is a reduction in the rate of investment in physical capital.

N/14/32/25

- 16** Which change would cause an increase in a country's Human Development Index?
- A** a decrease in gender inequality
  - B** a decrease in income inequality
  - C** an increase in the mean years of schooling
  - D** an increase in the retirement age

J/15/32/14

- 17** When will a society have achieved an equitable distribution of income?
- A** when all individuals have equal job opportunities
  - B** when all workers are paid wages equal to their marginal value product
  - C** when the incomes within the society are equally distributed
  - D** when the society believes that the distribution of income is fair

N/15/32/23

- 18** Gross Domestic Product (GDP) per head is an indicator sometimes used to compare living standards of various countries. GDP is converted into a common currency at market exchange rates. What might cause this indicator to exaggerate the relative position of an individual country?
- A** a high level of female participation in the labour force
  - B** a high level of foreign ownership in domestic industry
  - C** a high level of subsistence farming
  - D** relatively low hours worked by the labour force

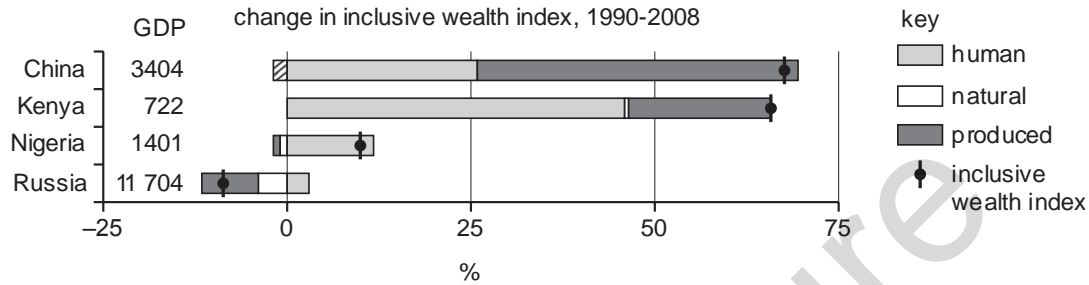
J/16/32/19

- 19** What would cause estimates of the money value of the 'Measure of Economic Welfare' for a country to be greater than the value of 'Gross National Product'?
- A** negative externalities such as pollution
  - B** property income received from abroad
  - C** regrettable necessities
  - D** the value of non-marketed activities and leisure

J/16/32/20

**20** In 2012 a United Nations report calculated the stock of wealth of 20 countries in terms of human, natural and produced resources. This was measured as the Inclusive Wealth Index (IWI).

The diagram shows the annual percentage (%) change in the IWI between 1990 and 2008 of the economies with the fastest and the slowest growth in IWI. It also shows their 2008 GDP per head (\$).



What can be concluded from the diagram?

- A** A low level of GDP per head meant an inability to build stocks of wealth.
- B** No country was able to prevent depletion of its natural resources.
- C** The faster the growth in a country's IWI the higher was its GDP.
- D** There was an increase in human resources in all four countries.

## Section: 20 Equilibrium National Income (Circular flow of National Income)

National output/product shows the market value of goods and services produced in a country in a year's time.

National income shows the income earned by factors of production employed to produce goods and services in a country.

Since a product's market value equals the payments made to production factors, national income (Y) always equals national output.

$Y \equiv$  output is the most important identity in macro economies and shows that a country's income is the output the country's citizens produce.

Equilibrium in the economy can only be achieved when all goods and services produced are sold i.e. Aggregate Expenditures (AE) equal national income (Y):

$$Y = AE \text{ or } Y = E$$

Withdrawals or leakages represent the portion of income not spent on currently and locally made goods and services. Withdrawals (leakages) reduce the demand for goods and services, resulting in some of them to remain unsold. This disequilibrium prevails till demand is 'injected' into the economy, encouraging purchases of unsold goods. Equilibrium national income is thus arrived at, when income (Y) equals expenditures (E) or withdrawals (W) equal injections (J).

$$\begin{aligned} \text{Income (Y)} &= \text{Expenditures (E)} \\ \text{Demand withdrawals (W)} &= \text{Demand Injections (J)} \end{aligned}$$

### Equilibrium National Income- a mathematical treatment

Expenditures (E) and withdrawals (W) are a direct function of income i.e. expenditures and withdrawals rise whenever income rises.

$$E = f(Y) \qquad W = f(Y)$$

Income equals the sum of expenditures and withdrawals

$$Y = E + W$$

$$\Delta Y = \Delta E + \Delta W \quad \Delta \text{ (delta) is a symbol of change.}$$

Dividing the entire equation by  $\Delta Y$

$$\frac{\Delta Y}{\Delta Y} = \frac{\Delta E}{\Delta Y} + \frac{\Delta W}{\Delta Y}$$

$$1 = MPE + MPW$$

$$1 = e + w$$

e (or MPE, marginal propensity to spend) is the fraction of an added £ in income that is spent.

w (or MPW, marginal propensity to withdraw) is the fraction of an added £ in income that is not spent and withdrawn from the system.

To satisfy the above equation, values of MPE and MPW must lie between zero and one and add up to 1. If MPE is 0.8, MPW becomes 0.2, implying that an additional income of £100 raises expenditures by £80 and withdrawals by £20.

$$\begin{aligned} MPE = e &= \frac{\Delta E}{\Delta Y} \\ \Delta E &= e \cdot \Delta Y \\ &= 0.8 \times 100 \\ &= 80 \end{aligned}$$

$$\begin{aligned} MPW = w &= \frac{\Delta W}{\Delta Y} \\ \Delta W &= w \cdot \Delta Y \\ &= 0.2 \times 100 \\ &= 20 \end{aligned}$$

For a linear expenditure function, marginal propensity to spend (MPE) and thus marginal propensity to withdraw (MPW) are assumed to be constant.

Expenditures can further be split up into:

- (i) **Income induced expenditures:** This component changes directly with income. Mathematically, it is the product of marginal propensity to spend and income i.e. MPE.Y or eY.
- (ii) **Income autonomous expenditures:** This component does not change with changes in income. Any change in income autonomous expenditures (A) is represented by a shift in the expenditure function. Factors causing this, such as changes in interest rate are discussed later.

An expenditure function can be represented in the form of a linear equation as follows:

$$E = A + eY$$

Where:

E = Aggregate Expenditures

A = Autonomous Expenditures

e = MPE = marginal propensity to spend

Y = National Income

Autonomous expenditures (A) form the vertical intercept of the expenditure function and marginal propensity to spend, MPE or e represents the slope.

Equilibrium income is arrived at when:

$$Y = E$$

$$Y = A + eY$$

$$Y - eY = A$$

$$Y(1 - e) = A$$

$$Y = A \cdot \frac{1}{1 - e}$$

$$Y = A \cdot \frac{1}{w} \quad (1 = e + w \text{ or } w = 1 - e)$$

Therefore, equilibrium income is the product of income autonomous expenditures (A) and the inverse of marginal propensity to withdraw (w).



**Example:** Calculate equilibrium income for an economy whose expenditure function is given by the linear equation  $E = 150 + 0.8Y$ .

**Answer:** In the given equation, autonomous expenditures (A) are 150 and marginal propensity to spend (e), 0.8. Marginal propensity to withdraw (w) is therefore 0.2 (MPW =  $1 - MPE = 1 - 0.8$ ), and the inverse of marginal propensity to withdraw, 5.

Equilibrium income is given by:

$$\begin{aligned} Y &= A \cdot \frac{1}{w} \\ &= 150 \times 5 \\ &= 750 \end{aligned}$$

This figure for national income can be counter checked by examining the  $Y=E$  identity:

$$\begin{aligned} E &= 150 + 0.8Y \\ &= 150 + 0.8(750) \\ &= 150 + 600 \\ &= 750 \end{aligned}$$

Since marginal propensity to withdraw (w) is a fraction and its inverse  $\left(\frac{1}{w}\right)$  exceeds 1, any increase in (income autonomous) expenditures brings a multiplied increase in national income.

$$\begin{aligned} Y &= A \cdot \frac{1}{1-e} \\ \Delta Y &= \Delta A \cdot \frac{1}{1-e} \\ \Delta Y &= \Delta A \cdot \frac{1}{w} \end{aligned}$$

A change in autonomous expenditures triggers a series of changes in income and expenditure, the final change in income being larger than the initial change in expenditures.

$\frac{1}{1-e}$  or  $\frac{1}{w}$  is the autonomous expenditure multiplier. In the example given above, the value of the multiplier is 5.

National income rises by 250 (to 1000) if autonomous expenditures increase by 50.

$$\begin{aligned} \Delta Y &= \Delta A \cdot \frac{1}{w} \\ 250 &= 50 \cdot \frac{1}{0.2} \end{aligned}$$

The following example illustrates how a certain change in expenditures leads to a series of changes in income and expenditures and eventually, a larger increase in national income. Assume that an increase of £1 in income raises expenditures by £ 0.9 and withdrawals by £0.1. As expenditures by one individual become the earnings of another, assuming an increase in autonomous expenditures of £1, income of 'A' increases by £1 and his spending, by £0.9. This

£0.9 becomes B's income, who raises his spending by £0.81 ( $0.9 \times 0.9$  or  $0.9^2$  i.e.  $e^2$ ) and the process repeats itself infinitely as shown in the table below:

	$\Delta Y$	$\Delta E$	$\Delta W$	
A	£1	£0.9	£0.1	$\Delta E = e (\Delta Y) = 0.9(1) = 0.9 = e$
B	£0.9(e)	£0.81	£0.09	$\Delta E = e (\Delta Y) = 0.9(0.9) = 0.81 = e^2$
C	£0.81(e <sup>2</sup> )	£0.719	£0.081	$\Delta E = e (\Delta Y) = 0.9(0.81) = 0.719 = e^3$
D	£0.719(e <sup>3</sup> )	£0.656	£0.073	$\Delta E = e (\Delta Y) = 0.9(0.719) = 0.656 = e^4$
E	£0.656(e <sup>4</sup> )			
.	.	.	.	
.	.	.	.	
.	.	.	.	
.	.	.	.	
.	.	.	.	
.	.	.	.	
.	.	.	.	
.	.	.	.	
K = 10		9	1	

The final change in income is calculated by summing up the contents of column 1, given by K.

$$K = 1 + 0.9 + 0.81 + 0.719 + 0.656 \dots\dots$$

$$K = 1 + e + e^2 + e^3 + e^4 \dots\dots e^n \quad \text{(i)}$$

$$eK = e + e^2 + e^3 + e^4 \dots\dots e^{n+1} \quad \text{(ii)} \quad \text{(multiplying equation (i) by MPE = e)}$$

$$K - eK = 1 - e^{n+1} \quad \text{(subtracting equation (ii) from (i))}$$

Given that n is an extremely large number,  $e^{n+1}$  is almost zero and may safely be ignored.

$$K - eK = 1$$

Taking K common:

$$K(1 - e) = 1$$

$$K = \frac{1}{1 - e}$$

Thus, it is proven that expenditure multiplier (K) is  $\frac{1}{1 - e}$  or  $\frac{1}{w}$ . In the given example, autonomous expenditure multiplier is 10 and a change in autonomous expenditures by £1 changes national income by £10.

## Squaring The Economic Cycle

### Humorist Art Buchwald examines the multiplier

The recession hit so fast that no body knows exactly how it happened. One day we were land of milk and honey and next day we were the land of sour cream and load stamps.

There is one explanation. Holberger, the Chevy salesman in Tomcat, called up Littleton of Littleton of Menswear and Haberdashery and said, "Good News, the new Fords have just come in and I have put aside one for you and your wife.

Littleton said, "I can't Holberger, my wife and I are getting a divorce. I am sorry but I can't afford a car this year. After I settle with my wife, I will be lucky to buy a bicycle."

Holberger Hung up. His phone rang after a few minutes.

"This is Bedcheck, the painter," the voice on the other hand said. "When do you want me to start painting the house?"

"I changed my mind" said Holberger, "I am not going to paint the house"

"But I ordered the paint" Bedcheck said. "Why did you change your mind?"

"Because Littleton is getting a divorce and he can't afford a new car"

That evening Bedcheck came home and his wife said, "The new color television set arrived from Gladstone's TV shop"

"Take it back" Bedcheck told his wife.

"Why?" she demanded.

"Because Holberger is not going to have his house painted now that Littletons are having divorce."

The next day Mrs. Bedcheck dragged the TV set in its carton back to Gladstone. "We don't need it"

Gladstone's face dropped. He immediately called his travel agent, Sandstorm. "You know the trip you have scheduled for me to the Virgin Islands?"

"Right, the tickets are all written up"

"Cancel it! I cannot go. Bedcheck just sent back his TV because the Holberger didn't sell the car to Littletons who are getting a divorce"

Sandstorm tore up the tickets and went over to see his banker, Gripsham. "I can't pay back my loan this month because Gladstone cancelled his trip"

Gripsham became furious and when Rudemaker came to borrow money for his new kitchen, Gripsham turned him cold. "How can I loan you money when Sandstorm hasn't repaid the money he borrowed?"

Rudemaker called up the contractor, Eagleton and said he couldn't put a new kitchen...and Eagleton lay off eight men.

Meanwhile, General Motors announced it was giving a rebate on its new models. Holberger called Littleton. "Good news," he said. "Even if you are getting a divorce, you can still afford a new car".

"I am not getting a divorce," Littleton said. "It was all a misunderstanding and we have made up"

"That's great" Holberger said. "Now you can buy the Ford"

"No way," said Littleton. "My business has been lousy. I don't know why I keep the doors open"

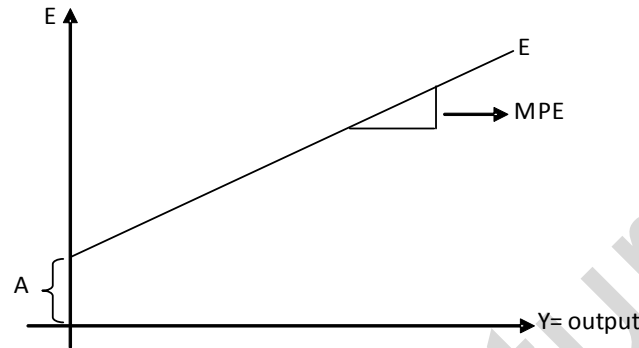
"I didn't realize that" said Holberger.

"Do you realize that I have not seen Bedcheck, Gladstone, Sandstorm, Gripsham, Rudemaker or Eagleton for more than a month? How can I stay in business if they do not patronize my store?"

## Equilibrium Income (a Graphical Treatment)

Diagram 20.1 shows what a linear expenditure function looks like, where income/output is shown along the x axis and expenditures along y axis. As explained before, the vertical intercept of the expenditure function measures income autonomous expenditures (A) and its slope, marginal propensity to spend (MPE) i.e.  $\left(\frac{\Delta E}{\Delta Y}\right)$ .

Diagram 20.1



Locating equilibrium income graphically requires that a hypothetical 45° line be drawn, containing all points where income equals expenditures. Consider points I, II & III in diagram 20.2. Whereas, income is the same at all three, it equals expenditures at II only, since it lies on the 45° line. Expenditures exceed income at point I and fall short of it at III. It is therefore concluded that all points at the 45° line show equilibrium income, whereas those above it have expenditures exceeding income and those below it have expenditures falling short of income (see diagram 20.3)

Diagram 20.2

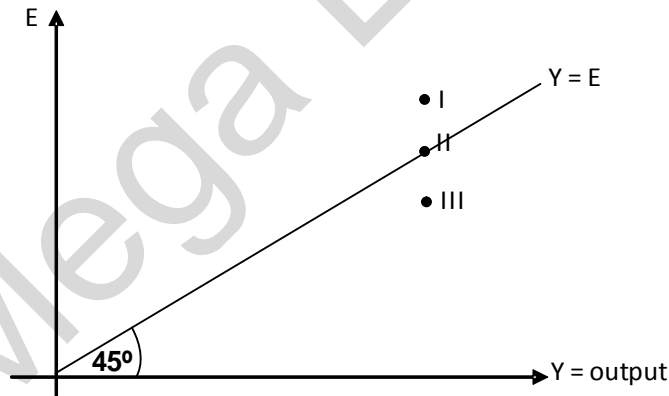
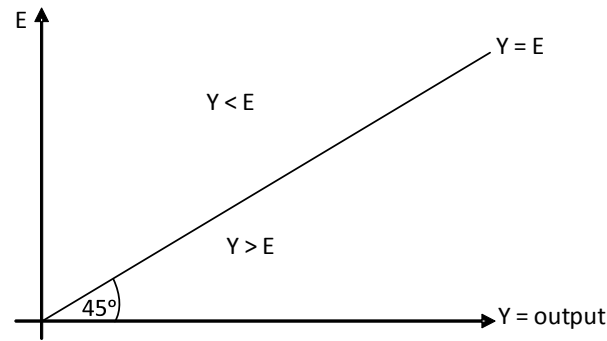
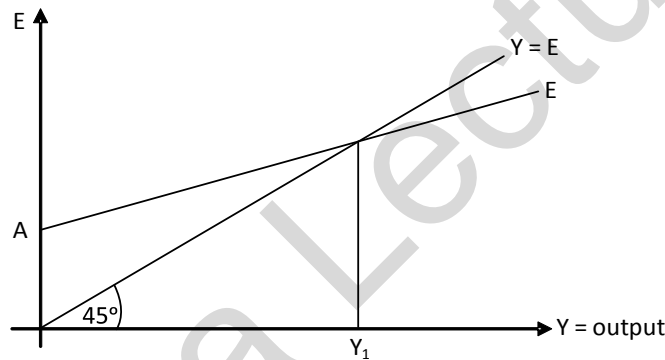


Diagram 20.3



Equilibrium income is achieved where the expenditure function intersects the 45° line. The two are bound to intersect since the slope of the expenditure function (MPE) is a fraction and hence, less than 1, the slope of the 45° line.  $Y_1$  in diagram 20.4 is one such point, showing equilibrium income. At income levels below  $Y_1$ , expenditures exceed income (since expenditure function is above 45° line in this range) and at income levels above  $Y_1$ , income is less than expenditures (since expenditure function is below 45° line in this range).

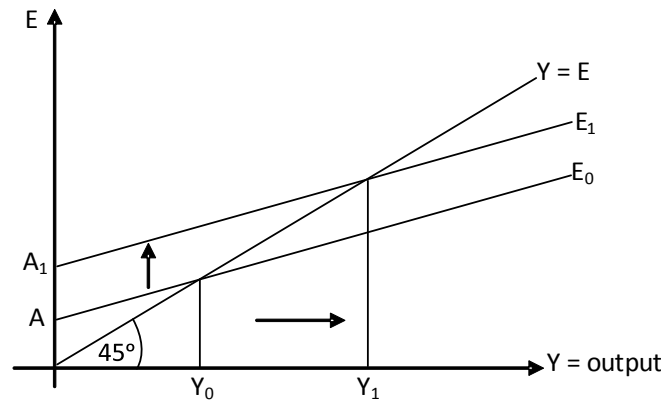
Diagram 20.4



**Changes in equilibrium national income**

Changes in autonomous expenditures change equilibrium income by bringing about a shift in the expenditure function.

Diagram 20.5



As shown in diagram 20.5, an increase in autonomous expenditures from  $A$  to  $A_1$  shifts expenditure functions upwards from  $E_0$  to  $E_1$  and raises equilibrium income from  $Y_0$  to  $Y_1$ . Increase in national income is larger than increase in expenditure because of expenditure multiplier.

We now proceed to the process of determining equilibrium income in three different kinds of economics models:

1. Close Economy without Government (two sectoral model)
2. Close Economy with Government (three sectoral model)
3. Open Economy (four sectoral model)

### Close Economy without Government (two sectoral model)

As the name implies, a two sectoral model (or close economy without government) focuses on two sectors, households and firms, and their respective expenditures: consumer expenditures ( $C$ ) and investment expenditures ( $I$ ).

$$E = C + I$$

Consumer expenditures may take up any of the following forms:

- (i) Non durable such as food and fuel
- (ii) Durables such as furniture, cars, electronics
- (iii) Services such as education, medical care, insurance etc.

In a two sectoral model, income is either consumed ( $C$ ) or saved ( $S$ ) so that:

$$Y = C + S$$

$S$  includes savings of both households and firms- the portion of income which is not consumed in the year it is earned.

$$S = Y - C$$

Saving is negative (dissavings) when consumption exceeds current income. A household must borrow money to finance its consumption expenditures in case they exceed its income. Borrowing is thus a form of dissaving and repayment of loans is saving.

**Marginal Propensities to Consume (MPC) and Save (MPS)**

$$Y = C + S$$

$$\Delta Y = \Delta C + \Delta S$$

$$\frac{\Delta Y}{\Delta Y} = \frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y}$$

$$1 = MPC + MPS.$$

$$1 = c + s.$$

c (or marginal propensity to consume, MPC) is the fraction of an added £ in income that is consumed.

s (or marginal propensity to save, MPS) is the fraction of an added £ in income that is saved.

In a close economy without government, the sum of MPC and MPS equals 1 and marginal propensity to save is  $1 - MPC$ . For example, where MPC is 0.8, MPS becomes 0.2 and an additional income of £100 raises consumption by 80 and savings by 20.

$$mpc = \frac{\Delta C}{\Delta Y} \quad mpc \Delta Y = \Delta C \quad 0.8 \times 100 = 80$$

$$mps = \frac{\Delta S}{\Delta Y} \quad mps \Delta Y = \Delta S \quad 0.2 \times 100 = 20$$

According to John Maynard Keynes, consumption (C) and savings (S) are a function of income:

$$C = f(Y) \quad S = f(Y)$$

Every change in income brings about changes in both consumer expenditures, C and saving, S so that values of MPC and MPS can never be zero and must be less than 1.

Keynes suggested two components of consumption: autonomous consumption ( $C_0$ ) and induced consumption ( $c.Y$ ). The former represents the portion of total consumption not varying with changes in income. Determinants of autonomous consumption include wealth, savings from previous years, availability of loans and interest rates. Induced consumption ( $c.Y$ ) is that portion of consumption that varies directly with income. Keynesian consumption function is thus given by the linear equation:

$$C = C_0 + cY$$

where

C = consumption

$C_0$  = Autonomous consumption

MPC =  $c$  = marginal propensity to consume

Y = income

Diagram 20.6

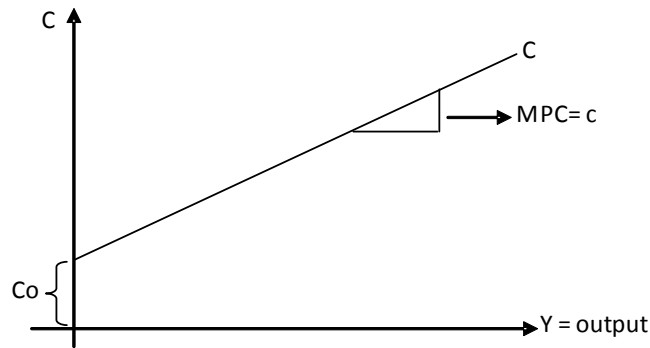


Diagram 20.6 shows a consumption function with income/output along x axis and consumer expenditures along y axis. The vertical intercept of the linear consumption function is given by autonomous consumption ( $C_0$ ) whereas marginal propensity to consume,  $c$ , is its slope.

Given the consumption function, the saving function can automatically be determined as:

$$\begin{aligned}
 Y &= C + S \\
 S &= Y - C \\
 C &= C_0 + cY \\
 S &= Y - (C_0 + cY) \\
 &= Y - C_0 - cY \\
 &= -C_0 + Y - cY \\
 \text{Taking } Y \text{ common:} \\
 &= -C_0 + (1 - c)Y \\
 &= -C_0 + sY
 \end{aligned}$$

Thus, the saving function is given by:  
 $-C_0 + sY$

where

$C_0$  = Autonomous consumption

$S$  = MPS = marginal propensity to save =  $1 - MPC = 1 - c$



Diagram 20.7

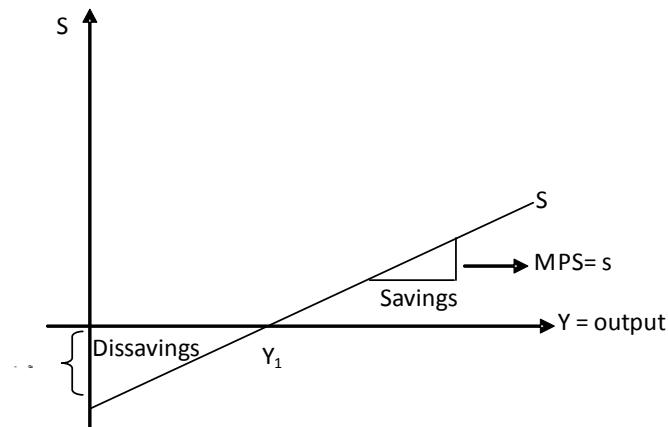


Diagram 20.7 shows a saving function with income/output along x-axis and savings along y axis. –Co shows the vertical intercept of the saving function whereas its slope measures marginal propensity to save i.e.  $MPS = s = \frac{\Delta S}{\Delta Y}$ .

Vertical intercepts of consumption and saving functions are equal but their signs are opposite and their sum equals zero. The sum of MPC and MPS i.e. the slopes of consumption function and saving function always equals 1. Try attempting the following question:  
In which situation are consumption and saving functions parallel?

**Average Propensities to Consume (APC) and Save (APS)**

Average Propensity to Consume (APC) is the ratio of total consumption (C) and total income (Y)

$$APC = \frac{C}{Y}$$

Likewise, Average Propensity to Save (APS) is the ratio of saving (S) and income (Y).

$$APS = \frac{S}{Y}$$

Now,  $Y = C + S$

$$\frac{Y}{Y} = \frac{C}{Y} + \frac{S}{Y}$$

$$1 = APC + APS.$$

The sum of both APC and APS, and MPC and MPS equals 1 so that:

$$APC + APS = MPC + MPS = 1.$$

For a linear consumption function, MPC is a fraction and constant throughout. However, APC may be higher than 1 if consumption exceeds income and savings are negative (dissavings). In diagram 20.7, this happens at all income levels below  $Y_1$ . Thus at income below  $Y_1$ , APC exceeds 1 and APS is negative.

When $Y = Y_1$	$S = 0$	$APS = 0$	$Y = C$	$APC = 1$
When $Y < Y_1$	$S < 0$	$APS < 0$	$C > Y$	$APC > 1$
When $Y > Y_1$	$S > 0$	$APS > 0$	$C < Y$	$APC < 1$

Consider table 20.1 where consumption exceeds income at all income levels below 500 and saving is negative. APC exceeds 1 and APS is negative for this income range. APC equals 1 (since consumption equals income) at the income of 500, and APS is zero. At income levels higher than 500, APC is a fraction and APS exceeds zero.

### Relationship between Average and Marginal Propensities to Consume

$$C = C_0 + cY$$

$$APC = \frac{C}{Y} = \frac{C_0 + cY}{Y} = \frac{C_0}{Y} + \frac{cY}{Y} = \frac{C_0}{Y} + c$$

Given that autonomous consumption,  $C_0$  and marginal propensity to consume,  $c$  are constant, APC decreases whenever  $Y$  increases. However, APC is always higher than MPC as  $C_0$  is positive. Thus, for a linear consumption function, APC always exceeds MPC but decreases whenever income increases.

### Relationship between APS and MPS

$$S = -C_0 + sY$$

$$APS = \frac{S}{Y} = \frac{-C_0 + sY}{Y} = \frac{-C_0}{Y} + \frac{sY}{Y} = -\frac{C_0}{Y} + s$$

Given that  $C_0$  is negative, any increase in income reduces  $\frac{C_0}{Y}$  and hence increases APS.

However, APS is always less than MPS.

Therefore, the following hold true for a linear consumption function ( $C_0 > 0$ ):

- MPC and MPS are constant
- APC decreases whenever income increases
- APC always exceeds MPC
- APS increases whenever income rises
- APS is always less than MPS.

If  $C_0 = 0$ , the consumption function becomes  $C = c.Y$  and the saving function,  $S = s.Y$

$$APC = \frac{C}{Y} = \frac{cY}{Y} = mpc$$

$$APS = \frac{S}{Y} = \frac{s.Y}{Y} = mps$$

Table 20.1 drawn assuming  $C = 100 + 0.8Y$  confirms the above mentioned observations.

Table 20.1

Y	C	S	MPC	MPS	APC	APS
0	100	-100	0.8	0.2	-	-
100	180	-80	0.8	0.2	1.8	-0.8
200	260	-60	0.8	0.2	1.3	-0.3
300	340	-40	0.8	0.2	1.13	-0.13
400	420	-20	0.8	0.2	1.05	-0.5
500	500	0	0.8	0.2	1	0
600	580	20	0.8	0.2	0.97	0.03
700	660	40	0.8	0.2	0.94	0.06

For a linear consumption function where  $C_0 = 0$ :

- MPC and MPS are constant
- APC and APS are also constant
- APC always equals MPC
- APS always equals MPS

Table 20.2 drawn assuming  $C = 0.8Y$  confirms the above mentioned observations.

Table 20.2

Y	C	S	MPC	MPS	APC	APS
0	0	0	0.8	0.2	-	-
100	80	20	0.8	0.2	0.8	0.2
200	160	40	0.8	0.2	0.8	0.2
300	240	60	0.8	0.2	0.8	0.2
400	320	80	0.8	0.2	0.8	0.2
500	400	100	0.8	0.2	0.8	0.2
600	480	120	0.8	0.2	0.8	0.2
700	560	140	0.8	0.2	0.8	0.2

When MPC is 0.5, MPS is also 0.5 and the two thus become equal. This is the only possibility of the consumption and saving functions becoming parallel to each other.

The slope of the consumption function  $\left(\frac{\Delta C}{\Delta Y}\right)$  gives marginal propensity to consume whereas the

slope of a straight line drawn from origin shows average propensity to consume  $\left(\frac{C}{Y}\right)$ . Consider

diagram 20.8 where slope of the consumption function (MPC) is given by  $\frac{II}{III}$  whereas that of the

dotted line drawn from origin (APC) at income of Y is given by  $\frac{I + II}{III}$ . APC therefore exceeds MPC. In order to calculate APC at a higher income level, another straight line can be drawn from origin. Such a line is flatter than the dotted line shown below, implying APC decreases whenever income increases.

Diagram 20.8

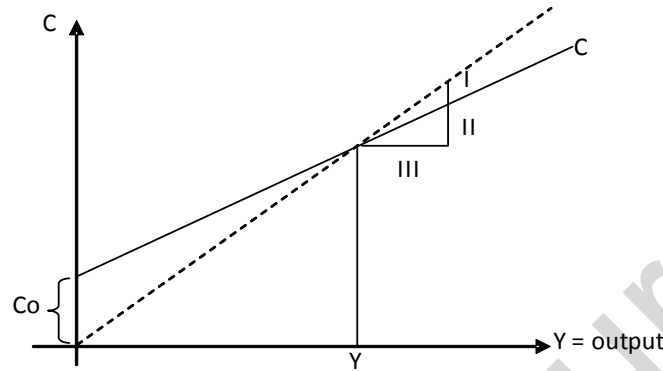
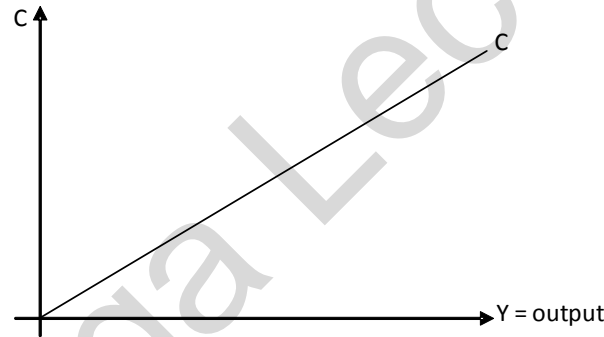


Diagram 20.9 shows the case where  $C_0$  is zero and hence MPC equals APC at all points.

Diagram 20.9

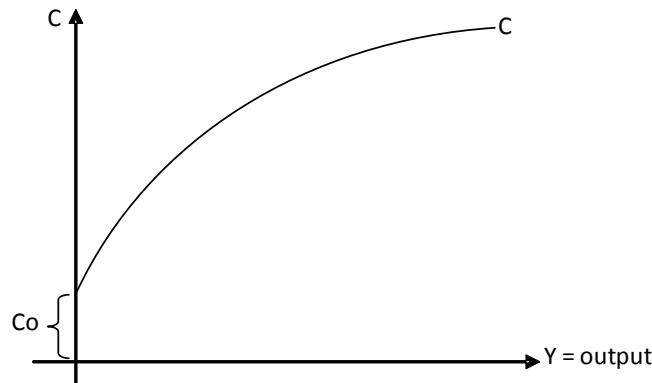


**Non-linear composition function**

A linear consumption function assumes that marginal propensity to consume, MPC, is the same for people from different income groups whereas in reality, poor people are likely to have a higher MPC as they tend to spend more out of additional income and save less. With time however, the ability to save increases with additional income so that richer people possess a lower MPC.

The consumption function shown in diagram 20.10 is therefore, flatter at higher income levels as MPC falls with every increase in income. Decreased MPC means MPS must be rising, hence implying a saving function that gets steeper at higher income levels.

Diagram 20.10



In diagram 20.10,  $\frac{C_0}{Y}$  decreases along the consumption function. Since  $APC = \frac{C_0}{Y} + mpc$  and both  $\frac{C_0}{Y}$  and  $mpc$  decline over the given function, APC decreases with every increase in income.

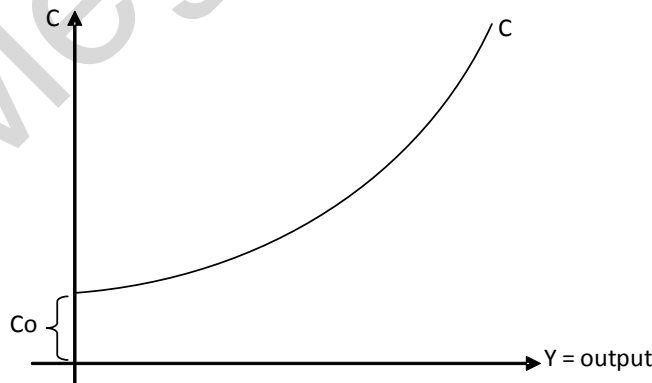
Any increase in APC implies an offsetting decrease in APS as the sum of APC and APS equals 1. Thus, APS decreases along the consumption function. Whereas APC exceeds MPC throughout the range of income, APS stays below MPS since  $APS = mps - \frac{C_0}{y}$ . Summarizing whatever is

explained in diagram 20.10:

- MPC falls throughout
- MPS rises throughout
- APC decreases throughout
- APS rises throughout
- APC exceeds MPC at all points
- APS is less than MPS at all points

A consumption function may rarely be similar to the one shown in diagram 20.11. This consumption function is steeper at higher income levels i.e. MPC increases whenever income increases. Saving function in this situation, is flatter at higher income levels meaning MPS decreases when income increases.

Diagram 20.11



$\frac{C_0}{Y}$  falls with increases in income but MPC increases so that effects on APC (given by  $\frac{C_0}{y} + mpc$ ) are ambiguous- it may increase or decrease.

Thus, along the consumption function shown in diagram 20.11:

- MPC rises
- MPS falls
- APC can increase or decrease
- APS can increase or decrease
- APC always exceeds MPC
- APS is always less than MPS

## Investment Expenditures

Investment expenditures are of three types:

- (i) Fixed capital formation i.e. the purchase of fixed assets such as plant and machinery, equipment and fixtures.
- (ii) Changes in inventories: Firms maintain inventories (stocks), which are further categorized into:
  - (a) Raw material prior to use
  - (b) Finished goods prior to sale
  - (c) Work in progress (WIP)

Inventory investment is positive when stocks pile up and negative when stocks deplete.

- (iii) New construction

It must be noted that only those activities are classified as investment expenditures that increase demand for currently made goods and services. None of the following activities shows investment as none increases the demand for currently made goods and services.

- Depositing money in a bank.
- Buying bonds
- Buying shares
- Buying second hand machinery or an old factory
- Buying property: However renovating old property could be regarded as investment
- Importing machinery

According to Keynesian theory, investments are income autonomous and do not depend on the level of current income. Investment function is therefore given by:

$$I = I_0$$

### Determinants of investment

#### Rate of interest

Rate of interest is the cost of investment. For zero geared firms (firms raising finance wholly through equity, with zero borrowings), interest rate is the opportunity cost of equity invested in a business. Increased interest rates raise the opportunity cost of capital and discourage

investments, thus, interest rates and quantity of investments move inversely. This inverse relationship between rate of interest and quantity of investment may be explained using the concept of Net Present Value (NPV). NPV is the difference between present value of cash inflows and outflows. Projects with positive NPV are feasible and thus carried out by businesses.

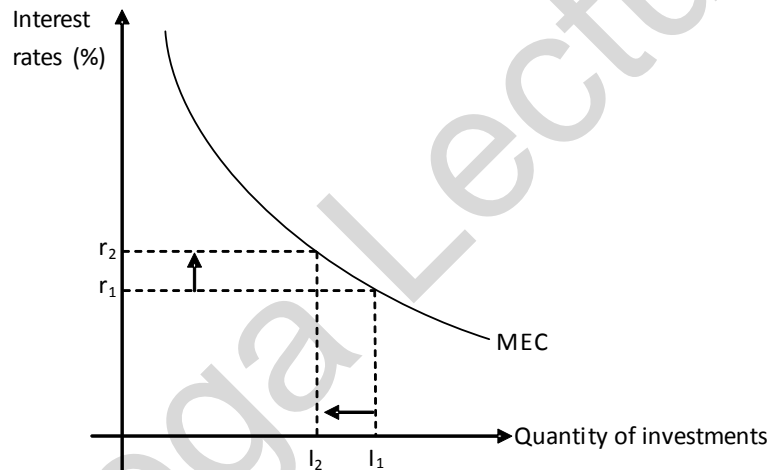
Present value =  $\frac{\text{Cash inflow}}{(1+r)^n}$  where  $r$  is the rate of interest and  $n$ , number of years.

$$\text{NPV} = \text{Cash Inflow}_{\text{PV}} - \text{outflow.}$$

For any increase in interest rates, present value of cash flows and thus NPV decreases. Interest rates may increase to an extent where positive Net Present Value becomes negative and otherwise feasible projects become unattractive. A project is feasible as long as its internal rate of return exceeds market interest rates. Internal rate of return, IRR or marginal efficiency of capital, MEC is that discount rate which makes NPV zero. Projects with IRR below market interest rate are not feasible and rejected.

Diagram 20.12 shows Marginal Efficiency of Capital, MEC. MEC slopes downwards, recording projects in a descending order i.e. projects with lower IRR are shown later.

Diagram 20.12



Quantity of investment is shown along x axis and rate of return,  $r$  along y axis. At the market interest rate of  $r_1$ , all projects upto (and including)  $I_1$  are feasible and thus carried out. As the market interest rate rises from  $r_1$  to  $r_2$ , fewer projects remain feasible and investments decrease from  $I_1$  to  $I_2$ .

### Future expectations

Investors' confidence is key to their investment decisions. Investors are more optimistic and confident in booming economies, with sales and profits growing rapidly. They may want to invest even if prevailing interest rate is high. In contrast, investors' pessimism caused by fear of recession forces them to delay their investment plans. Even a decrease in interest rates may not be sufficient to induce them to invest.

### Taxes

Since taxes are deducted from cash inflows, Net Present Value (Cash inflows<sub>pV</sub> – cash outflow) and hence, investment decreases whenever taxes are raised.

Political and economic stability reduces the uncertainties associated with investments and encourages people to invest more. Strong and sound infrastructure helps firms produce goods and services at lower per unit cost, further encouraging investments. Government policies regarding international trade also have a bearing on investment decisions e.g. trade protection for a certain industry may trigger investments in that industry. Geographical disparities compel governments to announce tax reliefs for businesses locating in less privileged and under developed areas. This strategy of making capital mobile instead of labour not only reduces regional disparities but also population pressure on major cities. Road congestion and over utilization of civic resources is significantly reduced as villagers get jobs near their own residence.

Availability of cheap and skilled labour also encourages investment. Expensive labour, if possessing a positive attitude to work and trained properly may cost firms less compared to workers who accept a low wage but lack the ability and aptitude required to carry out the job effectively. In such a case, 'cheap labour costs more'. Higher wages do not necessarily translate into higher costs for the firms as workers' productivity may improve with wage. However, firms are reluctant to invest wherever strong and militant trade unions demand wage increases in excess of productivity improvements. Likewise, a national minimum wage legislation raises labor cost and makes investments less feasible.

Law and order and availability of required inputs such as raw materials and sources of energy also determine the level of investments.

## Equilibrium National Income

(in 2 sectoral model)

In a close economy without government (two sectoral economy), income is either consumed or saved.

$$Y = C + S$$

Expenditures in a two sectoral model are of two types: consumer expenditures (C) and investment expenditures (I).

$$E = C + I$$

For the economy to be in equilibrium:

$$\begin{aligned} Y &= E \\ C + S &= C + I \\ S &= I. \end{aligned}$$

Saving is a demand withdrawal, the portion of income not spent on goods and services. Investment is a demand injection, raising the demand for currently made goods and services.

Consumption function is given by a linear equation,  $C = C_0 + cY$  where  $C_0$  is autonomous consumption and  $c$  is marginal propensity to consume. Investments are assumed to be income autonomous so that  $I = I_0$ . Thus, expenditures in a close economy are given by:



$$E = C + I$$

$$= C_0 + cY + I_0$$

For equilibrium income,

$$Y = E$$

$$Y = C_0 + cY + I_0$$

$$Y - cY = C_0 + I_0$$

$$Y(1 - c) = C_0 + I_0$$

$$Y = (C_0 + I_0) \frac{1}{1 - c} = (C_0 + I_0) \frac{1}{s}$$

In a close economy without government:

- We consider two sectors: households and firms
- Expenditures are given by: consumer expenditures (C) and investment expenditures (I)
- Demand injection (J) is investment expenditure (I)
- Demand withdrawal (W) is savings (S)
- Autonomous expenditures, A equal  $C_0 + I_0$
- Marginal propensity to spend equals marginal propensity to consume- MPE = MPC
- Marginal propensity to withdraw equals marginal propensity to save- MPW = MPS
- Autonomous expenditure multiplier is given by  $\frac{1}{1 - c}$  or  $\frac{1}{s}$ .

In order to derive autonomous expenditure multiplier in a two sectoral model,

$$Y = E \text{ or } Y = C + I \text{ (as } E = C + I)$$

$$\Delta Y = \Delta C + \Delta I$$

Dividing the equation by  $\Delta Y$ :

$$\frac{\Delta Y}{\Delta Y} = \frac{\Delta C}{\Delta Y} + \frac{\Delta I}{\Delta Y}$$

$$1 = c + \frac{\Delta I}{\Delta Y}$$

$$\frac{\Delta I}{\Delta Y} = 1 - c$$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - c}$$

Investment expenditure multiplier is therefore the ratio of change in income and change in investment.

$$\frac{\Delta Y}{\Delta I} = K = \frac{1}{1 - c}$$

**Example:** Calculate equilibrium national income when  $C = 100 + 0.8Y$  and  $I_0 = 50$ .

**Answer:** Equilibrium income can be calculated in two ways:

(i) Income Expenditure Approach

$$\begin{aligned}
 Y &= E \\
 Y &= C + I \\
 Y &= 100 + 0.8Y + 50 \\
 Y - 0.8Y &= 150 \\
 Y(1 - 0.8) &= 150 \\
 Y &= 150 \times \frac{1}{1 - 0.8} \\
 &= 150 \times \frac{1}{0.2} \\
 &= 150 \times 5 = 750
 \end{aligned}$$

or simply multiply the autonomous expenditures, 150 ( $C_0 + I_0 = 100 + 50$ ) with 5, the inverse of MPS (as  $MPS = 0.2$ )

(ii) Withdrawal-Injection Approach.

$$\begin{aligned}
 W &= J \\
 S &= I
 \end{aligned}$$

Saving is the only withdrawal (W) and investment, the only injection (J) in a two sectoral model.

$$\begin{aligned}
 I &= I_0 = 50 \\
 S &= -C_0 + sY \\
 &= -100 + 0.2Y
 \end{aligned}$$

$$\begin{aligned}
 S &= I \\
 -100 + 0.2Y &= 50 \\
 0.2Y &= 150 \\
 Y &= 150 \times \frac{1}{0.2} \\
 &= 750
 \end{aligned}$$

**Question:** What happens to equilibrium income if Investment increases by 50 for the data given above?

**Answer:** Increased investment expenditures increase national income by 250 (to 1000).

$$\begin{aligned}
 K &= \frac{\Delta Y}{\Delta I} \\
 \Delta Y &= \Delta I \cdot K \\
 &= \Delta I \cdot \frac{1}{s} \\
 &= 50 \cdot \frac{1}{0.2} \\
 &= 250
 \end{aligned}$$

## A Situation of Disequilibrium

There is no guarantee of buyers' purchasing decisions matching the plans of producers to supply a certain volume of goods and services. A state of disequilibrium results when either output (Y) exceeds aggregate expenditures (E) or expenditures exceeds income.

Consider an economy where producers plan to supply output worth \$1000 m but consumers plan to spend \$600m. Apart from an inventory investment of \$50m, investors plan to buy new plant and machinery (fixed capital formation) worth \$300m so that total planned investment is \$350m. Total planned expenditures (consumer expenditures plus investment expenditure) are \$950m and thus fall short of available output, \$1000m. Goods and services worth \$50m are unsold.

These unsold goods are not wasted or thrown away, instead, they become part of inventories. This addition in stocks is however, unplanned. Inventories pile up and inventory investment is positive when planned expenditures fall short of income. On the other hand, inventories deplete when planned expenditures exceed income and unplanned inventory investment is negative.

Actual expenditures include both planned and unplanned expenditures and always equal income since unplanned expenditures act as a balancing item.

$$\begin{aligned} \text{Income} &\equiv \text{Actual expenditures} \\ \text{Income} &\equiv \text{Planned} + \text{Unplanned expenditures} \end{aligned}$$

Equilibrium income is reached when unplanned expenditures are zero and income (Y) equals planned expenditures (E) or planned withdrawals (W) equal planned injections (J).

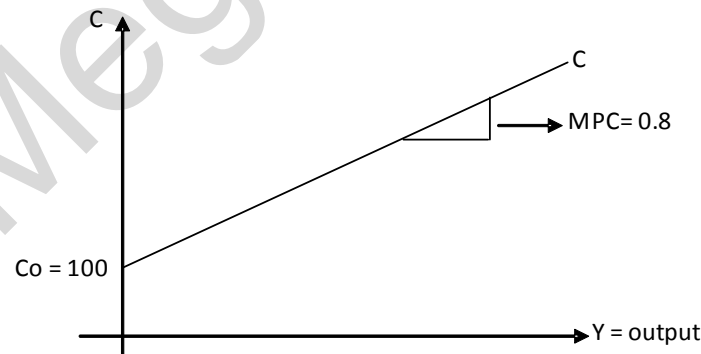
### Equilibrium National Income (two sectoral model)-Graphical analysis

Consider the two components of expenditures in a two sectoral model, consumer and investment expenditures given by :

$$\begin{aligned} C &= C_0 + cY \\ &= 100 + 0.8Y \end{aligned} \qquad I = I_0 = 50$$

Diagram 20.13(a) shows a linear consumption function, the vertical intercept of which shows autonomous consumption ( $C_0$ ) and slope, marginal propensity to consume ( $MPC = c$ ).

Diagram 20.13(a)



An investment expenditure function, as shown in diagram 20.13(b) is a straight horizontal line implying that it is income autonomous.

Diagram 20.13(b)

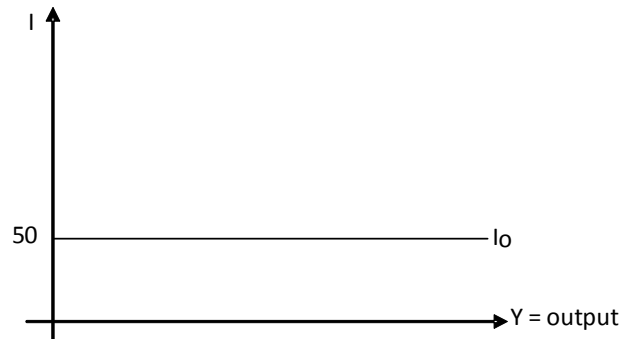
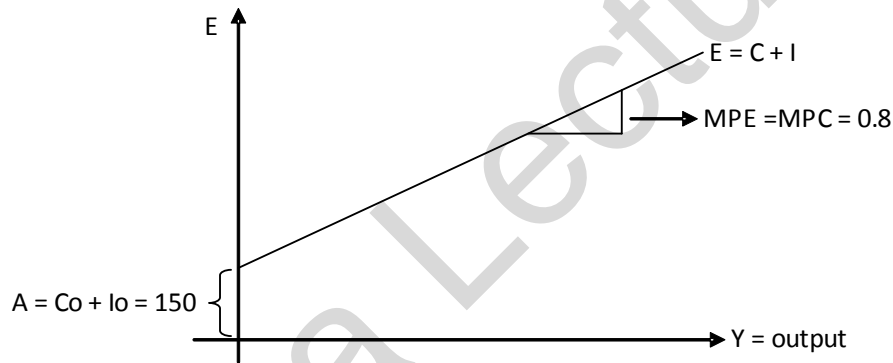


Diagram 20.13(c) shows the expenditure function. Its vertical intercept measures autonomous expenditures, measured by the sum of individual intercepts i.e. 150 ( $A = C_0 + I_0$ ).

The slope of the expenditure function equals the slope of the consumption function ( $MPC = MPE$ ).

Diagram 20.13(c)



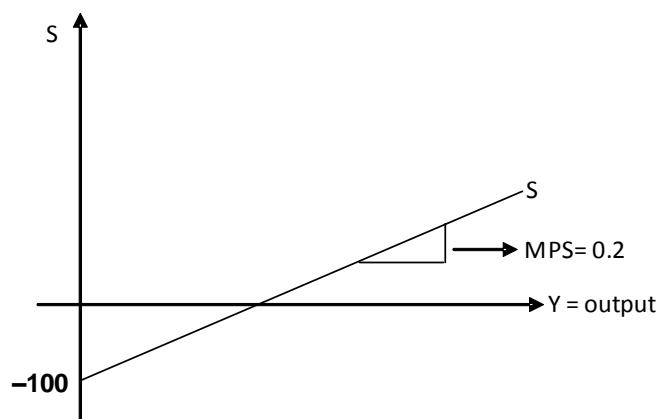
The intersection of 45° line and expenditure function, given by the total of consumer and investment expenditure functions, determines equilibrium income at 750(see diagram 20.15).

Equilibrium income may also be determined by the intersection of withdrawals and injections (J), which in a two sectoral model means the intersection of savings and investments.

$$C = 100 + 0.8Y.$$

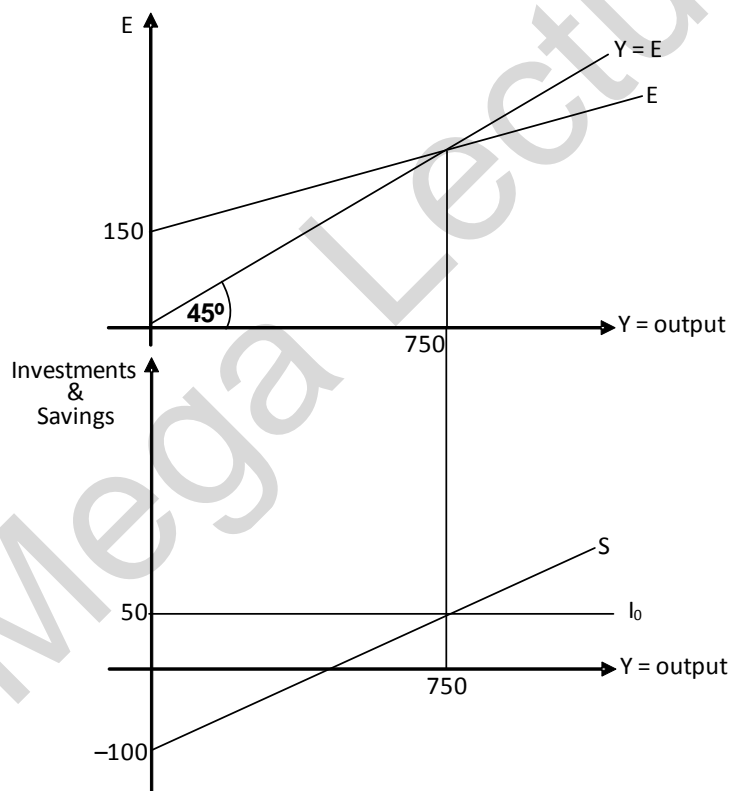
$$S = -100 - 0.2Y$$

Diagram 20.14



The vertical intercepts of the saving and consumption functions are equal in amount but differ in signs. The slope of saving function measures MPS, marginal propensity to save. Its intersection with investment function determines equilibrium income at 750 (see diagram 20.15)

Diagram 20.15

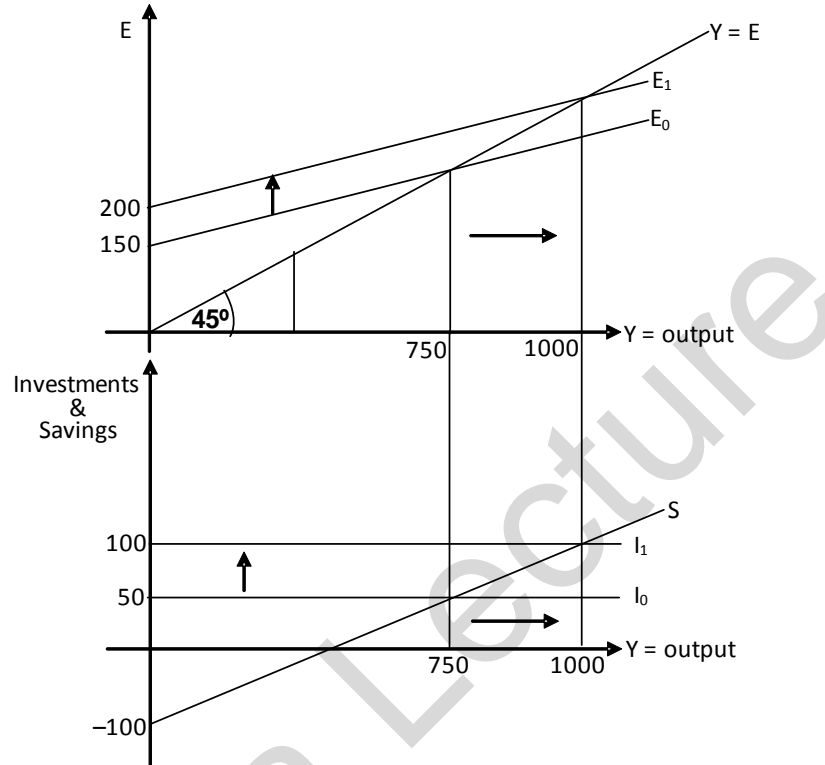


**Changes in equilibrium income**

Increased autonomous expenditures shift the expenditure function and injections (J) upwards and raise national income. Diagram 20.16 shows the initial expenditure function as  $E_0$  and injections

(J),  $I_0$ . Equilibrium income is 750. Increasing investment expenditures by \$50m shifts the expenditure and investment functions upwards by \$50m and raises equilibrium income by \$250m. As explained earlier, the increase in national income exceeds the increase in autonomous expenditures because of the multiplier effect (multiplier= 5 in this case).

Diagram 20.16



## Multiple Choice Questions (Section 20)

J/02/3/21

- 1 The marginal propensity to consume in a country is 0.9 and the average propensity is 0.8.  
What is the value of the multiplier?

- A 1.1
- B 1.25
- C 5
- D 10

N/03/3/21

- 2 The table shows the level of consumption at various levels of national income for a closed economy with no government.

national income (\$ million)	consumption (\$ million)
10	11
12	12
14	13
16	14
18	15
20	16

What happens to the average and marginal propensities to consume as income increases?

	average propensity to consume	marginal propensity to consume
A	constant	constant
B	falls	constant
C	falls	falls
D	rises	falls

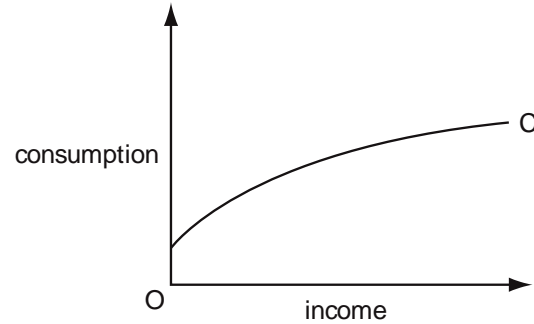
J/04/3/17

- 3 In a closed economy with no government sector the multiplier shows the impact of a change in

- A consumption on investment.
- B investment on national income.
- C national income on consumption.
- D national income on investment.

J/04/3/18

4 The diagram shows an economy's consumption function.

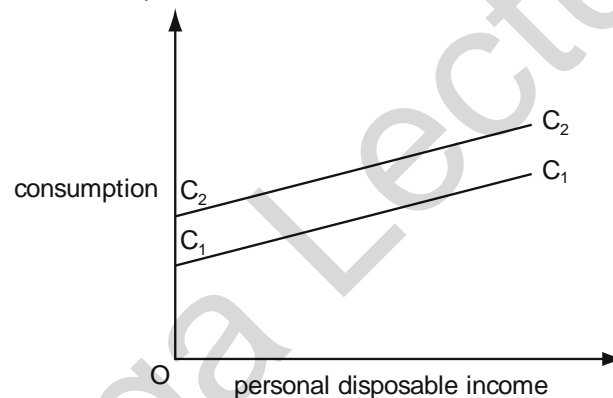


What might explain why the consumption function shifts over time?

- A Autonomous consumption is greater than zero.
- B Income is only one of several variables that affect consumption.
- C The average propensity to consume falls as income increases.
- D The marginal propensity to consume falls as income increases.

N/04/3/22

5 A country's initial consumption function is  $C_1C_1$ .



What will cause the consumption function to shift from  $C_1C_1$  to  $C_2C_2$ ?

- A an increase in wealth
- B an increase in interest rates
- C an increase in personal disposable income
- D an increase in the expected future rates of income tax

J/05/3/18

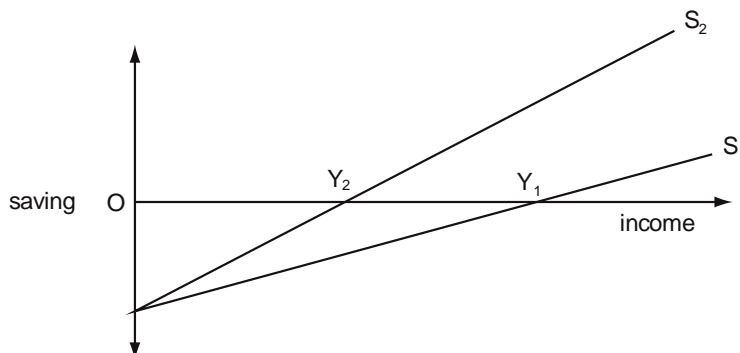
6 In a closed economy with no government, consumption is three-quarters of income at all levels of income.  
The present equilibrium level of income is \$220 million.  
The full employment level of income is \$240 million.  
By how much would investment have to increase to reach full employment?

- |   |              |   |              |
|---|--------------|---|--------------|
| A | \$5 million  | B | \$15 million |
| C | \$20 million | D | \$30 million |



J/05/3/19

7 The diagram shows a shift in the economy's saving function from  $S_1$  to  $S_2$ .



What can be deduced from the diagram?

- A The multiplier has increased.
- B The marginal propensity to save has increased.
- C Autonomous consumption has increased.
- D Equilibrium national income has fallen from  $OY_1$  to  $OY_2$ .

J/06/3/20

8 A closed economy with no government has an equilibrium level of national income of \$10 000 million. Consumption expenditure is \$8000 million. Assuming that the  $MPC = APC$  what will be the change in national income following an increase in investment of \$100 million?

- A \$100 m
- B \$120 m
- C \$400 m
- D \$500 m

N/06/3/21

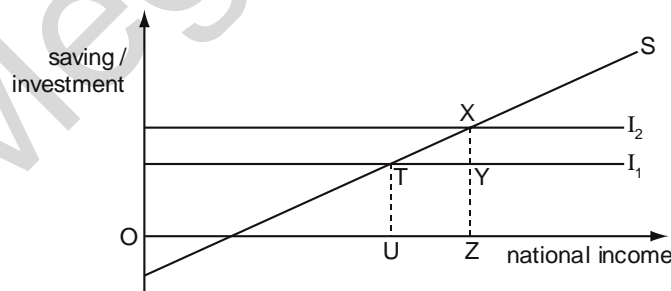
9 In a closed economy with no government  $C = 30 + 0.8 Y$  and  $I = 50$ , where  $C$  is consumption,  $Y$  is income and  $I$  is investment.

What is the equilibrium level of income?

- A 64
- B 80
- C 250
- D 400

J/07/3/22

10 The diagram shows the equilibrium levels of national income in a closed economy with no government, at two levels of investment,  $I_1$  and  $I_2$ .

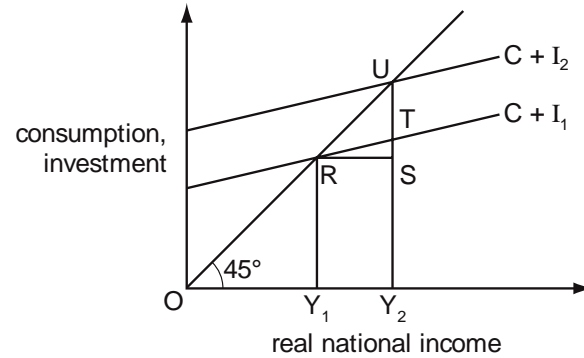


Which ratio gives the value of the multiplier?

- A  $\frac{TX}{UZ}$
- B  $\frac{UZ}{TX}$
- C  $\frac{UZ}{XY}$
- D  $\frac{XY}{UZ}$

N/07/3/21

- 11 The diagram shows a two-sector economy. Initially consumption is  $C$ , investment is  $I_1$  and the equilibrium level of income is  $Y_1$ . Investment increases to  $I_2$  giving a new equilibrium level of income,  $Y_2$ .

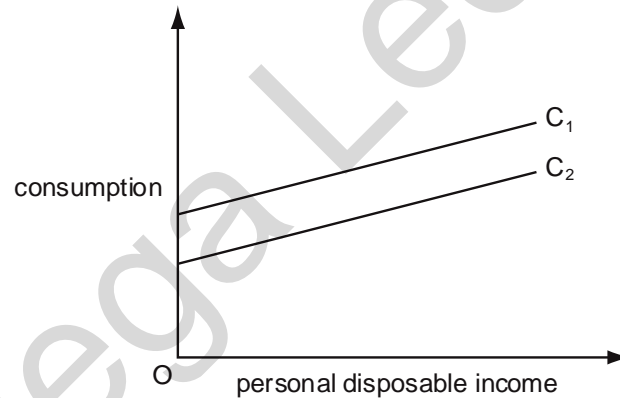


What is the value of the multiplier?

- A  $\frac{RS}{TU}$       B  $\frac{RS}{RU}$       C  $\frac{RU}{TU}$       D  $\frac{TU}{RU}$

J/09/3/18

- 12 A country's initial consumption function is  $C_1$ .



What would be most likely to cause the consumption function to shift from  $C_1$  to  $C_2$ ?

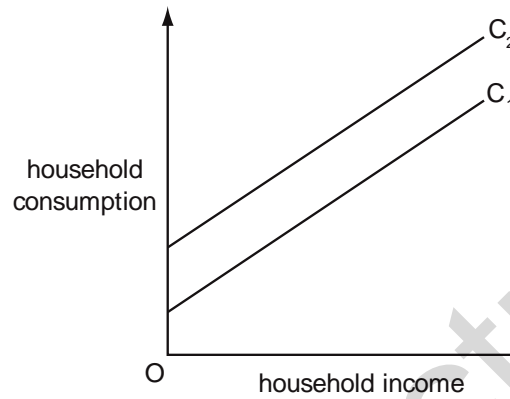
- A a decrease in personal disposable income  
 B a decrease in the expected future rates of income tax  
 C an increase in interest rates  
 D an increase in wealth

J/09/3/19

- 13** In a closed economy with no government  $C = 30 + 0.7Y$ , where  $C$  is consumption and  $Y$  is income.  
 The equilibrium level of income is 300.  
 What is the level of investment?  
**A** 60                      **B** 100                      **C** 210                      **D** 270

J/10/3/17

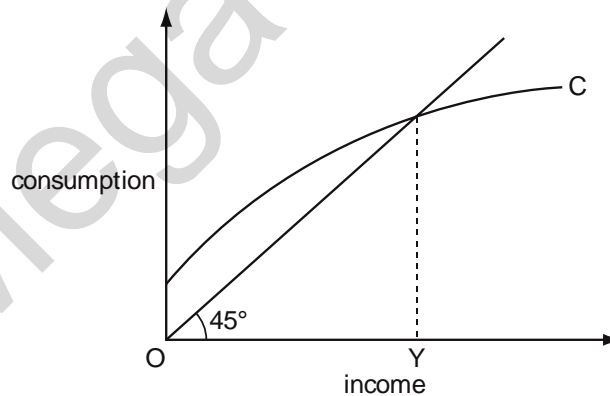
- 14** The diagram shows the relationship between household income and household consumption.



- What would be likely to cause the household consumption curve to shift from  $C_1$  to  $C_2$ ?  
**A** a decrease in household income  
**B** a decrease in the value of household assets  
**C** an increase in interest rates  
**D** an increase in the expected future level of household income

J/10/3/18

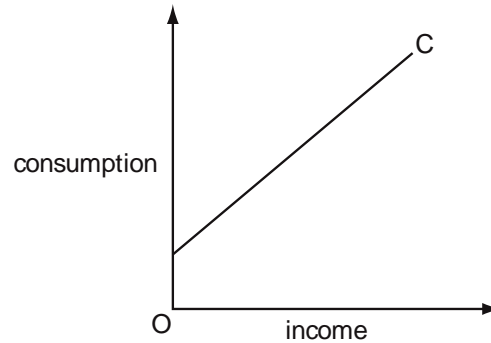
- 15** The diagram shows a consumption function for a closed economy with no government.



- What can be concluded from the diagram?  
**A** At income levels below  $OY$ , saving is negative.  
**B** At income levels below  $OY$ , there is an inflationary gap.  
**C** The equilibrium level of income is  $OY$ .  
**D** The marginal propensity to consume increases as income increases.

N/10/3/19

16 The diagram shows the relationship between consumption expenditure and income.

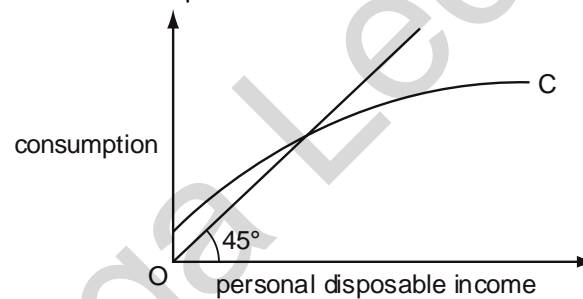


Which statement is correct?

- A The average propensity to consume is constant.
- B The average propensity to consume is rising.
- C The marginal propensity to consume is equal to the average propensity to consume.
- D The marginal propensity to consume is less than the average propensity to consume.

J/11/32/16

17 The diagram shows a consumption function.



As income increases, what happens to the average propensity to save and the marginal propensity to save?

	average propensity to save	marginal propensity to save
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

J/13/32/30

- 18** Without any change in government policy, what will be the effect of an economic recession on tax revenue and on government expenditure?

	tax revenue	government expenditure
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	increase
<b>D</b>	increase	decrease

N/14/32/23

- 19** In a closed economy with no government  $C = 40 + 0.8 Y$  and  $I = 60$ , where  $C$  is consumption,  $Y$  is income and  $I$  is investment. What is the equilibrium level of income?

**A** 80                      **B** 100                      **C** 300                      **D** 500

J/15/32/21

- 20** In a closed economy with no government, investment increases by \$400. At the new equilibrium level of income, consumption has increased by \$1200. What is the value of the investment multiplier?

**A** 2                      **B** 3                      **C** 4                      **D** 8

## Section: 21 Close Economy with Government (3 sectoral economy)

Analysis of a three sectoral economy introduces a third sector to us- the government, the influence of which stems through three powerful sources:

- (i) Government expenditures (G)
- (ii) Net Taxes (T) = Direct taxes – transfer payments
- (iii) Government lending and borrowing

Government budget, a statement of its expenditures and revenues is decided upon few months before a financial year begins so that government expenditures do not depend on the level of income of the year in which they are spent. Government expenditures are thus autonomous and given by:

$$G = G_0$$

Taxes can either be autonomous or induced. Autonomous taxes ( $T = T_0$ ) do not change with changes in national income. Although a real life example of autonomous taxes is impossible to find, the poll tax in UK (a tax on every adult member of population irrespective of his income) may be considered a good example.

Disposable income,  $Y_d$  is income less net taxes and therefore decreases whenever taxes rise

$$Y_d = Y - T$$

### Equilibrium Income in a Close Economy with Government

Consider the three types of expenditures in a three sectoral model: consumer expenditures (C), investment expenditures (I), Government expenditures (G).

$$E = C + I + G$$

Consumption function is given by:  $C = C_0 + cY_d$

Taxes are assumed to be income autonomous:  $T = T_0$

$$\begin{aligned} C &= C_0 + c(Y - T) \\ &= C_0 + c(Y - T_0) \\ &= C_0 + cY - cT_0 \end{aligned}$$

As known, investment and government expenditures are income autonomous.

$$\begin{aligned} I &= I_0 \\ G &= G_0 \end{aligned}$$

$$\begin{aligned} \text{Now, } E &= C + I + G \\ E &= C_0 + cY - cT_0 + I_0 + G_0 \\ Y &= E \\ Y &= C_0 + cY - cT_0 + I_0 + G_0 \end{aligned}$$

$$Y - cY = Co + Io + Go - cTo$$

Taking Y common:

$$Y(1 - c) = Co + Io + Go - cTo$$

$$Y = (Co + Io + Go - cTo) \frac{1}{1 - c}$$

**Example:** Calculate equilibrium national income for the economy with:

$$C = 100 + 0.8Y_d$$

$$I = Io = 100$$

$$G = Go = 75$$

$$T = To = 50$$

**Answer:**

$$C = 100 + 0.8Y_d$$

$$= 100 + 0.8(Y - T)$$

$$= 100 + 0.8(Y - 50)$$

$$= 100 + 0.8Y - 40$$

$$= 60 + 0.8Y$$

$$I = 100$$

$$G = 75$$

$$E = C + I + G$$

$$E = 60 + 0.8Y + 100 + 75$$

$$= 235 + 0.8Y$$

$$Y = E$$

$$Y = 235 + 0.8Y$$

$$Y - 0.8Y = 235$$

$$Y(1 - 0.8) = 235$$

$$Y = 235 \times \frac{1}{1 - 0.8}$$

$$= 235 \times 5$$

$$= 1175$$

Alternatively, national income may be calculated by directly multiplying autonomous expenditures with the expenditure multiplier. Autonomous expenditures equal  $Co + Io + Go - cTo$  ( $100 + 100 + 75 - 40 = 235$ ) and the multiplier, 5 so that equilibrium income becomes 1175.

It must be noted that only a fraction of tax,  $cTo$  is deducted from autonomous expenditures and not the entire tax amount. Taxes reduce disposable income by 50 and consumption (and hence expenditures) by 40 since marginal propensity to consume is 0.8.

Equilibrium income may also be determined using the withdrawals and injections approach. In this model, withdrawals are given by Savings (S) as well as Taxes, T, as they represent the portion of income paid to the government and hence unavailable to spend on goods and services.

$$\begin{aligned}\text{Withdrawals} &= \text{Savings} + \text{Taxes} \\ W &= S + T\end{aligned}$$

Investment expenditure (I) injects demand into the economy and so does government expenditure (G).

$$\begin{aligned}\text{Injections} &= \text{Investments} + \text{government expenditures} \\ J &= I + G\end{aligned}$$

Equilibrium income is achieved when demand withdrawals equal demand injections

$$\begin{aligned}W &= J \\ S + T &= I + G\end{aligned}$$

The following procedure shows how equilibrium national income is calculated:

$S = -100 + 0.2Y_d$  (Saving function is obtained by deducting consumption function from income)

$$I = I_o = 100$$

$$G = G_o = 75$$

$$T = T_o = 50$$

$$S + T = I + G$$

$$-100 + 0.2Y_d + 50 = 100 + 75$$

$$0.2(Y - T) = 175 - 50 + 100$$

$$0.2(Y - 50) = 225$$

$$0.2Y - 10 = 225$$

$$0.2Y = 225 + 10$$

$$0.2Y = 235$$

$$\begin{aligned}Y &= 235 \times \frac{1}{0.2} \\ &= 1175\end{aligned}$$

As expected, income calculated through income expenditure and leakages injections approaches is the same.

As stated earlier, government budget is a statement of its revenues (mainly taxes) and expenditures. A budget surplus is said to occur when tax revenues exceed government expenditures whereas a deficit results from tax revenues falling short of government expenditures. When taxes equal expenditures, we have a balanced budget. Budget deficit means a demand injection and budget surplus, demand withdrawal.

Government budget need not be balanced for equilibrium to hold in a close economy with government. Equilibrium income may still be achieved in case of a budget deficit, if savings exceed investments.

**Example:** Consider a budget deficit of Rs.20 bn and investment expenditures, I worth Rs.70 bn. Calculate savings, S for such an economy in equilibrium.

**Answer:** Budget deficit implies government expenditures, G exceed tax revenues, T by Rs.20 bn.



$$\begin{aligned} S + T &= I + G \\ S &= I + (G - T) \\ &= 70 + 20 \\ &= 90 \end{aligned}$$

Budget deficits show governments' dissaving. Private sector saving must therefore exceed private sector investment expenditures for the economy to be in equilibrium. In the example given above, savings exceed investment expenditures by 20 i.e. private sector surplus equals public sector (government) deficit and thus, the economy is in equilibrium.

Summing up, in a three sectoral model (when taxes are autonomous):

- There are 3 sectors: households, firms and government
- Expenditures are: consumer expenditures (C), investment expenditures (I) and government expenditures (G)
- The two demand injections (J) are investment expenditures (I) and government expenditures (G)
- The two demand withdrawals (W) are savings (S) and Taxes (T)
- Autonomous expenditures are given by:  $A = C_0 + I_0 + G_0 - cT_0$
- Marginal propensity to spend equals marginal propensity to consume i.e.  $MPE = MPC$
- Marginal propensity to withdraw equals marginal propensity to save i.e.  $MPW = MPS$
- Autonomous expenditure multiplier is given by  $\frac{1}{1-c}$  or  $\frac{1}{s}$ .

## Equilibrium National Income (Three Sectoral Economy)- Graphical Analysis

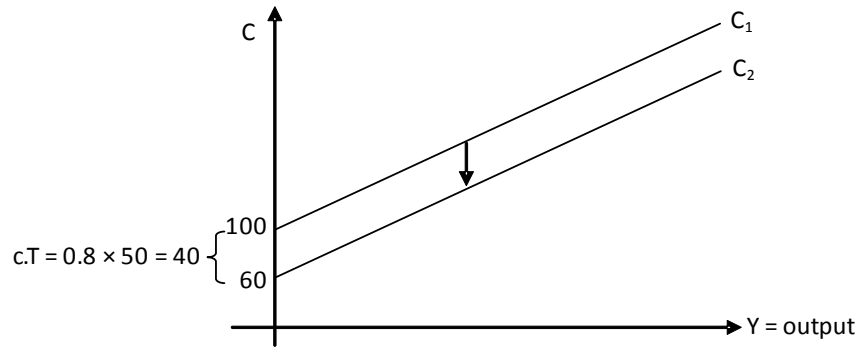
Consider consumer, investment and government expenditures being given by following equations:

$$\begin{aligned} C &= C_0 + cY_d \\ &= 100 + 0.8Y_d \\ &= 100 + 0.8(Y - T) \\ &= 100 + 0.8(Y - 50) \\ &= 100 + 0.8Y - 40 \\ &= 60 + 0.8Y \end{aligned} \qquad I = I_0 = 100 \qquad G = G_0 = 75$$

$$T = T_0 = 50$$

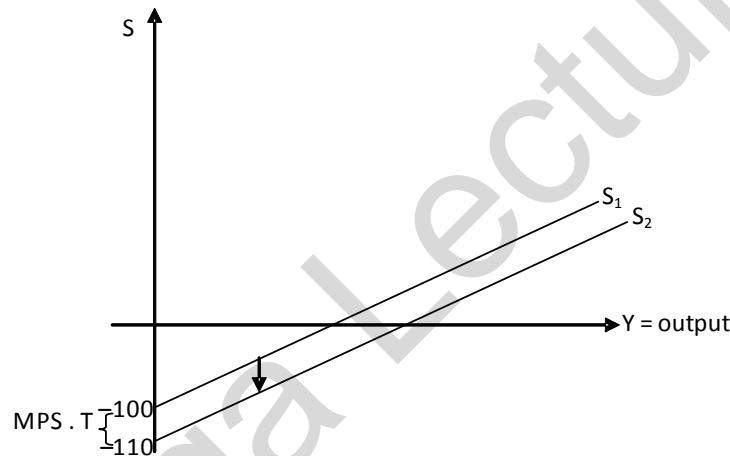
Diagram 21.1(a) shows consumption function  $C_1$  without taxes. The imposition of autonomous taxes equaling 50 causes a parallel shift of the function downwards by 40, so that  $C_2$  lies below  $C_1$  but possesses the same slope or marginal propensity to consume. Disposable income is reduced by 50 at every income level and consumption, by 40 as marginal propensity to consume is 0.8.

Diagram 21.1(a)



Given that consumption function is given by  $C = 100 + 0.8Y_d$ , saving function becomes  $S = -100 + 0.2Y_d$ . The imposition of autonomous taxes of 50 decreases disposable income by 50 and savings by 10 ( $MPS \times T = 0.2 \times 50$ ) at every income level. Autonomous taxes cause a downward parallel shift in the saving function, as shown in diagram 21.1(b).

Diagram 21.1(b)



Autonomous taxes therefore:

- do not alter the slope of consumption, saving and expenditure functions
- reduce the vertical intercepts of consumption and expenditure functions by an amount equaling the product of marginal propensity to consume and the amount of tax levied
- reduce the vertical intercept of saving function by an amount equaling the product of marginal propensity to save and the tax amount

Diagrams 21.1(c) & (d) show investment and government expenditure functions as straight, horizontal lines as they are income autonomous.

Diagram 21.1(c)

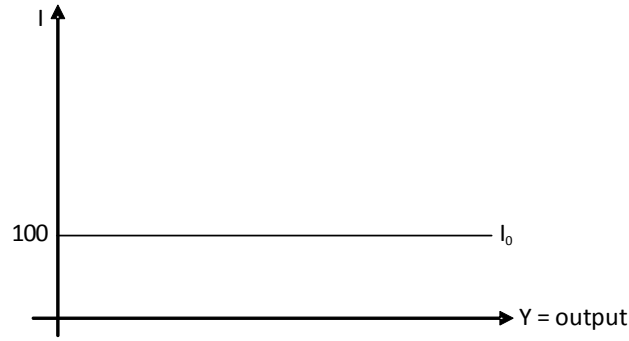
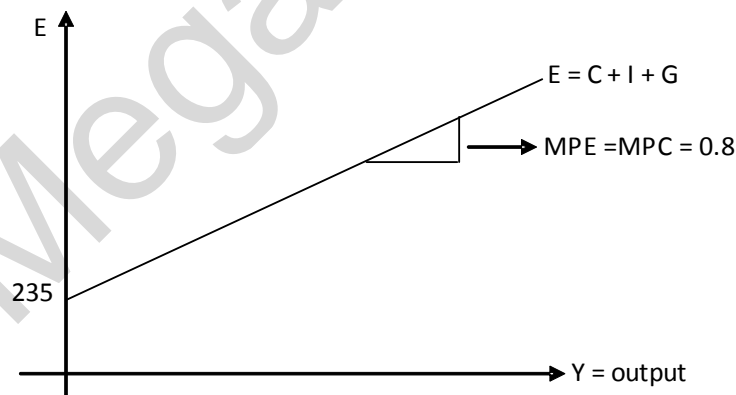


Diagram 21.1(d)



We may now aggregate these expenditure functions (consumer, investment and government) as shown in diagram 21.1(e). The vertical intercept shows autonomous expenditures, A, as 235- the sum of  $(C_0 - cT_0)$ ,  $I_0$  and  $G_0$  ( $75 - (0.8 \times 50) + 100 + 75 = 235$ ). The slope of the expenditure function is given by marginal propensity to consume (MPE=MPC) as slopes of government and investment functions are zero.

Diagram 21.1(e)

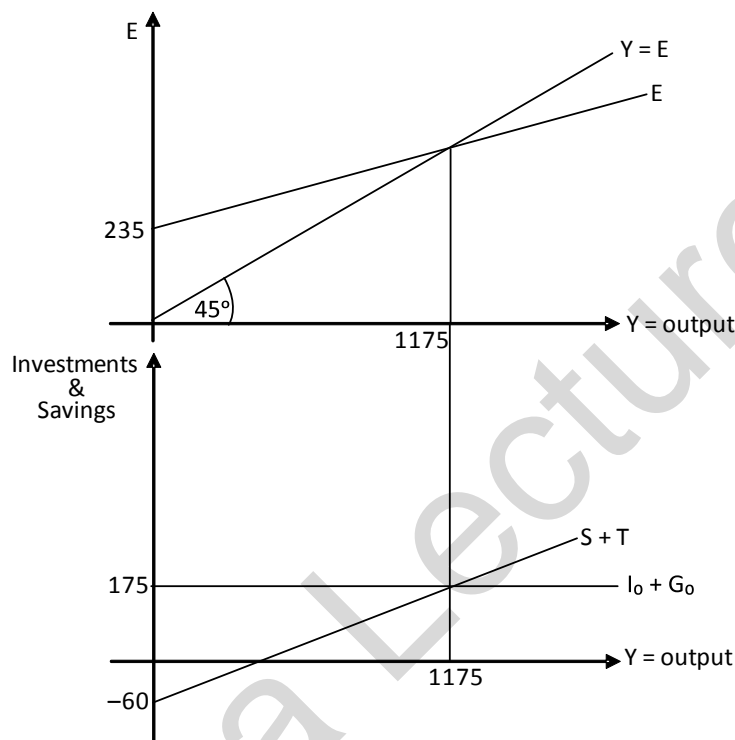


The upper panel in diagram 21.2 shows how equilibrium income is determined by the intersection of the  $45^\circ$  line and the expenditure function. The lower panel demonstrates the injection and withdrawal approach for a three sectoral model, where injections are given by investment and government expenditures ( $I_0 + G_0 = 100 + 75 = 175$ ) and withdrawals, by savings and taxes. As

shown in diagram 19.2 and explained earlier, autonomous taxes shift the saving function downward by 10. This shift decreases the vertical intercept of saving function to -110 (see diagram 21.1 (b)). Since taxes are 50, the vertical intercept of withdrawal function becomes -60 (-110 + 50).

It must be noted that the vertical intercept of the expenditure functions equals demand injections' intercept less withdrawals' (175 - (-60) = 235). The product of autonomous expenditures, 235, and expenditure multiplier, 5 determines equilibrium income at 1175.

Diagram 21.2



### Impacts of changes in autonomous taxes on equilibrium income

The concept of the tax multiplier is crucial to understanding the impact on equilibrium income, of changes in autonomous taxes. The autonomous tax multiplier is less than the expenditure multiplier since the imposition of taxes changes expenditures by only a fraction of the tax amount. Increased taxes reduce consumer expenditures by an amount equaling the product of the tax amount and marginal propensity to consume.

The tax multiplier may be derived as follows:

$$Y = A \times \frac{1}{1 - e}$$

$$Y = (C_0 + I_0 + G_0 - cT_0) \frac{1}{1 - c}$$

$$\Delta Y = (\Delta C_0 + \Delta I_0 + \Delta G_0 - c\Delta T_0) \frac{1}{s}$$

$\Delta Y = \Delta T_o \left(-\frac{c}{s}\right)$  assuming that  $C_o$ ,  $I_o$  and  $G_o$  remain unchanged

The equation above shows how changes in income may be calculated when autonomous taxes change.  $-\frac{c}{s}$  shows the autonomous tax multiplier, which is negative since national income decreases when taxes rise. The value of the autonomous tax multiplier is less than that of the expenditure multiplier by 1.

Autonomous tax multiplier = 1 - Autonomous expenditure multiplier

$$-\frac{c}{s} = 1 - \frac{1}{s}$$

### Transfer Payment Multiplier

Net taxes are taxes less transfer payments i.e. payments received but not earned like pensions, unemployment allowances, old age benefits and social security payments. They are excluded from national income since no production activity takes place against such payments.

Transfer payment multiplier is positive since increased transfer payments raise disposable income, consumption and hence national income. The co-efficient of transfer payment multiplier however, equals that of the autonomous tax multiplier.

$$\text{Transfer payment multiplier} = \frac{c}{s}$$

**Question:** Explain the impact on national income if taxes and pensions rise by the same amount

**Answer:** Whereas increased taxes decrease national income, increased transfer payments have an expansionary effect on it. Change in national income equals the sum of changes resulting from changes in both taxes and transfer payments

$$\Delta Y = \Delta \text{transfer payments} \times \frac{c}{s} + \Delta \text{taxes} \times \frac{-c}{s}$$

$$\Delta Y = \frac{c}{s} (\Delta \text{transfer payment} - \Delta \text{taxes})$$

Increasing taxes and transfer payments by the same amount has a neutral impact on national income. However, the transfer payment multiplier may differ from the tax multiplier in reality. Pension holders are relatively poor and have no option but to spend a higher fraction of their income, thus their marginal propensity to consume is likely to exceed that of tax payers who are usually rich and able to save more, implying a lower MPC. Thus tax multiplier is likely to be less than the transfer payment multiplier so increasing taxes and pensions by the same amount may have an expansionary effect on national income.

It must be noted however, that increased taxes reduce the post tax wage rate and assuming an upward rising supply curve for labour, induce workers to work for fewer hours. Likewise, increased pensions may prompt workers to seek early retirements. The combined effect on national income of increased taxes and pensions in this case is contractionary, as such a policy dampens the incentive to work.

## Induced Taxes

Induced taxes are those, the amount of which varies directly with income. In a linear equation, the tax rate,  $t$ , stays the same so that induced taxes may be given by the following equation:

$$T = tY$$

Equilibrium income in a close economy with government and induced taxes are induced may be calculated in the following manner:

$$Y_d = Y - T$$
$$T = tY$$

$$C = C_o + cY_d$$
$$= C_o + c(Y - T)$$
$$= C_o + c(Y - tY)$$
$$= C_o + cY - ctY$$

$$I = I_o$$
$$G = G_o$$

$$E = C + I + G$$
$$E = C_o + cY - ctY + I_o + G_o$$

$$Y = E$$
$$Y = C_o + cY - ctY + I_o + G_o$$
$$Y - cY + ctY = C_o + I_o + G_o$$

Taking Y common:

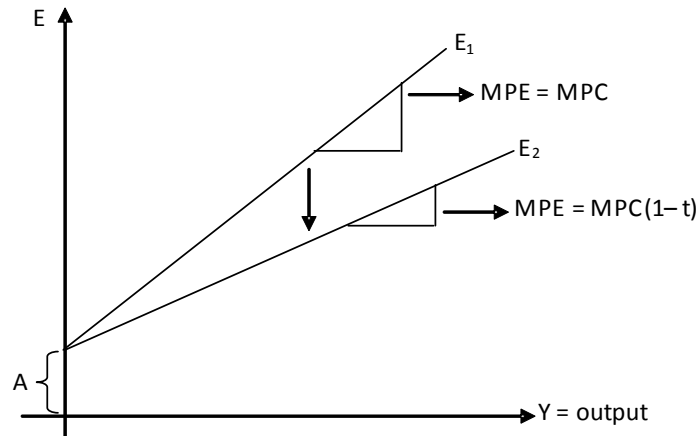
$$Y(1 - c + ct) = C_o + I_o + G_o$$

Taking c common:

$$Y(1 - c(1 - t)) = C_o + I_o + G_o$$
$$Y = (C_o + I_o + G_o) \frac{1}{(1 - c(1 - t))}$$

Diagram 21.3 shows expenditure function  $E_1$  without taxes, with its slope equaling both marginal propensities to spend and consume ( $MPE = MPC$ ). Induced taxes reduce expenditures and cause the function to shift downwards to  $E_2$ , which has a smaller slope equaling  $MPC(1 - t)$ . The vertical intercept of the expenditure function remains unchanged.

Diagram 21.3



Induced taxes do not change the vertical intercept but reduce the slope of the expenditure function whereas autonomous taxes do not change the slope but reduce the vertical intercept.

Induced taxes also create a divergence between marginal propensities to spend and consume, which were equal so far. Marginal propensity to spend decreases after the imposition of induced taxes and equals  $MPC(1-t)$ . The new expenditure function is flatter and decreases equilibrium income since it intersects the 45° line at a lower income level.

Expenditure function	Without taxes	After taxes	
		Autonomous taxes	Induced taxes
Vertical intercept (A)	$C_0 + I_0 + G_0$	$C_0 + I_0 + G_0 - cT_0$	$C_0 + I_0 + G_0$
Slope (MPE)	MPC	MPC	$MPC(1-t)$

To understand the difference between marginal propensity to spend ( $MPE = e$ ) and marginal propensity to consume ( $MPC = c$ ) assume that MPC before tax equals 0.8 and tax rate, 20% so that increased income of £1 raises taxes by £0.2 and disposable income by £0.8. Consumers increase spending by £0.64 ( $MPC \times \Delta Y_d = 0.8 \times 0.8$ ) and savings by £0.16 ( $MPS \times \Delta Y_d = 0.2 \times 0.8$ ).

Marginal propensity to spend is a fraction of an added £ in income that is spent, 0.64 in this case.

$$MPE = MPC(1-t) = 0.8(1-0.2) = 0.8(0.8) = 0.64$$

The autonomous expenditure multiplier is  $\frac{1}{(1-c(1-t))}$  and decreases whenever the tax rate rises.

Marginal propensity to tax, MPT is the fraction of an added £ in income that is taxed. It equals tax rate,  $t$ , if tax rate does not change with changes in income.

In the example given above, marginal propensity to consume is 0.8 and tax rate is 0.2. Plugging these values in the formula for expenditure multiplier, we get:

$$\frac{1}{(1-c(1-t))} = \frac{1}{(1-0.8(1-0.2))} = \frac{1}{(1-0.8(0.8))} = \frac{1}{1-0.64} = \frac{1}{0.36} = 2.78$$

We observe that the expenditure multiplier is the inverse of marginal propensity to withdraw, the sum of marginal propensities to save and tax.

$$MPW = MPS + MPT$$

$$e = \frac{1}{MPS + MPT} = \frac{1}{s + t} = \frac{1}{0.16 + 0.20} = \frac{1}{0.36} = 2.78$$

Marginal propensity to save before tax is 0.2 (since marginal propensity to consume is 0.8) but marginal propensity to save after tax is 0.16 since increased income of £1 increases disposable income by £0.8 (taxes increase by £0.2) and savings increase by £0.16. Marginal propensity to tax is 0.2. Marginal propensity to withdraw equals the sum of marginal propensity to save (post taxes) and marginal propensity to tax.

## Inflationary and Deflationary Gaps

Full employment level of national income is obtained when all available factors of production are fully utilized to produce output. Inflationary or deflationary gaps result whenever an economy produces an output level where its equilibrium differs from the full employment income level.

Inflationary or deflationary gaps are the vertical distances between the 45° line and expenditure function at full employment. Diagram 21.4(a) shows an economy operating at full employment output level. The 45° line and expenditure function coincide at  $Y_e$ , hence there is neither an inflationary nor a deflationary gap.

Diagram 21.4(a)

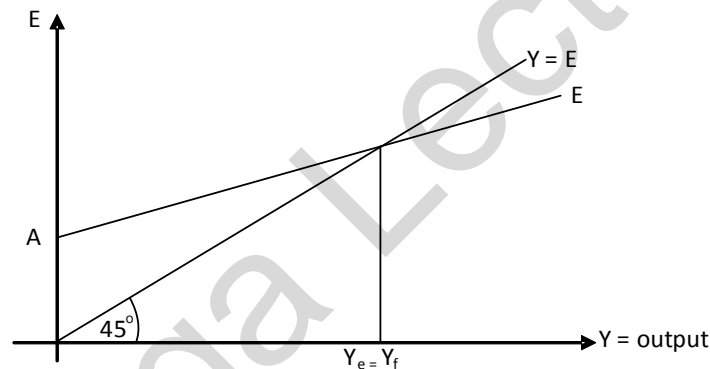
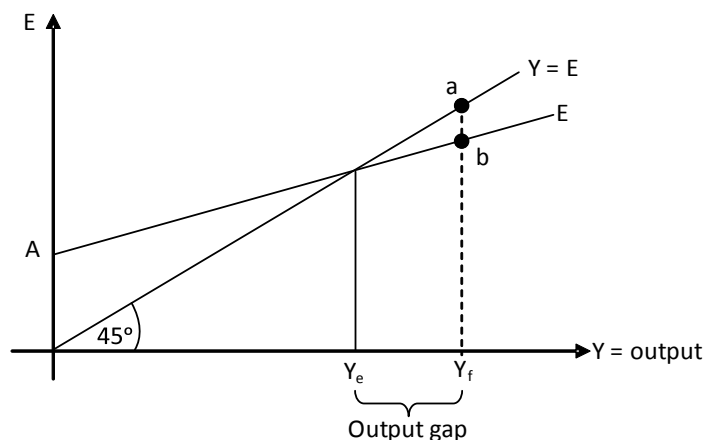


Diagram 21.4(b) shows a deflationary gap, which occurs when the expenditure function lies below the 45° line at the full employment level of output. The economy produces an output level below that of full employment and hence faces unemployment. 'ab', the vertical distance between the expenditure function and the 45° line measures the deflationary gap at full employment. The gap in output is represented by the difference between output at full employment and the output currently made.

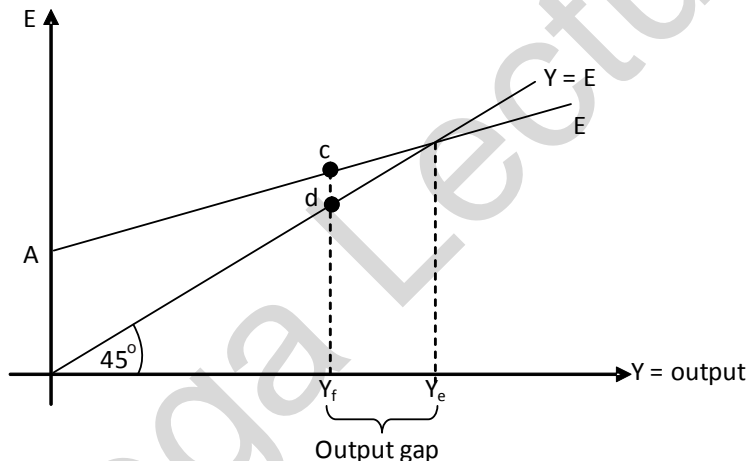


Diagram 21.4(b)



An inflationary gap, 'cd' is shown in diagram 21.4(c), occurring when the expenditure function lies above the 45° line at the full employment level. In this case, the economy is overheated and produces at an output level above full employment.

Diagram 21.4(c)



### Filling inflationary and deflationary gaps

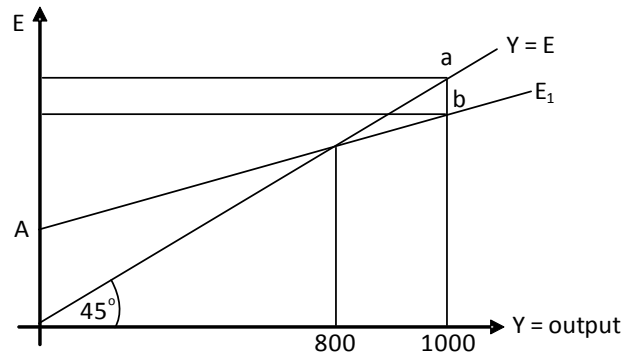
Deflationary gaps can be eliminated by increasing autonomous expenditures, which through the multiplier effect, bring about a larger change in national income. A deflationary gap may be filled in the following ways:

- (i) Government expenditures increase
- (ii) Taxes decrease
- (iii) Governments wanting balanced budgets increase their spending and taxes by the same amount

Diagram 21.5(a) shows an expenditure function  $E_1$  with vertical intercept  $A$  and slope (MPE), 0.8. The economy produces output worth 800 whereas income at full employment is 1000. There

exists an output gap of 200 and a deflationary gap, 'ab'. Students are urged to calculate this gap, along with the value of A before they discover the answers in the ensuing text.

Diagram 21.5(a)



The vertical intercept may be calculated as follows:

$$Y = A \cdot \frac{1}{1-e}$$

$$800 = A \cdot \frac{1}{1-0.8}$$

$$800 = A \cdot 5$$

$$A = 160$$

Point 'a' lies on the 45° line, thus income and expenditures equal each other at this point. However, point 'b' is below 45° line showing that expenditures fall short of income. Expenditures at 'b' (full employment level) may be calculated by as:

$$E = A + eY = 160 + 0.8(1000) = 160 + 800 = 960$$

**Question:** Calculate the vertical intercept of the withdrawal function for the given example, assuming autonomous demand injections are 50.

**Answer:** The vertical intercept of the expenditure function, A measures the difference between the intercepts of demand injections and demand withdrawals.

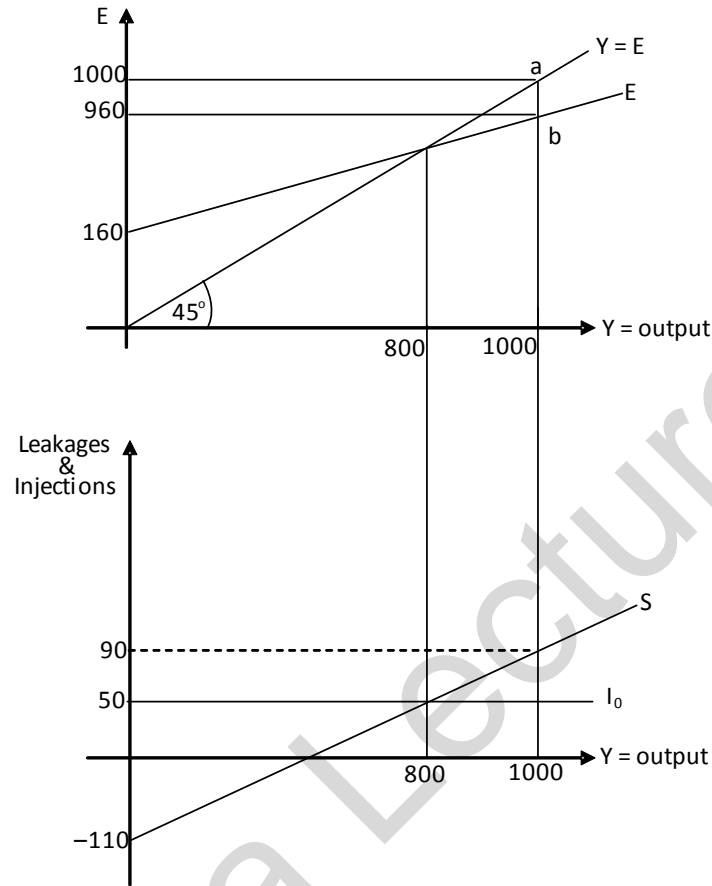
$$A = \text{Vertical intercept of demand injections} - \text{vertical intercept of demand withdrawals}$$

$$\begin{aligned} \text{Vertical intercept of demand withdrawals} &= \text{vertical intercept of demand injections} - A \\ &= 50 - 160 \\ &= -110 \end{aligned}$$

The vertical distance between the 45° line and the expenditure function or between injections and withdrawals functions at full employment level captures the deflationary gap. This gap, equaling 40 in the given example may be filled if government spending, G, increases by 40 or taxes decrease by an amount higher than 40. Since the tax multiplier is less than the expenditure multiplier, a greater change in taxes is required to bring about the same desired change in national income.

Can you calculate the needed change in taxes to fill this deflationary gap?

Diagram 21.5(b)

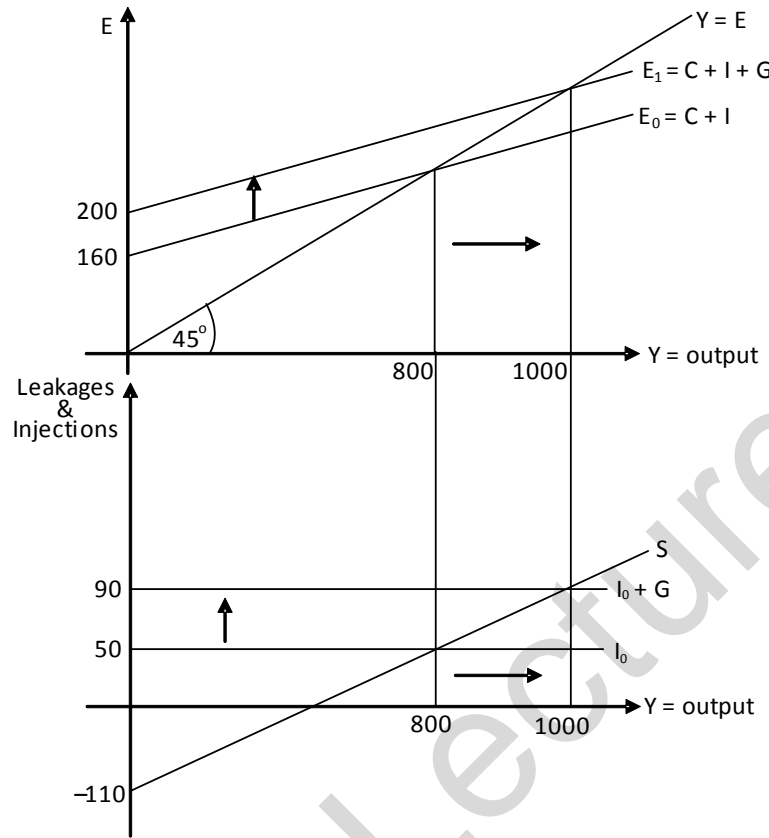


**Impacts of increased government spending on national income**

Diagram 21.6(a) shows what happens if the government decides to raise spending by 40. The expenditure function shifts upwards and raises equilibrium national income to 1000. As may well be known by now, increase in national income is larger than increase in expenditures because of the multiplier effect (multiplier=5 in this case).

The lower panel shows that increasing government expenditures shifts the injection function upwards from  $I_0$  to  $(I_0 + G)$ . Equilibrium income which is determined by the intersection of injections and withdrawals functions increases from 800 to 1000.

Diagram 21.6(a)



**Impacts of decreased taxes on national income**

The tax multiplier is negative and less than the expenditure multiplier by 1. Since the latter is 5, the tax multiplier is -4. Taxes must be decreased by 50 if national income is to increase by 200 and reach full employment.

$$\Delta Y = \Delta T \cdot \text{Tax multiplier}$$

$$= \Delta T (-4)$$

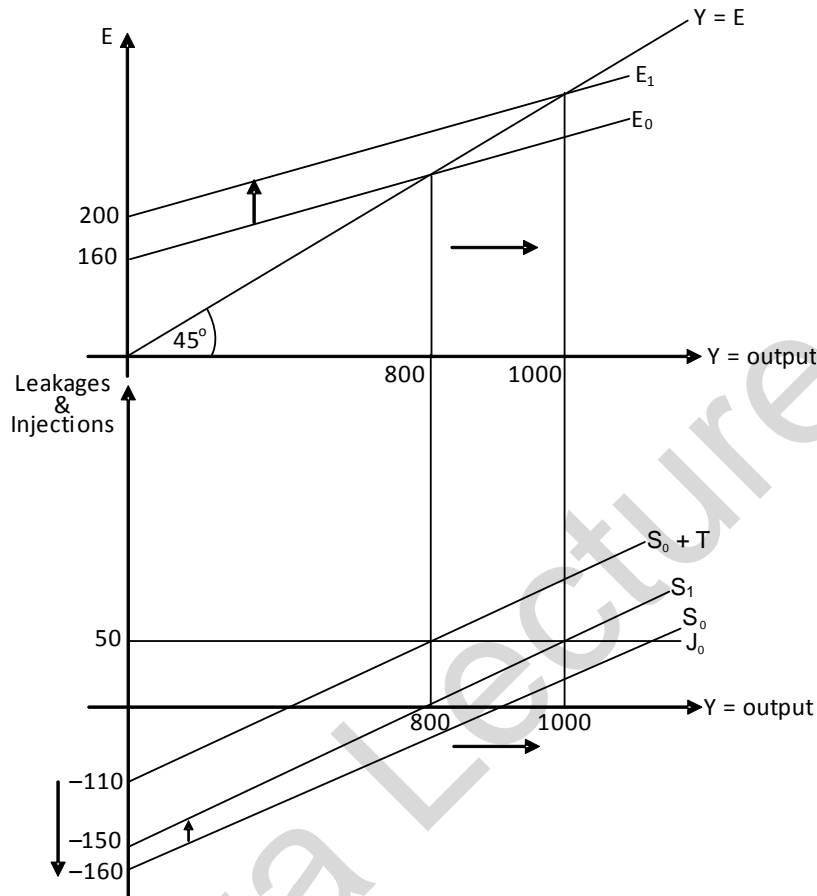
$$\Delta T = \frac{\Delta Y}{-4} = \frac{200}{-4} = -50$$

Consider the upper panel in the pair of diagrams shown in figure 21.6(b). Decreasing taxes by 50 raises disposable income by 50 and spending by 40 ( $MPC \cdot \Delta Y_d = 0.8 \times 50$ ). This increase in consumer expenditures shifts the expenditure function upwards, from  $E_0$  to  $E_1$  by 40 and increases national income from 800 to 1000.

The lower panel shows how decreased taxes shift the withdrawal curve ( $S_0 + T$ ) downwards by 50. Taxes, which were assumed to be 50, become zero and savings remain the only withdrawal. However, decreased taxes raise disposable income by 50 and savings by 10 at every income

level so the saving function shifts upwards by 10. The new saving function,  $S_1$  intersects the injection function,  $J_0$  at an equilibrium income of 1000.

Diagram 21.6(b)



### Impacts of a balanced budget policy on national income

Changes in government spending and taxes of the same amount and direction change national income with the same amount and in the same direction. Governments willing to pursue a balanced budget may raise government spending and taxes by 200 to fill the deflationary gap and increase national income by 200. Increasing government spending,  $G$ , by 200 increases national income by 1000:

$$\Delta G \cdot K = \Delta Y$$

$$200 \cdot 5 = 1000$$

Increasing taxes by 200 reduces equilibrium income by 800.

$$\Delta T \cdot \text{Tax multiplier} = \Delta Y$$

$$200 \cdot (-4) = -800$$

The resulting effect is an increase in national income of 200. The balanced budget multiplier is the sum of the autonomous expenditure and tax multipliers and equals unity.

$$\text{Balanced budget multiplier} = \text{expenditure multiplier} + \text{tax multiplier} = \frac{1}{1-c} + \frac{-c}{1-c} = \frac{1-c}{1-c} = 1$$

Summing up, a government can fill a deflationary gap by either:

- (i) increasing government spending by the amount of the deflationary gap, or
- (ii) decreasing taxes by an amount higher than the deflationary gap ( $\frac{\text{deflationary gap}}{mpc}$ ), or
- (iii) increasing government spending and taxes by the same amount, equal to the output gap.

Likewise, an inflationary gap may be dealt with, by either:

- (i) decreasing government spending by the amount of the inflationary gap, or
- (ii) increasing taxes by an amount higher than the inflationary gap, or
- (iii) decreasing government spending and taxes by the same amount, equal to the output gap.

## Systems of Taxation

There exist three tax systems:

- (i) Progressive
- (ii) Proportionate
- (iii) Regressive

### Progressive taxation

This system calls for increasing the tax rate with increase in income i.e. rich people pay a greater portion of their income in taxes. Consider the following example of a progressive tax system.

Progressive taxation			
Y (individual's income)	Tax rate(t) = ART	Tax amount (T)	MRT
0	-	0	-
100	10%	10	10%
200	12%	24	14%
300	14%	42	18%

The tax rate,  $t$ , rises as the individual's income increases. The tax rate also equals the Average Rate of Tax (ART).

$$\begin{aligned} \text{Average Rate of Tax} &= \frac{\text{Tax amount}}{\text{Income}} \\ \text{ART} &= \frac{T}{Y} \\ &= \frac{\text{tax rate} \times \text{income}}{Y} \\ &= \frac{t \times Y}{Y} \\ &= t \end{aligned}$$

Marginal Rate of Tax (MRT) shows additional tax paid due to an increase in income. It is the ratio of change in tax amount and change in income

$$\text{MRT} = \frac{\Delta T}{\Delta Y}$$

For a progressive system of taxation:

- Tax rate ( $t$ ) increases with every increase in income.
- Tax amount increases more than proportionately when income increases
- Marginal Rate of Tax (MRT) exceeds the tax rate ( $t$ ).

### Proportionate Taxation

This system charges the same tax rate, irrespective of the level of income. The following table presents an example of proportionate taxation.

Proportionate taxation			
Y	Tax rate(t) = ART	Tax amount (T)	MRT
0	10%	0	-
100	10%	10	10%
200	10%	20	10%
300	10%	30	10%

For a proportionate tax system:

- Tax rate (t) stays the same at every income level.
- Tax amount increases proportionately when income increases.
- Marginal Rate of Tax (MRT) equals tax rate (t).

### Regressive Taxation

This system of taxation has a decreasing tax rate for every increase in income. Consider the following tables as examples of regressive taxation

#### Regressive Taxation

(Case I)			
Y	Tax rate(t) = ART	Tax amount (T)	MRT
0	-	0	-
100	10%	10	10%
200	8%	16	6%
300	6%	18	2%

(Case II)			
Y	Tax rate(t) = ART	Tax amount (T)	MRT
0	$\infty$	10	-
100	10%	10	0%
200	5%	10	0%
300	3.33%	10	0%

(Case III)			
Y	Tax rate(t) = ART	Tax amount (T)	MRT
0	-	0	-
100	10%	10	10%
200	4%	8	-2%
300	2%	6	-2%

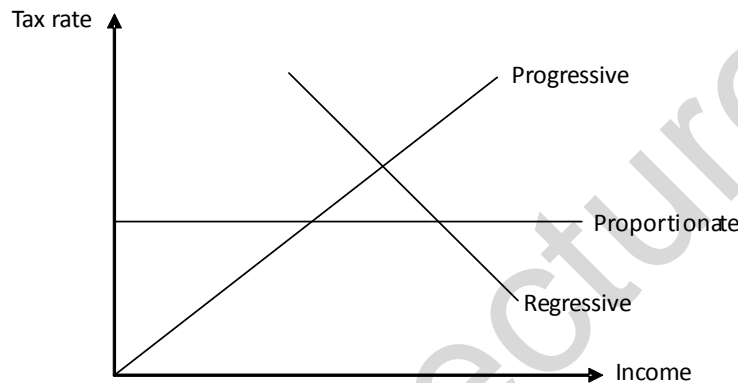
For regressive taxation:

- Tax rate (t) decreases with every increase in income.
- Tax amount can increase, stay the same or can even decrease when income increases.
- Marginal Rate of Tax (MRT) is less than the rate of tax (t).
- Marginal Rate of Tax (MRT) is positive when tax amount increases. However, tax amount increases less than proportionately with increases in income. Case I shows a situation where tax rate decreases when income increases but tax amount still increases.

- Marginal Rate of Tax (MRT) is zero when tax amount does not change with increase in income. This happens in the case of autonomous taxes- taxes that do not vary with changes in income, as in case II. All autonomous taxes are regressive in their impact but all regressive taxes are not autonomous.
- Case III shows a situation where tax amount decreases with increase in income. In this case, Marginal Rate of Tax (MRT) is negative.
- All indirect taxes (taxes on expenditures) are regressive in their impact since rich people are less affected by them. Thus countries collecting a greater portion of tax revenues through indirect taxes and less through direct taxes have a less progressive tax system.

Diagram 21.7 provides a graphical representation of the three systems of taxation

Diagram 21.7



### Principles of taxation and systems of taxation

Equity and efficiency are the two fundamental principles of taxation. A progressive tax system is more likely to satisfy the principle of equity as it leads to a more equal distribution of income. Rich people pay a greater portion of their income as taxes, thus reducing gap between the incomes of the rich and poor. However, a highly progressive tax system dampens the incentive to work as a high top tax rate (tax rate at the highest income range) discourages people to work and forces them to invest less (try J/08/3/14). High income earners are encouraged to work and invest under a less progressive system of taxation so it is more likely to satisfy the principle of efficiency. However, this comes at the cost of a less equal distribution of income.

Example: J/02/3/16

Which of the following elements of a tax and benefits system is regressive?

- A** the taxation of capital gains
- B** the payment of child benefits to families
- C** specific taxes on beer and tobacco
- D** rent subsidies to tenants of publicly owned housing

Option A: Capital gain is the excess of sale and purchase price of an asset and is common in the real estate and stock markets. Investment in real estate and stock markets usually comes from rich people, so taxation of capital gains affects them more, making the system progressive.



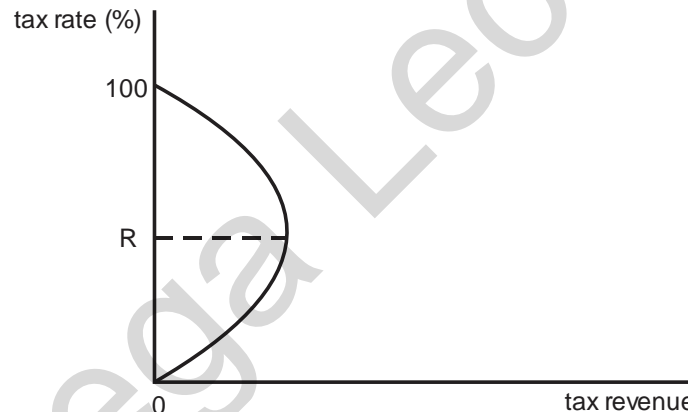
Option B: Paying child benefits to families benefits poor income earners more than the rich. Thus, this presents a progressive system of tax and benefit, where rich people pay a greater portion of their income as taxes or get benefits worth a smaller portion of their income.

Option C: This is an example of indirect tax, which does not increase with increase in income. Thus rich people pay a smaller portion of their income as indirect taxes. Indirect taxes are regressive in their impact so option C is the correct answer.

Option D: Publicly owned houses are built by governments for use by poor families who may not afford accommodation otherwise. A subsidy on rent of publicly owned housing benefits poor income earners more, making it an example of progressive taxation.

## Laffer Curve

Laffer curve is a curve depicting the possible relationship between INCOME TAX rates and total TAX revenue received by the government. Fig. shows a typical Laffer curve. As tax rates per pound of income are raised by the government, total tax revenue or yield initially increases. However, if tax rate is increased beyond OR, then this higher tax rate has a disincentive effect so that fewer people will offer themselves for employment and existing workers will not be inclined to work overtime. The result is that the tax base declines and government tax receipts fall at higher tax rates. The possible Laffer curve relationship has been used by governments in recent years as a justification for cuts in tax rates as part of a programme of work incentives, which is often regarded as a supply side tool.



## Nudge Theory

Nudge Theory (or Nudge) is a concept in behavioural science, political theory and economics which argues that positive reinforcement and indirect suggestions to try to achieve non-forced compliance can influence the motives, incentives and decision making of groups and individuals, at least as effectively – if not more effectively – than direct instruction, legislation, or enforcement. “A nudge, as we will use the term, is any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not.”

### **Means-Tested Benefit**

A Means-Tested Benefit in the United Kingdom is a payment available to people who can demonstrate that their income and capital are below specified limits. It is a central part of the Welfare state in the United Kingdom for example Income Support, Pension Credit, Guarantee Credit, Child Tax Credit, Housing Benefit etc.

### **Negative Income Tax**

In economics, a negative income tax (NIT) is a progressive income tax system where people earning below a certain amount receive supplemental pay from the government instead of paying taxes to the government. Such a system has been discussed by economists but never fully implemented.

In a negative income tax system, people earning a certain income level would owe no taxes; those earning more than that would pay a proportion of their income above that level; and those below that level would receive a payment of a proportion of their shortfall, which is the amount their income falls below that level.

Mega Lecture

## Multiple Choice Questions (Section 21)

### Inflationary and Deflationary Gaps

#### Systems of Taxation

J/02/3/16

1 Which of the following elements of a tax and benefits system is regressive?

- A the taxation of capital gains
- B the payment of child benefits to families
- C specific taxes on beer and tobacco
- D rent subsidies to tenants of publicly owned housing

N/02/3/13

2 The table shows the marginal tax rates paid by a country's taxpayers at different levels of income.

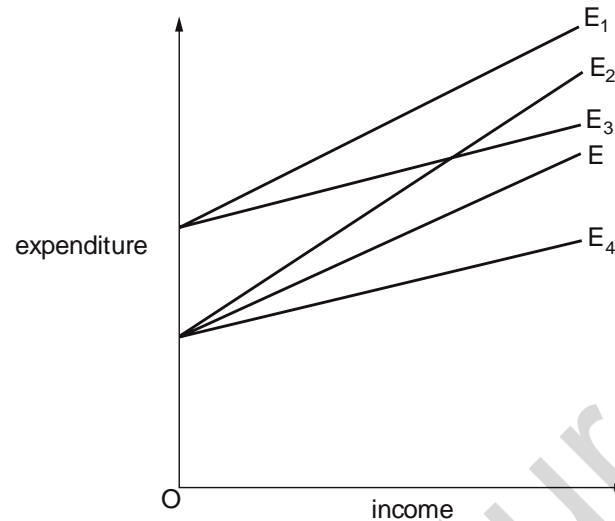
income	tax rate
first \$4000	zero
\$4001 - \$20 000	20%
above \$20 000	40%

Which of the following correctly describes this tax?

- A It is regressive over the entire range of income.
- B It is proportional over the income range \$4001 – \$20 000.
- C It is proportional over the range of income above \$20 000.
- D It is progressive over the range of income above \$4000.

N/02/3/16

- 3 The diagram shows a number of expenditure functions. The original expenditure function is shown by E.



The government announces an increase in government expenditure on goods and services and increases the standard rate of income tax.

Which line shows the new expenditure function resulting from these changes?

- |          |                |          |                |
|----------|----------------|----------|----------------|
| <b>A</b> | E <sub>1</sub> | <b>B</b> | E <sub>2</sub> |
| <b>C</b> | E <sub>3</sub> | <b>D</b> | E <sub>4</sub> |

N/02/3/20

- 4 In a closed economy, the full employment level of income is \$90 million,  $C = \frac{2}{3}Y$  and  $I = \$ (40 - 3r)$  million, where  $C$  = consumption,  $Y$  = income,  $I$  = investment and  $r$  = the rate of interest.

If planned government expenditure is \$20 million, what rate of interest would be required for there to be full employment?

- |          |               |
|----------|---------------|
| <b>A</b> | 10% per annum |
| <b>B</b> | 12% per annum |
| <b>C</b> | 14% per annum |
| <b>D</b> | 16% per annum |

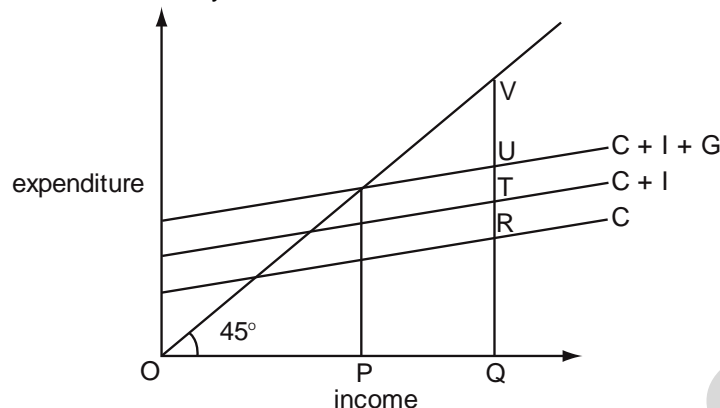
N/02/3/24

- 5 In a closed economy with no government the full employment level of output is \$25 million, the actual level of output is \$20 million, and the marginal propensity to consume is  $\frac{4}{5}$ . What is the size of the deflationary gap?

- |          |              |
|----------|--------------|
| <b>A</b> | \$1 million  |
| <b>B</b> | \$4 million  |
| <b>C</b> | \$5 million  |
| <b>D</b> | \$16 million |

J/03/3/19

- 6 In the diagram, OP is the equilibrium level of income and OQ the full employment level of income in a closed economy.

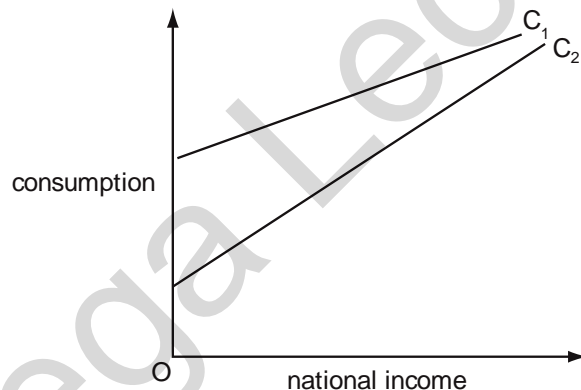


What is the deflationary gap?

- A RV                      B TV                      C UV                      D PQ

J/03/3/22

- 7 In the diagram,  $C_1$  shows the initial relationship between consumption and national income.



What could cause the consumption function to shift to  $C_2$ ?

- A an increase in exports  
B an increase in investment  
C a decrease in the rate of unemployment benefits  
D a decrease in the standard rate of income tax

N/03/3/18

- 8 A regressive tax is defined as one which requires  
A all taxpayers to pay the same absolute amount of their income in taxation.  
B high income earners to pay less in taxes than low income earners.  
C high income earners to pay more in taxes than low income earners.  
D high income earners to pay a lower proportion of their income in taxes than low income earners.

J/04/3/19

- 9** In an economy, the marginal propensity to consume of the unemployed is higher than that of taxpayers.

The government increases both expenditure on unemployment benefits and taxation by \$10 million.

What will be the impact on aggregate demand?

- A** It will be unchanged.
- B** It will increase by less than \$10 million.
- C** It will increase by \$10 million.
- D** It will decrease by \$10 million.

J/04/3/29

- 10** What is most likely to be increased by a policy of increased direct taxes and lower government spending?

- A** the balance of payments deficit
- B** the budget deficit
- C** the rate of inflation
- D** the level of unemployment

N/04/3/21

- 11** In a closed economy, households pay \$0.40 in tax on every \$1 increase in their gross income, and spend 5/6 of every increase in their disposable income.

What is the value of the multiplier?

- A** 2                      **B**  $2\frac{1}{2}$                       **C** 3                      **D** 6

J/05/3/27

- 12** Which of the following is an appropriate government policy for closing a deflationary gap?

- A** an increase in the rate of interest
- B** an open market sale of bonds
- C** an increase in government spending
- D** an increase in income tax

J/07/3/16

- 13** Which combination of fiscal policy measures would be most effective in reducing income inequality?

	top rates of income tax	indirect taxes	value of state benefits
<b>A</b>	increase	increase	increase
<b>B</b>	reduce	increase	reduce
<b>C</b>	increase	reduce	increase
<b>D</b>	reduce	reduce	reduce

J/08/3/14

- 14** The government of a country decides to increase the proportion of its tax revenue that it obtains from income tax and to reduce the proportion it obtains from indirect taxes. Total tax revenue is left unchanged.  
 What is likely to be the impact on the distribution of income and on work incentives?

	distribution of income	work incentives
<b>A</b>	more equal	increase
<b>B</b>	more equal	decrease
<b>C</b>	less equal	increase
<b>D</b>	less equal	decrease

J/08/3/20

- 15** In a closed economy, the full employment level of income is \$200 million.

$$C = \frac{3}{4} Y,$$

$$I = \$(50 - 5r) \text{ million,}$$

where C = consumption,

Y = income,

I = investment,

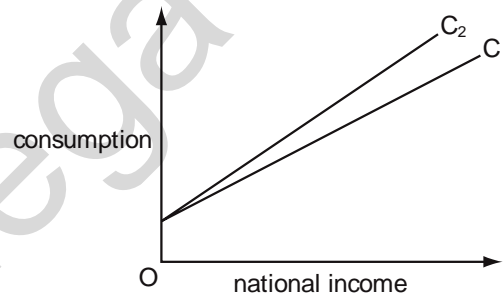
r = the rate of interest.

If planned government expenditure is \$30 million, what rate of interest would be required for there to be full employment?

- |          |               |          |               |
|----------|---------------|----------|---------------|
| <b>A</b> | 2 % per annum | <b>B</b> | 4 % per annum |
| <b>C</b> | 6 % per annum | <b>D</b> | 8 % per annum |

J/08/3/21

- 16** In the diagram,  $C_1$  shows the initial relationship between consumption and national income.

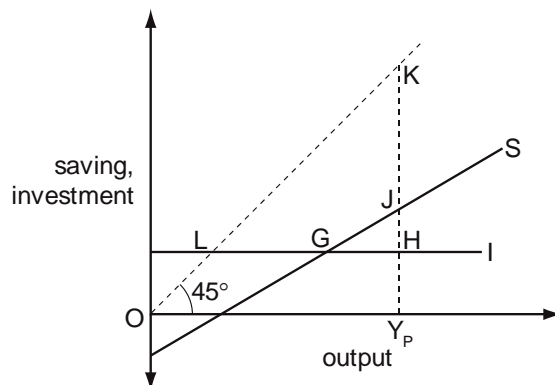


What could cause the consumption function to shift to  $C_2$ ?

- |          |   |
|----------|---|
| <b>A</b> | an increase in exports                          |
| <b>B</b> | an increase in investment                       |
| <b>C</b> | a decrease in the rate of unemployment benefits |
| <b>D</b> | a decrease in the standard rate of income tax   |

J/09/3/20

17 The diagram shows the saving and investment curves of a closed economy with no government.



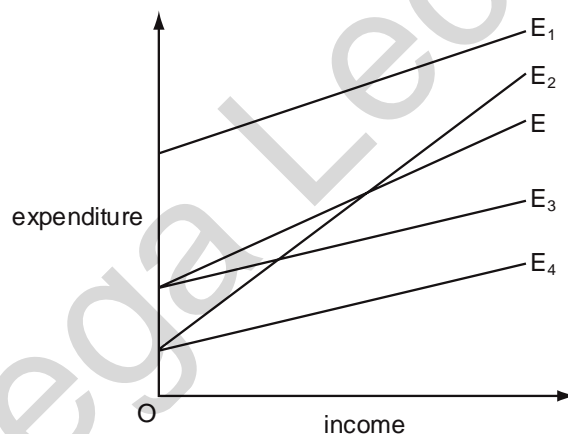
The potential level of output is OYP.

Which distance measures the gap between actual and potential output?

- A** LG                      **B** GH                      **C** JH                      **D** KJ

N/09/3/20

18 The diagram shows a number of expenditure functions. The original expenditure function is shown by E.



The government announces a decrease in government expenditure on goods and services and reduces the standard rate of income tax.

Which line shows the new expenditure function resulting from these changes?

- A** E<sub>1</sub>                      **B** E<sub>2</sub>                      **C** E<sub>3</sub>                      **D** E<sub>4</sub>

J/10/3/29

19 What will be the impact of an increase in marginal tax rates?

- A** an increase in the propensity to save  
**B** an increase in the value of the investment multiplier  
**C** a strengthening of work incentives  
**D** a strengthening in the operation of automatic stabilisers



N/10/3/13

- 20** A tax is said to be regressive when
- A** low income earners pay a higher proportion of their income in tax than high income earners.
  - B** marginal tax rates exceed average tax rates.
  - C** the cost of collecting the tax exceeds the revenue raised.
  - D** the marginal rate of tax is higher for high income earners than low income earners.

N/10/3/20

- 21** In a closed economy with no government  
 the full employment level of income = \$400 billion  
 and the equilibrium level of income = \$380 billion  
 If the deflationary gap is \$4 billion, what is the marginal propensity to consume?
- A**  $\frac{1}{5}$                       **B**  $\frac{1}{4}$                       **C**  $\frac{3}{4}$                       **D**  $\frac{4}{5}$

N/10/3/29

- 22** The government of a country decides to increase the proportion of its tax revenue it obtains from direct taxes and to reduce the proportion it obtains from indirect taxes.

	distribution of income	work incentives
<b>A</b>	less equal	decrease
<b>B</b>	less equal	increase
<b>C</b>	more equal	decrease
<b>D</b>	more equal	increase

J/11/32/25

- 23** Which tax is most likely to be regressive?
- A** an inheritance tax
  - B** a property tax
  - C** a sales tax
  - D** income tax

N/11/32/14

- 24** The government of a country decides to increase the proportion of its tax revenue that it obtains from indirect taxes and to reduce the proportion it obtains from income tax. Total tax revenue is left unchanged.  
 What is likely to be the impact on the distribution of income and on work incentives?

	distribution of income	work incentives
<b>A</b>	less equal	decrease
<b>B</b>	less equal	increase
<b>C</b>	more equal	decrease
<b>D</b>	more equal	increase

N/11/32/18

- 25** In a closed economy, households pay \$0.10 in tax on every \$1 increase in their gross income, and spend  $\frac{5}{6}$  of every increase in their disposable income. What is the value of the multiplier?  
**A** 1.5                      **B** 4.0                      **C** 6.0                      **D** 7.5

N/11/32/25

- 26** A government currently has a balanced budget. It is considering the possible variations in tax revenue and government expenditure shown.

options	tax revenue	government expenditure
W	increase	Increase
X	increase	reduce
Y	reduce	increase
Z	reduce	reduce

Which three options have the potential to move the budget into surplus?

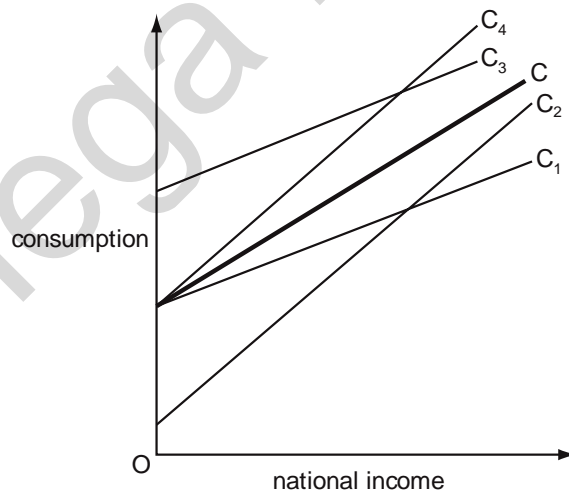
- A** W, X and Y      **B** W, X and Z      **C** W, Y and Z      **D** X, Y and Z

N/11/32/29

- 27** Assuming no change in tax rates or tax-free allowances, for which tax would the amount paid in tax become a smaller proportion of taxpayers' income during a period of wage and price inflation?  
**A** a progressive income tax  
**B** a specific tax on tobacco  
**C** capital gains tax  
**D** value added tax

J/12/32/22

- 28** In the diagram, C is an economy's initial relationship between consumption and national income.



Which curve could show the economy's new consumption function following a reduction in the rate of unemployment benefits?

- A** C<sub>1</sub>                      **B** C<sub>2</sub>                      **C** C<sub>3</sub>                      **D** C<sub>4</sub>

N/12/32/15

**29** What is most likely to be regressive?

- |          |                            |          |                        |
|----------|----------------------------|----------|------------------------|
| <b>A</b> | corporate profit taxes     | <b>B</b> | state pension benefits |
| <b>C</b> | specific tax on cigarettes | <b>D</b> | unemployment benefits  |

N/12/32/17

**30** An economist wishes to judge whether an economy's budget deficit is excessive. What would be the most appropriate way to measure the budget deficit when making this judgement?

- A** as a percentage of foreign currency reserves
- B** as a percentage of GDP
- C** in inflation adjusted terms
- D** in purchasing power parity terms

N/12/32/18

**31** In a closed economy with no government, the level of investment is \$5 million, the equilibrium level of income is \$22 million, the full employment level of income is \$25 million and there is a deflationary gap of \$1 million. What can be deduced from this information?

- A** The marginal propensity to consume is  $\frac{2}{3}$ .
- B** The marginal propensity to consume is  $\frac{1}{3}$ .
- C** The value of the investment multiplier is 5.
- D** The value of the investment multiplier is 1.5.

N/12/32/29

**32** Why is it more effective to increase regressive taxes rather than progressive taxes when pursuing a deflationary fiscal policy?

- A** Changes in VAT have minimal effect on consumers' spending.
- B** It is much more unfair to increase progressive taxes.
- C** Many workers reduce the hours they work when income taxes are raised.
- D** Low income households spend a larger proportion of their incomes.

N/12/32/30

**33** In an economy, the marginal propensity to consume of the unemployed is higher than that of taxpayers. The government increases expenditure on unemployment benefits by \$10 million. What will the government need to do if it wishes to keep aggregate demand unchanged?

- A** raise taxation by less than \$10 million
- B** raise taxation by more than \$10 million
- C** raise taxation by \$10 million
- D** leave taxes unchanged

J/13/32/15

**34** The table shows the marginal tax rates paid by a country's taxpayers at different levels of income.

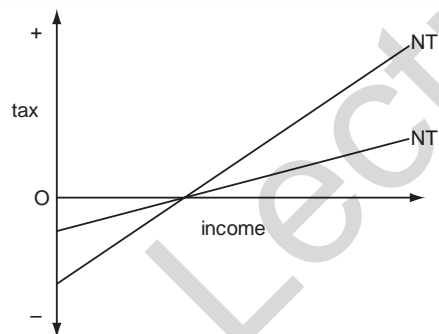
income	tax rate
first \$4000	zero
\$4001 - \$20 000	20 %
above \$20 000	40 %

What correctly describes this tax?

- A** It is regressive over the entire range of income.
- B** It is proportional over the income range \$4001 - \$20 000.
- C** It is proportional over the range of income above \$20 000.
- D** It is progressive over the range of income above \$4000.

N/13/32/14

**35** A country has a negative income tax.  
 The curve NT in the diagram shows the country's initial tax schedule.



A change in the tax rate causes the schedule to shift to NT<sub>1</sub>.  
 How will this affect work incentives and the after-tax distribution of income?

	work incentives	distribution of income
<b>A</b>	strengthen	more equal
<b>B</b>	strengthen	less equal
<b>C</b>	weaken	less equal
<b>D</b>	weaken	more equal

N/13/32/20

**36** In an economy, the marginal propensity to consume of the unemployed is higher than that of taxpayers.  
 The government increases expenditure on unemployment benefits by \$10 m and increases taxation by \$10 million.  
 What will be the impact on aggregate demand?

- A** It will be unchanged.
- B** It will increase by less than \$10 million.
- C** It will increase by \$10 million.
- D** It will decrease by \$10 million.

N/13/32/27

**37** What is a reflationary fiscal measure?

- A** reducing interest rates                      **B** increasing the money supply  
**C** increasing taxes                                      **D** increasing government spending

N/13/32/30

**38** During year 1, a government announces a temporary one-year reduction in the level of indirect taxation balanced by an equivalent temporary one-year increase in direct taxation.  
 What is most likely to be the impact on household saving in year 1 and in year 2?

	impact on household saving in year 1	impact on household saving in year 2
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

J/14/32/19

**39** In a closed economy with no government, consumption is 4/5 of income at all levels of income.  
 The present equilibrium level of income is \$220 million.  
 The full employment level of income is \$240 million.  
 By how much would investment have to increase to reach full employment?

- A** \$2 million    **B** \$4 million  
**C** \$16 million    **D** \$20 million

J/14/32/27

**40** What will be the impact of an increase in marginal tax rates?

- A** an increase in the propensity to save  
**B** an increase in the value of the investment multiplier  
**C** a strengthening of work incentives  
**D** a strengthening in the operation of automatic stabilisers

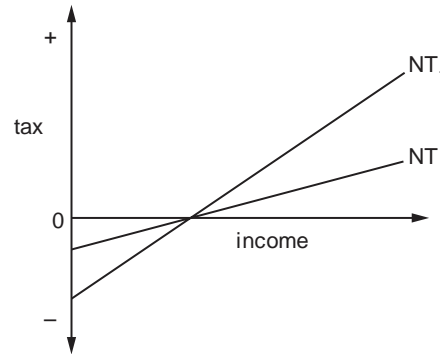
J/15/32/30

**41** A government's budget is balanced at a time when the economy is fully employed, but an aggregate demand shock causes a decline in national income.  
 What will be the result if the government keeps its tax rates and level of spending unchanged?

- A** a cyclical budget deficit  
**B** a cyclical budget surplus  
**C** a structural budget deficit  
**D** a structural budget surplus

N/15/32/17

- 42** A country has a negative income tax.  
In the diagram, the curve NT shows the country's initial tax schedule.



What could cause the tax schedule to shift to  $NT_1$ ?

- A** a higher marginal tax rate
  - B** a more equal distribution of income
  - C** an increase in household disposable income
  - D** an increase in the marginal propensity to consume
- N/15/32/24
- 43** In the absence of offsetting changes, what will result in an increase in a government's fiscal deficit?

- A** a decrease in household saving
- B** a decrease in interest rates on government bonds
- C** a decrease in private sector investment
- D** a decrease in the country's trade deficit

N/15/32/27

- 44** An economy has underemployed resources.  
Which method of financing an increase in government expenditure is likely to have the greatest expansionary effect?

- A** borrowing from the central bank
- B** borrowing from the non-bank private sector
- C** increased direct taxation
- D** increased indirect taxation

J/16/32/17

- 45** Which policy would be most effective in achieving a more equal distribution of disposable incomes between households?

- A** government support for trade unions
- B** import duties on manufactured goods
- C** minimum wage policy
- D** progressive income taxes

J/16/32/27

- 46** When would an economic recession result in an increase in a government's budget deficit?
- A** The government increases tariffs on imports with inelastic demand and keeps the total amount it spends on unemployment benefit unchanged.
  - B** The government keeps the unemployment benefit rate and direct and indirect tax rates unchanged.
  - C** The government reduces foreign aid and widens the tax base.
  - D** The government reduces the unemployment benefit rate and decreases the tax free allowance on income tax.

Mega Lecture

**Section: 22**

**Open Economy**

**(Four sectoral economy)**

We finally consider a fourth sector, the international market, which influences an economy in the following three ways:

- (i) Exports and imports of goods only
- (ii) Exports and imports of services only
- (iii) Financial capital flows

Exports and imports of goods are recorded in the balance of trade whereas that of services are recorded in the invisible section of the current account. Capital or financial accounts record the flows of financial capital.

**Equilibrium Income in an Open Economy**

In a four sectoral model, expenditures are given by: consumer expenditures (C), investment expenditures (I), Government expenditures (G) and net export revenues (Xn), export revenues less import expenditures ( $X_n = X - M$ ). Exports inject demand and imports withdraw it.

$$E = C + I + G + X - M$$

Exports are income autonomous as they only depend on the income of other countries and are thus given by:

$$X = X_o$$

A recession in the international market such as the current one in USA and Europe decreases exports for countries like Pakistan which export textiles etc to these developed economies.

Imports are income induced and an increase in consumers' income encourages them to spend more on both locally made and imported products. Marginal propensity to import (MPM = m) is the fraction of an added £ in income that is spent on imports and is assumed to be constant for a linear expenditure function. Import function is given by:

$$M = mY$$

Assuming marginal propensity to import equals 0.1, imports rise by £10 if income rises by £100

Equilibrium income in an open economy may thus be calculated in the following manner:  
Considering taxes to be induced:

$$T = tY$$

$$\begin{aligned} C &= C_o + cY_d \\ &= C_o + c(Y - T) \\ &= C_o + c(Y - tY) \\ &= C_o + cY - c tY \end{aligned}$$



$$\begin{aligned} I &= I_0 \\ G &= G_0 \\ X &= X_0 \\ M &= mY \end{aligned}$$

$$\begin{aligned} E &= C + I + G + X - M \\ E &= C_0 + cY - ctY + I_0 + G_0 + X_0 - mY \end{aligned}$$

$$\begin{aligned} Y &= E \\ Y &= C_0 + cY - ctY + I_0 + G_0 + X_0 - mY \\ Y - cY - ctY + mY &= C_0 + I_0 + G_0 + X_0 \\ \text{Taking } Y \text{ common:} \\ Y(1 - c - ct + m) &= C_0 + I_0 + G_0 + X_0 \\ \text{Taking } c \text{ common:} \\ Y(1 - c(1 - t) + m) &= C_0 + I_0 + G_0 + X_0 \\ Y &= (C_0 + I_0 + G_0 + X_0) \frac{1}{(1 - c(1 - t) + m)} \end{aligned}$$

A country's trade is balanced when its export revenues, X equal import expenditures, M. A trade surplus exists when export revenues exceed import expenditures whereas a deficit implies export revenues fall short of import expenditures. A trade surplus injects demand into the economy whereas a trade deficit is a demand withdrawal.

**Question:** Calculate savings for an economy in equilibrium, with trade and budget deficits of £20m each. Assume investment expenditures are £10m.

**Answer:** Trade deficit means import revenues exceed export expenditures by £20m ( $M - X = 20$ ) and budget deficit implies government spending exceeds tax revenues by £20m ( $G - T = 20$ ). Thus for the economy to be in equilibrium, savings must equal investments- savings equal £10m.

$$\begin{aligned} S + T + M &= I + G + X \\ S + (M - X) &= I + (G - T) \\ S + 20 &= 10 + 20 \\ S &= 10 \end{aligned}$$

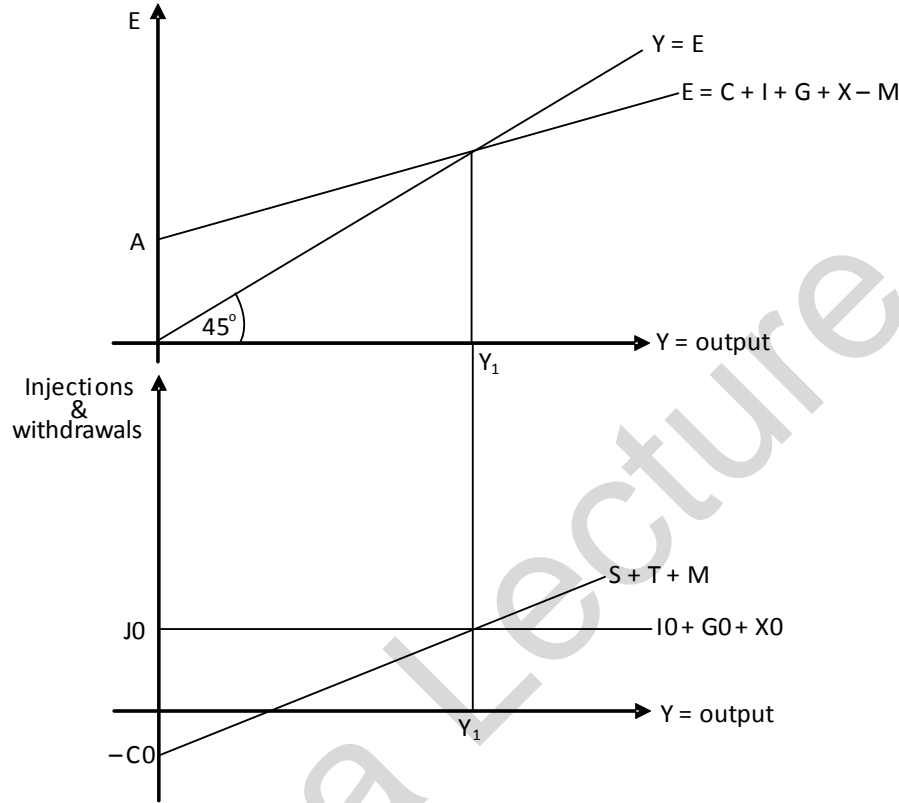
An open economy with induced taxes has:

- Four sectors: households, firms, government and international market
- Expenditures given by: consumer expenditures (C) investment expenditures (I) government expenditures (G) and net export revenue (Xn)
- Three demand injections (J): investment expenditures (I), government expenditures (G) and export revenue (X)
- Three demand withdrawals (W): savings (S), Taxes (T) and import expenditures (M)
- Autonomous expenditures given by:  $A = C_0 + I_0 + G_0 + X_0$
- Marginal propensity to spend as  $c(1 - t) + m$
- Marginal propensity to withdraw as  $MPS + MPT + MPM$  (where MPS is post taxes)
- Autonomous expenditure multiplier given by:  $\frac{1}{(1 - c(1 - t) + m)}$
- Expenditure multiplier expressed as  $\frac{1}{s + t + m} = \frac{1}{s + t + m}$

**Equilibrium National Income in an Open Economy- Graphical analysis**

As in all preceding cases, equilibrium national income in a four sectoral model is determined by the intersection of income and expenditure functions or demand injections and withdrawals. This is shown in diagram 22.1.

Diagram 22.1



## Multiple Choice Questions (Section 22)

J/02/3/20

- 1 Which of the following is **not** a leakage from the circular flow of income?
- A corporation tax
  - B expenditure on foreign goods
  - C personal saving
  - D retirement pensions

N/03/3/22

- 2 Out of any addition to national income, 20 % is spent on imports, 25 % is paid in taxes, 5% is saved and the rest is spent on domestically produced goods. What is the value of the multiplier?
- A 20
  - B 5
  - C 2
  - D 0.5

N/05/3/19

- 3 What is the value of the multiplier in an economy with no government where the marginal propensity to save is  $\frac{1}{6}$ , and the marginal propensity to import is  $\frac{1}{3}$ ?
- A  $\frac{1}{2}$
  - B  $1\frac{1}{2}$
  - C 2
  - D 3

J/06/3/17

- 4 Which of the following are injections into the circular flow of income?

	trade surplus	government budget deficit	private sector surplus (saving – investment)
A	✓		x
B	✓		x
C	x		✓
D	x		✓

N/06/3/20

- 5 The national income is initially in equilibrium. If there were a decrease in exports, which change of equivalent value would restore national income to its initial equilibrium level?
- A an increase in investment
  - B an increase in saving
  - C a reduction in government expenditure on goods and services
  - D a reduction in taxation

N/08/3/16

6 The table shows some data for an economy.

Investment \$m	Exports \$m	government expenditure \$m	Savings \$m	Imports \$m	Taxation \$m	national income \$m
200	100	50	50	120	100	700
200	100	50	60	140	150	800
200	100	50	75	160	200	900
200	100	50	100	180	275	1000

What is the equilibrium level of national income?

A \$700 m      B \$800 m      C \$900 m      D \$1000 m

J/09/3/16

7 Which of the following correctly identifies net leakages from the circular flow of income?

	trade surplus (exports - imports)	government budget deficit (government spending - taxes)	private sector surplus (saving - investment)
A	✓	✓	x
B	✓	x	x
C	x	✓	✓
D	x	x	✓

N/09/3/19

8 Out of any addition to national income, 20 % is spent on imports, 15 % is paid in taxes, 5 % is saved and the rest is spent on domestically-produced goods.

What is the value of the multiplier?

A 2.5      B 5      C 6      D 20

J/10/3/19

9 When national income equals \$40 000 million and government spending equals \$15 000 million, an economy is in equilibrium below full employment. Out of every increase of \$100 in national income, \$15 is taken in taxes, \$30 is spent on imports and \$5 is saved. To raise national income to the full employment level of \$50 000 million, to which level will the government need to raise its own spending?

A \$15 500 million      B \$20 000 million  
C \$25 000 million      D \$35 000 million

N/10/3/16

10 What is **not** a leakage from the circular flow of income?

A expenditure on foreign goods      B indirect taxes  
C undistributed profits      D unemployment benefits

J/11/32/15

11 What will reduce the value of the investment multiplier?

A a low marginal propensity to import      B automatic stabilisers  
C low marginal tax rates      D low rates of unemployment benefit

N/11/32/19

12 The table shows some data for an economy.

investment \$m	exports \$m	government expenditure \$m	savings \$m	imports \$m	taxation \$m	national income \$m
200	100	50	125	62.5	62.5	600
200	100	50	150	75	75	700
200	100	50	175	87.5	87.5	800
200	100	50	200	100	100	900

What is the equilibrium level of national income?

- A** \$600 m      **B** \$700 m      **C** \$800 m      **D** \$900 m

J/12/32/19

13 Which represents an injection into an economy's circular flow of income?

- A** a balance of trade surplus  
**B** a government budget surplus  
**C** the retained profits of private companies  
**D** household saving

J/13/32/20

14 Which correctly identifies injections into a country's circular flow of income?

	private sector $I > S$	government sector $G > T$	trade sector $M > X$
<b>A</b>	no	yes	yes
<b>B</b>	yes	no	no
<b>C</b>	yes	yes	no
<b>D</b>	no	no	yes

J/13/32/29

15 What will increase the multiplier effect of an increase in government spending on national income?

- A** an increase in direct taxation  
**B** an increase in interest rates  
**C** an increase in the marginal propensity to consume  
**D** an increase in the marginal propensity to import

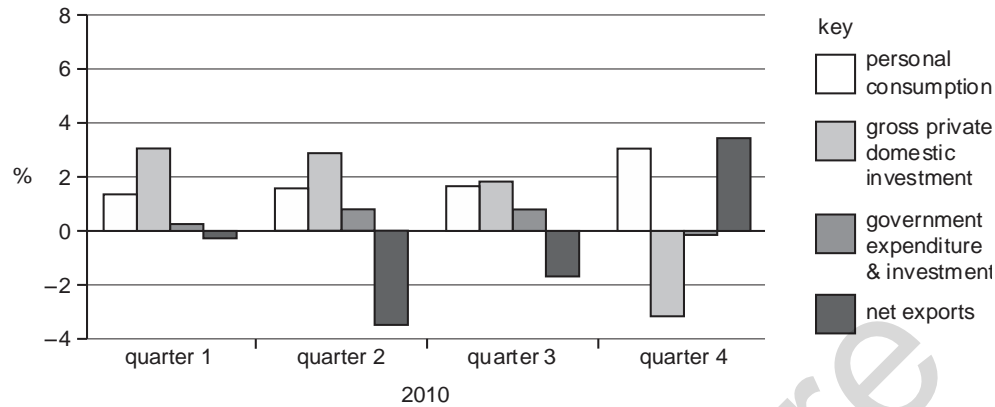
J/14/32/20

16 Other things being equal, what will result in a decrease in aggregate demand?

- A** a decrease in interest rates  
**B** a decrease in the balance of trade deficit  
**C** a decrease in the government's budget deficit  
**D** a decrease in the household saving ratio

J/14/32/22

17 The diagram shows the contribution of four components of aggregate demand to the change in US real GDP in the four quarters of 2010.



Which component made the greatest contribution and which component the least contribution to the positive growth in real GDP in 2010?

	<b>greatest contribution</b>	<b>least contribution</b>
<b>A</b>	gross private domestic investment	government expenditure and investment
<b>B</b>	gross private domestic investment	net exports
<b>C</b>	personal consumption	government expenditure and investment
<b>D</b>	personal consumption	net exports

J/15/32/19

18 Which is **not** an injection into a country's circular flow of national income?

- A** inward direct investment by multinational corporations
- B** private gross domestic fixed capital formation
- C** the sale of government bonds to members of the public
- D** wages paid to civil servants

J/15/32/20

19 The national income is initially in equilibrium. If there is an increase in exports, which change of equivalent value will restore national income to its initial equilibrium level?

- A** a decrease in imports
- B** a decrease in investment
- C** an increase in government expenditure on goods and services
- D** a reduction in taxation

N/15/32/18

**20** The information in the table is taken from a country's national income accounts.

	\$ million
national income	600
consumer spending	400
investment spending	80
government spending on goods and services	100
exports	140

What is the value of imports?

- A** \$100 million                      **B** \$120 million  
**C** \$140 million                      **D** \$240 million

N/15/32/19

**21** Which represents an injection into a country's circular flow of income?

- A** corporate taxes  
**B** interest payments on government bonds  
**C** the payment of dividends to foreign shareholders  
**D** the repayment of bank loans

J/16/32/26

**22** In a 4-sector economy, consisting of households, firms, government and foreign trade, the level of national income is in equilibrium where

$$C + I + G + (X - M) = Y.$$

What must Y include for an equilibrium to exist?

- A**  $C + S + M$   
**B**  $C + S + T$   
**C**  $S + T$   
**D**  $S + T + M$

J/16/32/30

**23** What will increase the multiplier effect of an increase in government spending on national income?

- A** an increase in direct taxation  
**B** an increase in interest rates  
**C** an increase in the marginal propensity to consume  
**D** an increase in the marginal propensity to import

**Section: 23 Principle of Accelerator**

As seen earlier, the autonomous expenditure multiplier shows the relationship between changes in autonomous expenditures (e.g. investment expenditures) and changes in national income. We now turn to the accelerator theory, which studies the relationship between changes in either income or consumption and changes in investment expenditures. The accelerator coefficient is either given by the ratio of change in investment expenditures and change in national income or change in investment expenditures and change in consumer expenditures.

$$\text{Accelerator coefficient} = \frac{\Delta I}{\Delta Y} \text{ or } \frac{\Delta I}{\Delta C}$$

Increased income and consumption encourage firms to increase production capacities so as to meet extra demand. Assuming firms invest £50m to produce extra output worth £10m, the accelerator coefficient is 5. The coefficient is large when firms increase investment spending significantly with increases in demand. This may happen in following situations:

- Firms operate at full capacities and must increase production capacities to satisfy fresh demand.
- The stock of unsold goods is low.
- Firms are certain that demand increase is permanent.
- Factors of production are easily available.
- Capital and labour are substitutable
- Economic indicators are favourable and show stability and growth.
- Government policies are investment and business friendly.
- Interest rates are low.

According to the accelerator theory, net investment increases whenever output increases at an increasing rate. Net Investment (In) shows the net addition in a country's capital stock and the difference between Gross Investment (Ig) and depreciation (R).

The following chart helps understand the relationship between changes in output and changes in net investments.

Years	Output	Capital stock	Gross investment (Ig)	Depreciation (R)	Net investment (In)
10	1000	100	-	-	-
11	1000	100	10	10	0
12	1100	110	20	10	10
13	1200	120	20	10	10
14	1400	140	30	10	20
15	1450	145	15	10	5
16	1400	140	5	10	-5



Assume that the capital stock of the country consists of 100 machines accumulated over a period of 10 years. The expected life of every machine is 10 years implying that 10 machines purchased in year 1 wear out in year 11, 10 purchased in year 2 wear out in year 12 and so on. One machine can produce output worth 10 so 100 machines are needed to produce an output worth 1000. The following summary explains the behaviour of net investment at different rates of economic growth

- Net investment is positive for growing economies (all years except year 11 and 16)
- Net investment is zero for static economies (year 11)
- Net investment is negative for declining economies (year 16)
- Net investment increases for economies whose income increases at an increasing rate (between years 13 and 14)
- Net investment stays the same for economies whose income increases at a constant rate (between years 12 and 13)
- Net investment decreases for economies whose income increases at a decreasing rate (between years 14 and 15)

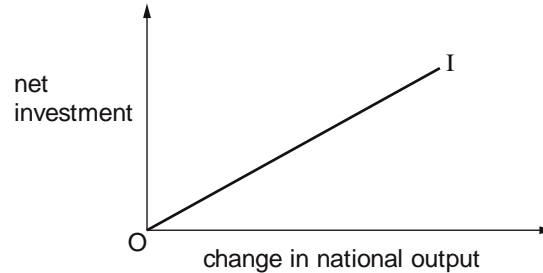
Try J/03/3/21-

The correct option is A, though wrongly worded. Net investment increases (and is not just 'positive') when income increases at an increasing rate. This point has been validated by the examiners' report.

## Multiple Choice Questions (Section 23)

N/02/3/19

- 1 In the diagram, the curve *I* depicts the accelerator relationship between net investment and the change in national output.



What does the slope of the curve measure?

- A the capital-output ratio
  - B the marginal propensity to invest
  - C the marginal propensity to save
  - D the multiplier
- J/03/3/21
- 2 According to the accelerator theory
- A net investment is positive if output is rising at an increasing rate.
  - B net investment may rise even if output rises at a declining rate.
  - C increases in investment occur when interest rates are falling.
  - D increases in investment will cause a more than proportionate increase in national income.

J/04/3/20

- 3 A closed economy is initially in equilibrium with a national income of \$100 million, and a capital stock of \$25 million. Aggregate demand increases by \$10 million.

According to the accelerator principle, by how much will net investment increase?

- A \$10 m
  - B \$5 m
  - C \$2.5 m
  - D \$2 m
- N/04/3/20
- 4 The accelerator principle refers to a relationship between investment and
- A the level of GDP.
  - B changes in GDP.
  - C the level of interest rates.
  - D changes in interest rates.

N/05/3/18

5 According to the accelerator theory, what determines this year's net investment?

- A last year's consumption
- B last year's output
- C the change in last year's output
- D the change in last year's investment

J/06/3/21

6 What does the accelerator principle state?

- A Consumption is a function of the rate of change of income.
- B Income is a function of the rate of change of investment.
- C Investment is a function of the rate of change of income.
- D Investment is a function of the rate of interest.

J/09/3/24

7 The table shows the figures for consumption, gross capital formation and depreciation in four economies, all measured in US \$.

Assuming that the state of technology remains unchanged, which economy is most likely to experience economic growth?

	economy consumption (\$ m)	gross capital formation (\$ m)	depreciation (\$ m)
A	200	40	50
B	500	200	150
C	1 000	1 200	1 400
D	20 000	6 000	6 000

N/09/3/18

8 The table gives the national income of a country over six years.

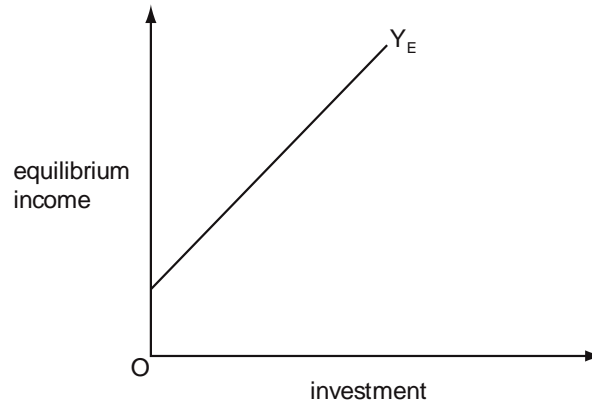
year	national income (Y)
1	2100
2	2110
3	2125
4	2145
5	2160
6	2170

According to the accelerator principle, in which year did net investment first fall to a level below that of the previous year?

- A year 3
- B year 4
- C year 5
- D year 6

J/12/32/21

- 9 In the diagram,  $Y_E$  indicates the equilibrium level of income corresponding to different levels of investment.



What does the slope of the line  $Y_E$  measure?

- A the investment multiplier
- B the marginal propensity to save
- C the rate of growth of investment
- D the rate of growth of national income

N/12/32/19

- 10 The table gives the national income of a country over six years.

year	national income (Y)
1	2100
2	2110
3	2125
4	2135
5	2140
6	2135

According to the accelerator principle, in which year did net investment first fall to a level below that of the previous year?

- A year 3
- B year 4
- C year 5
- D year 6

J/14/32/18

- 11 What will cause the level of investment to fall according to the accelerator model?

- A a decrease in business confidence
- B a decrease in the rate of growth of national income
- C an increase in the price of capital equipment
- D an increase in the rate of interest

N/15/32/22

- 12** The table shows the figures for consumption, capital formation and depreciation in four economies, all measured in US \$.  
Assuming that the state of technology remains unchanged, which economy is most likely to experience economic growth?

economy	consumption (\$ million)	capital formation (\$ million)	capital depreciation (\$ million)
<b>A</b>	100	10	20
<b>B</b>	500	200	100
<b>C</b>	1 000	1 200	1 400
<b>D</b>	20 000	5 000	6 000

Mega Lecture

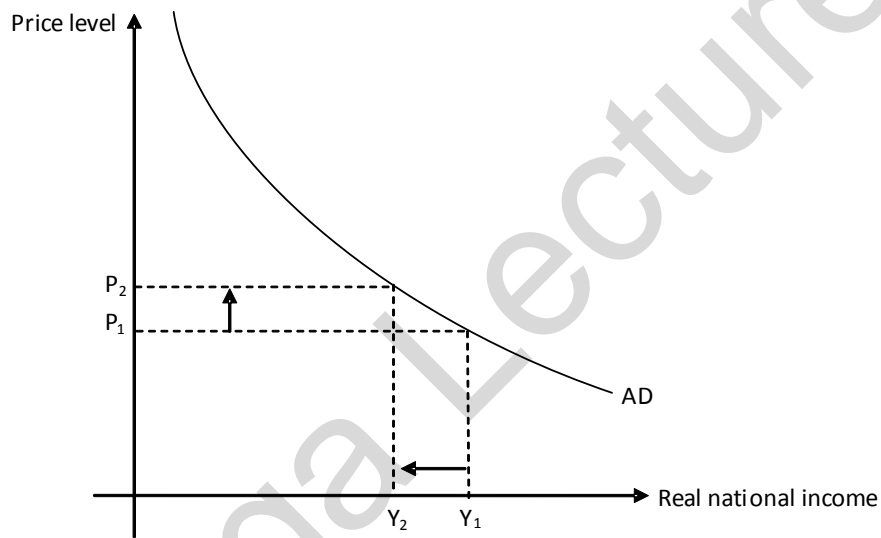
## Section: 24 Aggregate Demand (AD)

Aggregate Demand and Aggregate Supply are a part of the extension (A2) syllabus, but will be shifted to the core (AS) component with effect from June 2013. Students appearing in A Level in or after June 2013 should prepare this topic for the AS component while students taking only the A2 component should not expect a direct question from this topic.

### Aggregate Demand (AD)

Aggregate Demand represents the total demand for all goods and services by consumers, firms, government and foreigners. Aggregate Demand (AD) or Aggregate Monetary Demand (AMD) as it is sometimes called, expresses demand in terms of money. The AD curve slopes downwards in the panel of average price level (x-axis) and real national income/output (y-axis), as shown in diagram 24.1.

Diagram 24.1



Whereas Aggregate Demand (AD) measures total expenditures by taking *price level* and *real* income into account, the Aggregate expenditures (AE) approach measures the same by employing *expenditures* versus *nominal* national income. In an open economy, Aggregate Expenditures (AE) and Aggregate Demand equal consumer expenditures (C), Investment expenditures (I), government expenditures (G) and net export revenues (Xn) (see J/08/1/22)

#### Why does the AD curve slope downwards?

The negative slope of the AD curve indicates that increased price level decreases Aggregate Demand. Before learning why this happens, we reiterate the reasons for an individual market's demand curve sloping downwards (see section 3) and analyze if these changes help explain the slope of the AD curve.

We studied how the income and substitution effects determine the negative slope of an individual market's demand curve. Real income decreases whenever prices rise, lowering the demand for normal goods. However in macro economics, real income shows the number/volume of goods

and services produced and suffers no impact with changes in price level. Thus, the real income effect fails to explain the downward slope of the Aggregate Demand curve.

Substitution effect shows how a price increase makes people substitute the relatively expensive good for alternatives that seem cheaper. However, substituting one locally made product with another does not affect the Aggregate Demand of an economy. Thus, the substitution effect too can not explain the slope of the AD curve.

The following reasons help us understand the negative slope of the Aggregate Demand curve:

**Real wealth/money balances effect:** Income is a flow concept and measured for a period of time, say a month or a year whereas wealth is a stock concept and measured at a certain point in time e.g. bank balance, real estate, bonds, gold, shares etc.

Changes in price level do not affect real income but increased price level reduces the purchasing power (real value) of wealth/money balances. Money balances are important determinant of expenditures and decreased real balances lower expenditures (try N/05/3/20).

**Interest rate effect:** Households are forced to demand more money for their day to day and emergency requirements at higher price levels. Increased demand for money raises interest rates and interest sensitive expenditures such as consumption and investments decrease (see liquidity preference theory) (try J/02/3/22).

**International trade effect:** Increased price level in a country makes its products less price competitive both at home and abroad. Demand for exports falls and imports rises, resulting in decreased Aggregate Demand (try N/02/3/18).

### Shifts in Aggregate Demand

All factors causing an upward shift in the expenditure function shift aggregate demand towards right. The only exception to this rule is changes in price level, which shift the expenditure function but cause a movement along the AD curve. Otherwise, factors like increased wealth and booms in real estate or stock markets encourage households to spend more, shifting the expenditure function upwards and Aggregate Demand towards right. The recent slump of real estate market worldwide shifted the expenditure function downwards and Aggregate Demand towards left.

Decreased interest rates, lower (direct) taxes, increased budget deficit, improved consumer and business confidence, availability of loans, increased popularity and use of credit cards, depreciation of currency, improved export quality or better export marketing all increase expenditures and hence, Aggregate Demand.

It must be noted that any change in interest rate, price competitiveness of locally made goods or wealth attributed to changes in price level brings a movement along the AD curve whereas the AD curve shifts whenever interest rates or wealth change due to other factors.

## Comparison: Classical, Monetarists and Keynesians

Classicals support the view that economies always operate at full employment, government intervention in economic affairs is undesirable and its role is restricted to upholding individuals' property rights. People are rational and the "invisible hand", as envisaged by Adam Smith, guides people to the most prudent and efficient allocation of resources. The profit motive promotes efficiency and people, through working for their own betterment, bring about improvements in society at large.

Any deviation from full employment in the form of unemployment or inflation is only temporary as the price mechanism helps economies return to full employment level of national income. Consider a demand shock (leftward shift in AD), which reduces equilibrium national income and causes unemployment. According to Classicals, the flexible price and wage mechanism makes the economy resilient to these short lived changes. Unutilized production capacity forces firms to reduce prices, though profits remain unchanged as wage costs fall with unemployed workers accepting lower wages. Workers accept a wage cut as they're aware of the decrease in price level and hence cost of living- real wages remain unaltered. Both firms and workers are rational agents in that they see through money illusions and accept decreased prices and decreased wages. However the Great Depression of the 1930s lasted for several years, proving wrong all economists who believed that the recession would soon fade away in the face of flexible wage and price mechanism.

In contrast to all such economists, John Maynard Keynes argued that strong government intervention was desirable if an economy had to recover from recession. Government injects demand to cure its deficiency and reduce unemployment which according to Keynes, only results from demand deficiency. Keynesians are thus known as demand side economists- they aim to solve economic problems such as unemployment through demand management. Increased demand encourages producers to increase production and hire more workers, thus reducing unemployment.

Keynesians argue that prices and wages are not downward flexible i.e. firms and workers may welcome higher prices and wages respectively but neither would accept reductions in the same. Thus, expecting economic recovery from a recession through flexible price and wage mechanism is unwise.

Any decrease in demand makes firms slow down production and accumulate stocks of unsold items but not decrease price. Also, strong and militant trade unions and government legislation regarding minimum wages overrule the possibility of a wage cut. Strikes, work stoppages and street demonstrations further slow down the pace of economic recovery when firms try to cut wages. Firms and workers are not rational enough to see through money illusions and assign greater importance to nominal and money values. A reduction in money wages is therefore resisted by workers even when price level decreases, leaving real wages unchanged.

According to Keynesians, waiting for an automatic recovery is a mistake since such a recovery is very slow and painful for economic agents. What is essential to economic recovery is increased government spending or reduced taxes, injecting demand into the economy and shifting the Aggregate Demand curve towards right.



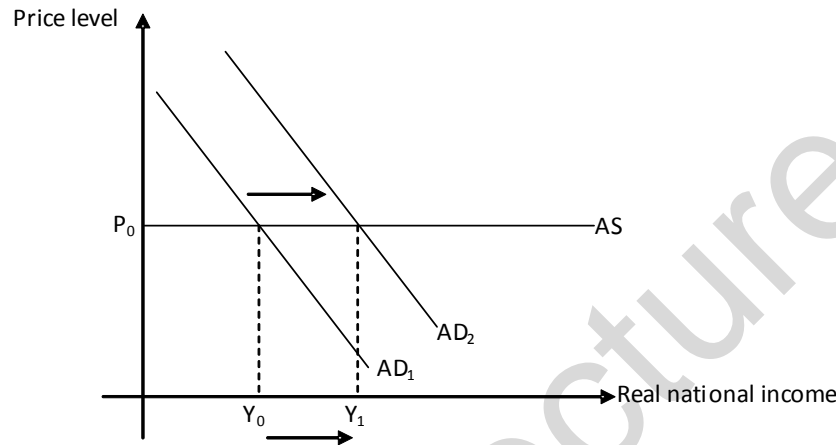
## Aggregate Supply (AS)

Whereas economists remain in harmony over the shape of the Aggregate Demand curve, dispute arises over what the Aggregate Supply curve looks like.

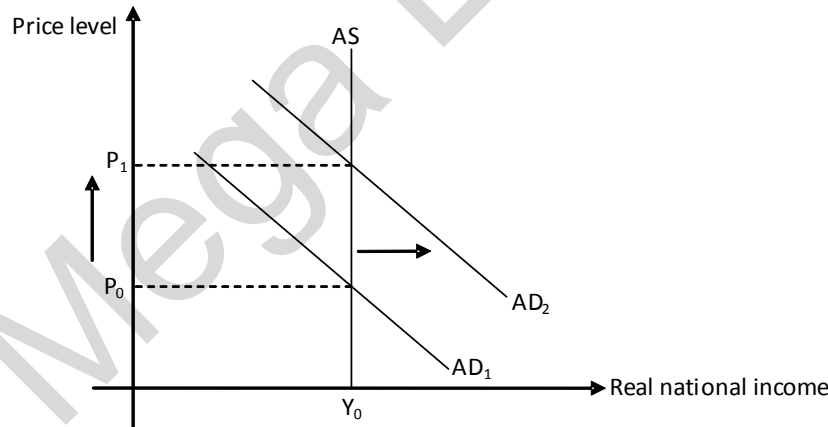
### Keynesian Aggregate Supply (AS) curve

Keynesians argue that excess capacity and unemployed resources always exist, as full employment is nothing but a special case. Aggregate Supply is a straight horizontal line showing that increased Aggregate Demand helps utilize unemployed resources and leads to increased real output whereas price level remains unaffected (see diagram 24.2).

Diagram 24.2

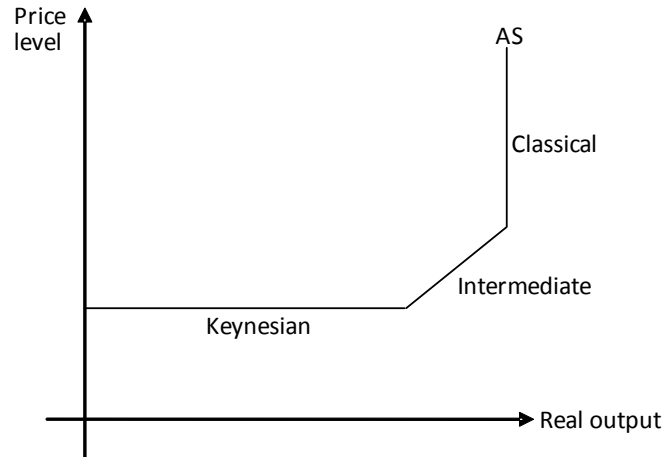


In contrast, the classical school of thought supports full employment and argues that excess capacity never really exists. Therefore, increased Aggregate Demand raises the price level but not real output- Classical's Aggregate Supply curve is a straight vertical line, as shown in diagram 24.3.



Diagrams 24.2 & 24.3 may be used to develop the Aggregate Supply curve as drawn in diagram 22.4 where in the Keynesian range, changes in Aggregate Demand only influence real output and not the price level. In the classical range, changes in Aggregate Demand only influence price level whereas real output remains unchanged. However, there exists an intermediate range of the AS curve too, where changes in Aggregate Demand partially influence real output and partially influence the price level.

Diagram 24.4



Wage rates are assumed to be constant along an Aggregate Supply curve so any change in them may shift the AS curve.

Unit labour cost (ULC) is the ratio of the cost of hiring a labour hour and the output produced by hiring it.

$$ULC = \frac{\text{wage rate/hour}}{\text{output/hour}}$$

Increased wages motivate workers and encourage them to work harder, making them more productive. Unit labour cost remains unchanged and cause no shift in the AS curve if a wage increase is fully offset by an equivalent improvement in productivity. Any wage increase in excess of productivity improvements increases unit labour cost and shifts the Aggregate Supply upwards (leftwards). Productivity improvements (assuming wage rate stays the same or rises slowly), shift the AS curve downwards (rightwards). Training, better work practice and a motivated workforce all result in improved productivity and lower unit labour cost.

Lower unit labour cost may also result from increased female participation, increased net immigration and increased birth rate since all these changes make labour cheaper by increasing its supply. Likewise, increased participation in the workforce resulting from governments' decisions to reduce unemployment benefits and pensions and spend more money on education, training and infrastructure shift Aggregate Supply downwards. Improved technology and increased resources also shift the Aggregate Supply curve towards right.

Strong and militant trade unions win a wage increase for their members in excess of productivity improvements, hence shifting Aggregate Supply towards left.

Equilibrium national income may be determined and analyzed using either the income/expenditure or Aggregate Demand/Aggregate Supply approach. The latter is however superior, since it separates the effects of increased injections on price level and real output, which are discussed in detail in the section on fiscal policy.

## Multiple Choice Questions (Section 24)

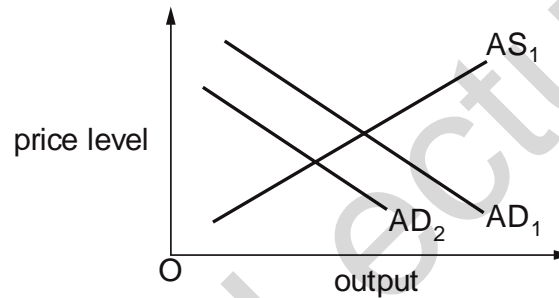
### Aggregate Demand (AD)

J/02/3/22

- 1 An aggregate demand curve slopes downwards from left to right. One reason for this is that a reduction in the average price level will lead to
- A a reduction in the real value of money balances.
  - B a reduction in interest rates.
  - C a decline in the country's international competitiveness.
  - D the expectation of further price falls.

N/02/3/17

- 2 In the diagram  $AD_1$  and  $AS_1$  are an economy's initial aggregate demand and aggregate supply curves.

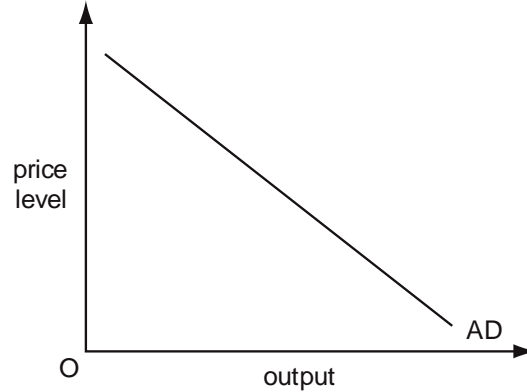


What will cause the aggregate demand curve to shift to  $AD_2$ ?

- A a depreciation of the currency
  - B an increase in the price level
  - C an increase in the real wage
  - D a reduction in the money supply
- N/02/3/18
- 3 One of the reasons why a country's aggregate demand curve slopes downwards is that a fall in the average price level
- A leads to an increase in interest rates.
  - B reduces the real value of money balances.
  - C makes the country's goods cheaper relative to foreign goods.
  - D leads to the expectation of further price falls.

N/04/3/23

4 The diagram shows an economy's aggregate demand curve.

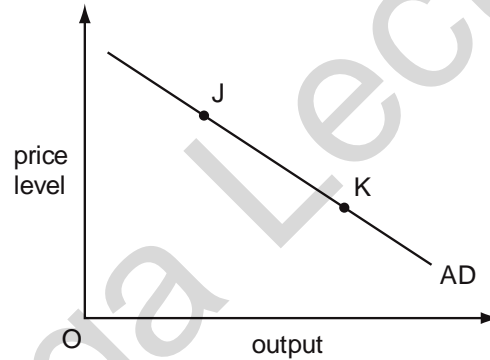


What is held constant when drawing an AD curve?

- A** the exchange rate                      **B** the money supply  
**C** the rate of interest                    **D** the price level

J/05/3/20

5 The diagram shows an economy's aggregate demand curve.



Which change will occur as the economy moves from point J to point K?

- A** an increase in the money supply  
**B** a decrease in the money supply  
**C** an increase in interest rates  
**D** a decrease in interest rates

N/05/3/20

6 An aggregate demand curve slopes downwards from left to right.  
One reason for this is that a reduction in the average price level will lead to

- A** an increase in the real value of money balances.  
**B** an increase in interest rates.  
**C** a decline in the country's international competitiveness.  
**D** the expectation of further price falls.

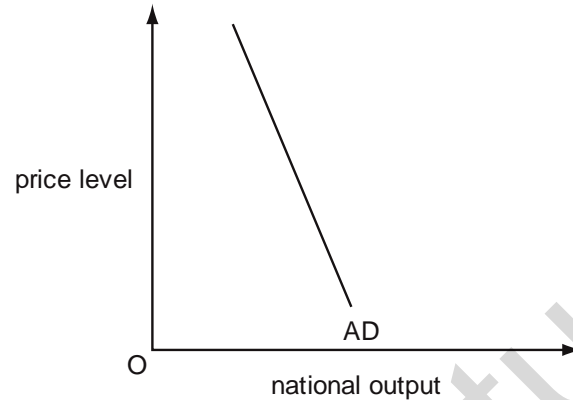
N/05/3/30

7 Which government policy will increase aggregate demand?

- |          |                           |          |                             |
|----------|---------------------------|----------|-----------------------------|
| <b>A</b> | raising indirect taxation | <b>B</b> | reducing the budget surplus |
| <b>C</b> | removing import quotas    | <b>D</b> | removing subsidies          |

J/06/3/19

8 The diagram shows an aggregate demand curve.

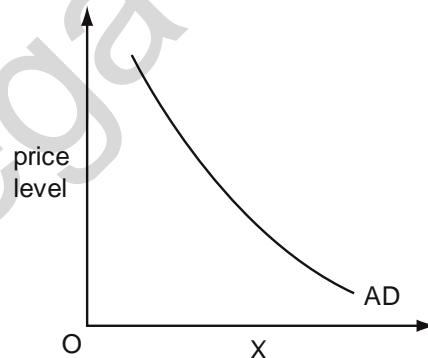


What helps to explain why the curve is downward sloping?

- A** When exports increase there will be an increase in national income.
- B** When investment increases there will be an increase in consumption.
- C** When the price level increases there will be an increase in interest rates.
- D** When government expenditure increases there will be an increase in national output.

J/08/3/22

9 The diagram shows an aggregate demand curve (AD).

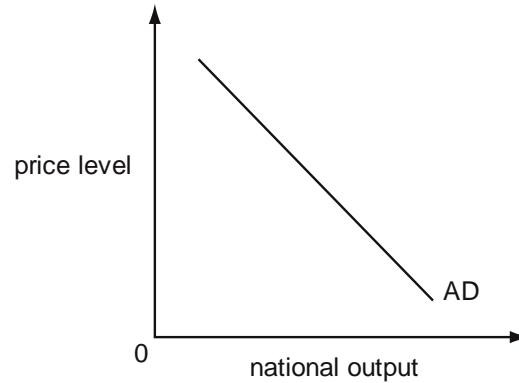


What is measured on the horizontal (X) axis?

- A** money national output
- B** nominal national income
- C** real disposable income
- D** real GDP

J/09/3/21

10 The diagram shows a country's aggregate demand curve.

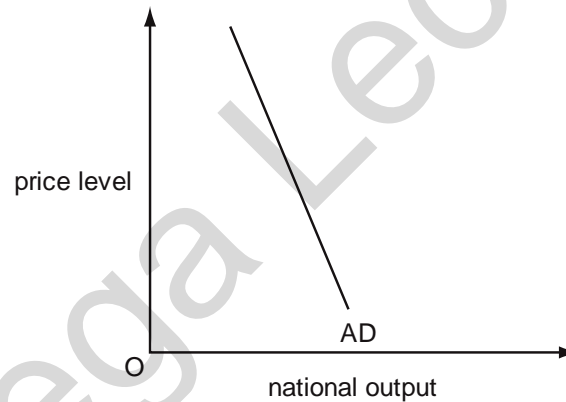


What could explain why the curve slopes downwards?

- A A fall in the price level increases the real value of money balances.
- B A fall in the price level leads to an increase in interest rates.
- C A fall in the price level leads to a rise in the real exchange rate.
- D A fall in the price level leads to the expectation of a further decrease in the price level.

N/10/3/21

11 The diagram shows an aggregate demand curve.



What helps to explain why the curve is downward sloping?

- A When exports increase there will be an increase in national income.
- B When government expenditure increases there will be an increase in national output.
- C When investment increases there will be an increase in consumption.
- D When the price level increases there will be an increase in interest rates.

J/11/32/17

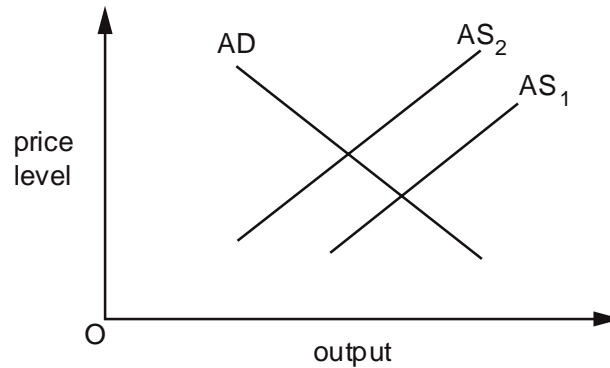
12 Other things being equal, what will result in a decrease in aggregate demand?

- A a decrease in interest rates
- B a decrease in the balance of trade deficit
- C a decrease in the government's budget deficit
- D a decrease in the household saving ratio

**Aggregate Supply (AS)**

J/02/3/23

**13** The diagram shows the aggregate demand and aggregate supply curves for an economy.

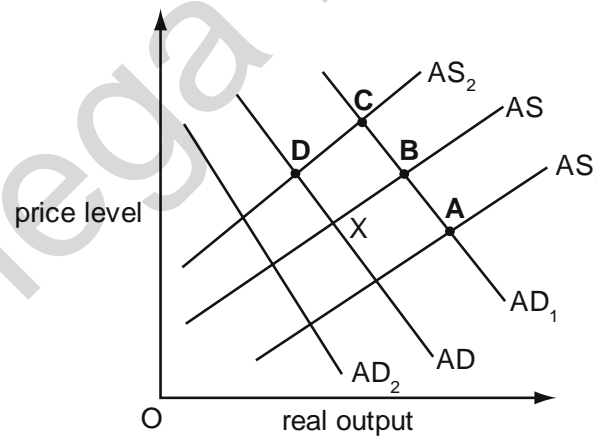


What could cause the aggregate supply to shift from  $AS_1$  to  $AS_2$ ?

- A** an increase in the balance of payments deficit
- B** an increase in the price level
- C** an increase in raw material costs
- D** an increase in labour market flexibility

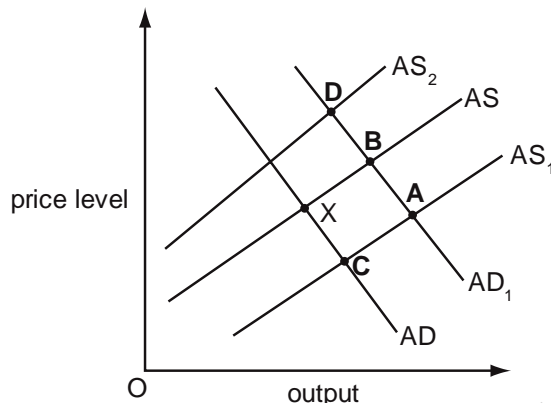
J/03/3/23

**14** In the diagram an economy is initially in equilibrium at point X. The government increases spending on education. This coincides with an increase in wage rate inflation. Which point shows the most likely new equilibrium of the economy?



N/03/3/23

- 15** An economy is currently in equilibrium at point X.  
 Government expenditure is increased on retraining programmes for those out of work.  
 This raises the productivity of the trainees.  
 Which point shows the new equilibrium in the economy?



J/04/3/23

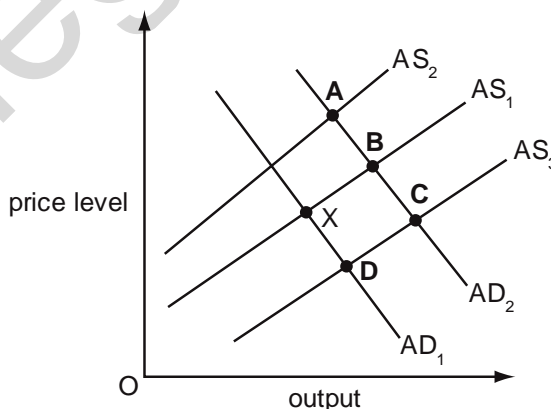
- 16** What is likely to cause a decrease in aggregate supply?  
**A** a decrease in consumption expenditure  
**B** an increase in labour productivity  
**C** a decrease in rates of unemployment benefit  
**D** an increase in wage costs per unit of output

N/06/3/19

- 17** What would explain why an economy's short-run aggregate supply curve is upward sloping?  
**A** a constant price level                      **B** constant money wages  
**C** diseconomies of scale                      **D** economies of scale

J/07/3/23

- 18** An economy is currently in equilibrium at point X.  
 Government expenditure is increased on retraining programmes for those out of work.  
 This raises the productivity of the trainees.  
 Which point shows the new equilibrium in the economy?





N/07/3/22

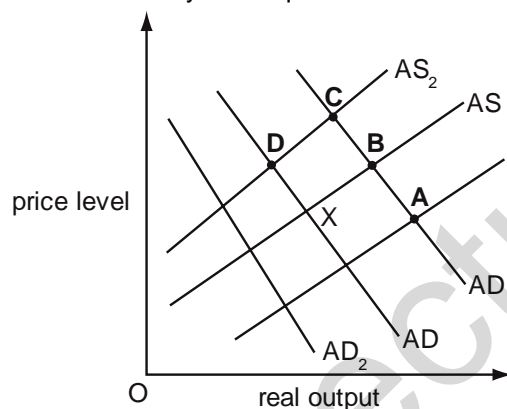
- 19** What is likely to cause a decrease in aggregate supply?  
**A** a decrease in consumption expenditure  
**B** an increase in labour productivity  
**C** a decrease in rates of unemployment benefit  
**D** an increase in wage costs per unit of output

N/08/3/17

**20** In the diagram an economy is initially in equilibrium at point X.

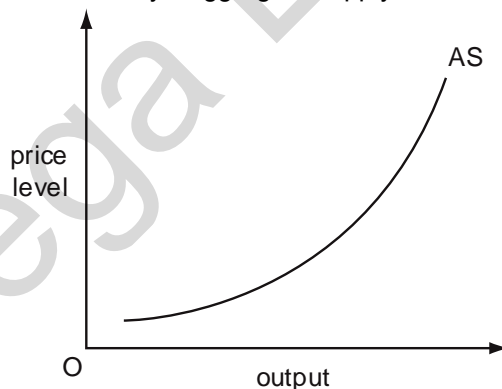
The government increases spending on education. At the same time there is a decrease in money wage rates.

Which point shows the most likely new equilibrium of the economy?



N/09/3/21

**21** The diagram shows an economy's aggregate supply curve.

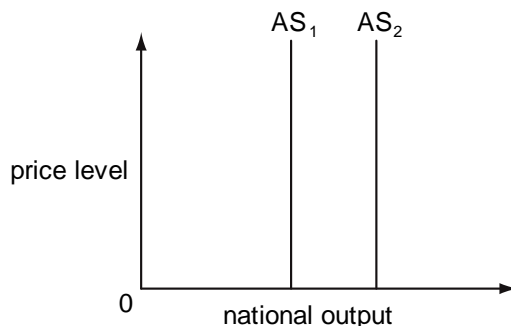


What is likely to cause the curve to shift to the left?

- A** improvements in technology  
**B** schemes to increase the geographical mobility of labour  
**C** an increase in investment due to a reduction in interest rates  
**D** an increase in the marginal rate of income tax

J/10/3/20

**22** In the diagram  $AS_1$  is an economy's long-run aggregate supply curve.



What will cause the aggregate supply curve to shift from  $AS_1$  to  $AS_2$ ?

- A** an increase in consumer spending
- B** an increase in inflation
- C** an increase in productivity
- D** an increase in net exports

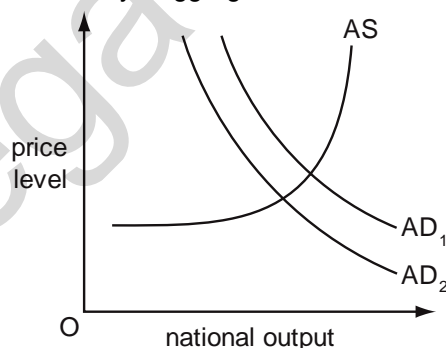
N/11/32/20

**23** What will be the effect, in the short run, on the price level and on national output of an increase in aggregate demand if firms are working at full capacity?

	price level	national output
<b>A</b>	rise	rise
<b>B</b>	rise	unchanged
<b>C</b>	unchanged	rise
<b>D</b>	unchanged	unchanged

N/11/32/21

**24** The diagram shows an economy's aggregate demand and aggregate supply curves.



What could cause the aggregate demand curve to shift from  $AD_1$  to  $AD_2$ ?

- A** an appreciation in the exchange rate
- B** an increase in the money supply
- C** a decrease in the interest rate
- D** a fall in the unemployment level

## Section: 25 Liquidity Preference Theory

John Maynard Keynes' liquidity preference theory helps us understand why people demand money. We assume that households possess wealth in the form of just two assets- bonds and cash. Bonds are debt instruments, so that firms can borrow money by issuing them. People subscribing bonds are entitled to a periodic interest payment, usually at a pre-determined fixed rate. The principal amount is returned to the holder, once the bond matures. Bonds are thus illiquid i.e. they can not be converted into other assets conveniently but are profitable since bond holders are entitled to receive an interest payment. Cash on the other hand does not generate interest streams but is liquid and allows flexibility in use as a medium of exchange.

Market interest rates move inversely with the market value of a fixed interest rate bond. Assuming a bond is issued and subscribed at an annual interest rate of 6%, an increase in the market interest rate to 7% at a later date forces initial subscribers to rid themselves of these bonds, which unfortunately only sell at reduced prices. On the other hand, decreased market interest rates render older bonds with higher fixed interest rate more attractive, hence increasing their market value.

According to Keynes, people prefer liquidity and are willing to sacrifice interest streams for three reasons:

- (i) transaction motives
- (ii) precautionary motives
- (iii) speculative motives

Transaction motive shows demand for money for regular and routine consumers and business requirements. Businesses experience a gap between making payments for purchase of raw materials, salaries etc and receiving payments from sale of finished goods. Firms typically demand liquidity i.e. cash to bridge this gap.

Precautionary motive is the demand for money arising due to unexpected and emergency requirements. A change in market conditions for example, may delay sales of firms' products or payments from debtors and hence, increase the gap between making payments to suppliers and receiving sale revenues.

Demand for transaction and precautionary motive is the active portion of money demand, expected to be used immediately. It does not depend on the interest rate. However, increased income, increased price level and decreased popularity of credit cards all increase the demand for money and shift the 'demand for money' curve towards right.

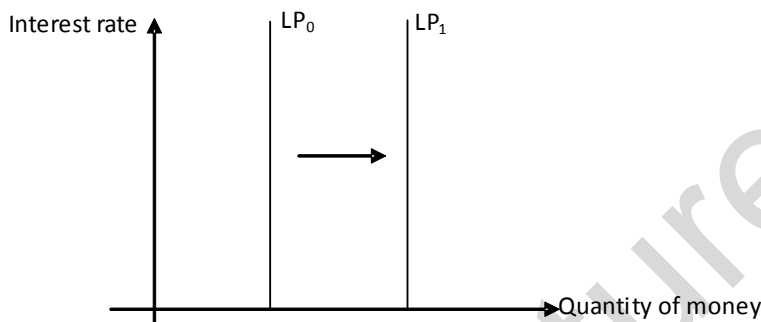
Consumer with higher incomes and businesses with higher sales turnover are likely to demand more money for transaction and precautionary motives. At higher prices, households and firms have to demand more money for their routine and emergency requirements. Credit cards are money substitutes and their popularity decreases demand for transaction and precautionary motives. Financial innovations such as Automatic Teller Machines (ATM) and debit cards also decrease the demand for money and shift the curve towards left.

Workers receiving salaries on a monthly basis demand more money than those getting it weekly. Increased frequency and hence a smaller interval between two payments decreases the need to keep liquid assets. Therefore, the shorter the gap there is between making payments and receiving payments, the lesser will be the demand for money for transaction and precautionary reasons.

Diagram 25.1 shows a straight vertical line representing demand for money for transaction and precautionary motives, implying that changes in interest rate do not influence money demand. Increased demand for money shifts the demand curve rightwards.

Diagram 25.1

Demand for money i.e. Liquidity Preference (LP) for transaction and precautionary motives



Demand for speculative motives however moves inversely with interest rates. At higher interest rates, bonds are thought to be under valued and households convert their liquid assets into bonds. Thus, households demand less money when interest rates are high. Money demanded for speculative motives is passive or idle since this part of liquidity is not likely to be used in near future. Consider diagram 25.2, showing demand for money for speculative reasons. The negative slope suggests that more money is demanded when interest rate falls. Decreased interest rate from  $r_0$  to  $r_1$  increases demand for money from  $Q_0$  to  $Q_1$ .

Diagram 25.2

Demand for money (LP) for speculative motives

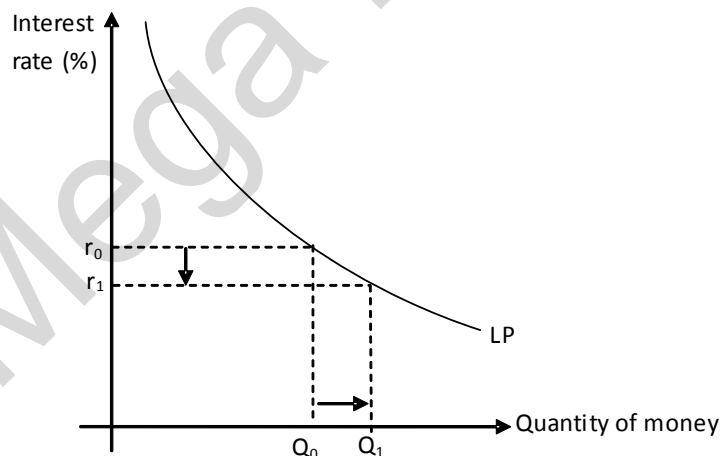
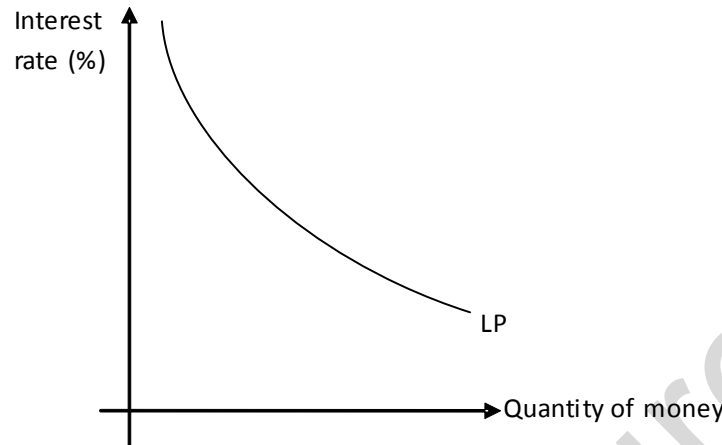


Diagram 25.3 shows a combined demand curve for money, its slope being given by speculative motive and position, by transaction and precautionary motives.

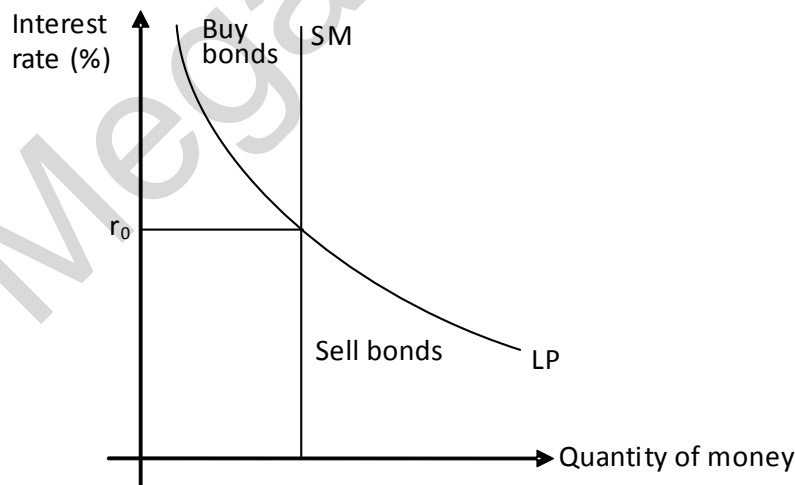
Diagram 25.3



**Equilibrium interest rate**

Equilibrium interest rate is determined by the intersection of demand and supply curves for money. Diagram 25.4 shows the downward sloping demand curve for money and the supply curve of money, SM as a straight vertical line. This is because the government has monopoly power to control money supply and changes in interest rate do not change supply for money.  $r_0$  shows the equilibrium interest rate. At interest rates lower than  $r_0$ , demand for money exceeds supply and people sell bonds to overcome the shortage of liquidity. Increased supply of bonds lowers their market value and increases market interest rate to the equilibrium point. At interest rates higher than  $r_0$ , demand for money falls short of supply and people buy bonds to utilize excess liquidity. Increased demand for bonds raises their market value and lowers market interest rate to the equilibrium point.

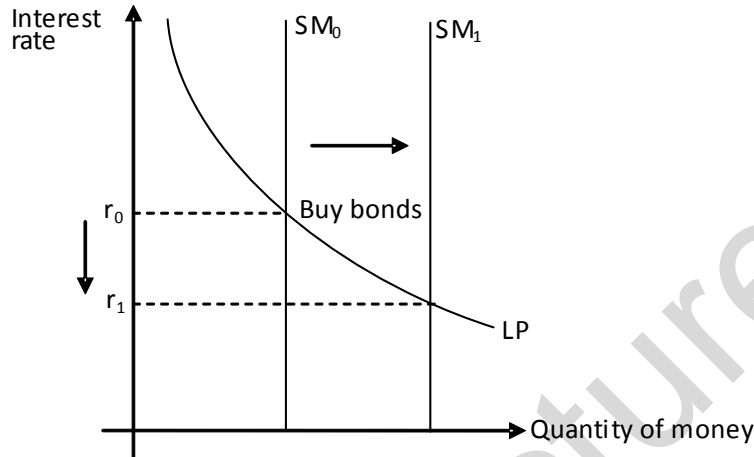
Diagram 25.4



### Impacts of changes in money supply on interest rate

Government's decision to raise money supply or credit creation by commercial banks shifts the supply curve for money from  $SM_0$  to  $SM_1$ . Demand for money falls short of money supply at  $r_0$  and extra liquidity encourages households to buy bonds, raising their prices. The market interest rate falls to  $r_1$ .

Diagram 25.5



The quantity theory of money (section 26) emphasizes that increased money supply raises the price level whereas Keynesians believe that increased supply of money decreases interest rate. They argue that changes in money supply do not change Aggregate Demand in the product/output market and hence the price level remains unaffected. The increased supply of money is spent on buying financial instruments such as bonds in the financial market, pushing up their prices and lowering interest rate.

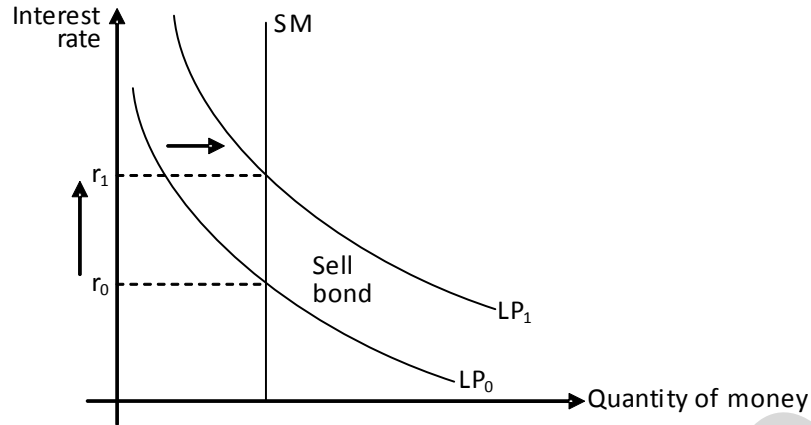
### Impacts of changes in money demand on interest rate

The following factors increase money demand, shifting the demand for money curve rightwards, from  $LP_0$  to  $LP_1$  as shown in diagram 25.6.

- Increased real income
- Increased price level
- Decreased popularity of credit cards
- Increased interval between two payments made to a worker. For example, a worker who was previously paid on weekly basis increases demand for money for transaction and precautionary motives if he is now paid on monthly basis.

Supply for money exceeds demand at  $r_0$  and the liquidity shortage forces households to sell bonds, decreasing their market value and raising interest rate to  $r_1$ . Demand for money and interest rate thus move directly.

Diagram 25.6

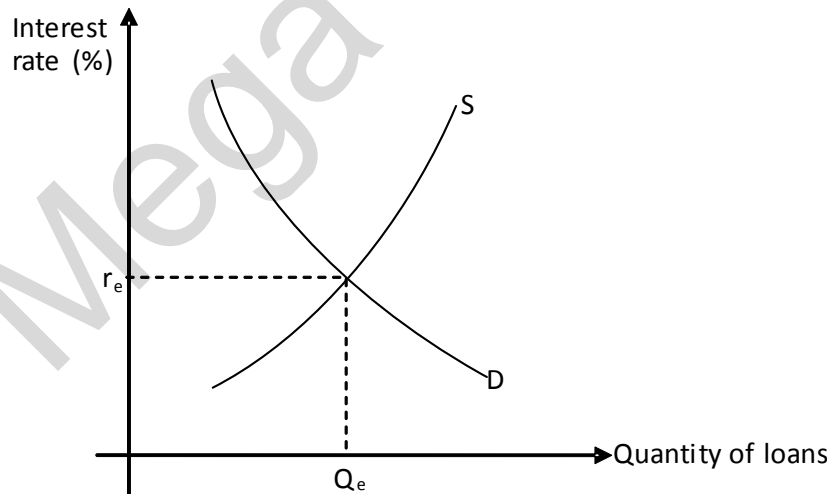


### Loanable Fund Theory

According to the loanable fund theory, equilibrium interest rate is determined by the intersection of demand and supply for loans as shown in diagram 25.7. Demand curve for loans slopes downward since more money is borrowed for consumption and investment purposes at lower interest rates. Supply curve for loans slopes upward since higher interest rate encourage people to save more.

Consumer and business confidence, improved technology and infrastructure and increased availability of better quality cheaper raw materials encourage borrowing, causing a rightward shift in the demand curve for loanable funds. On the other hand, improvement in the saving culture of the economy (i.e. increased propensity to save) or banks' lenient policy towards loans shifts the supply curve for loanable funds rightwards, decreasing interest rate.

Diagram 25.7

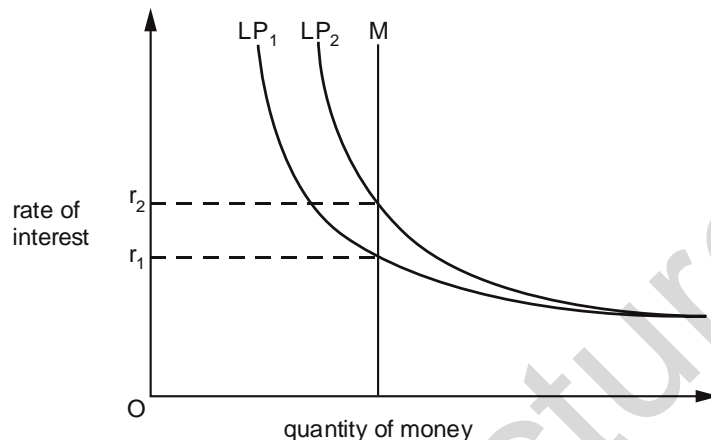


## Multiple Choice Questions (Section 25)

### Liquidity Preference Theory

J/02/3/24

- 1 The diagram shows the determination of the rate of interest in the economy where M represents the money supply and LP represents liquidity preference.



What could cause the rise in the rate of interest from  $r_1$  to  $r_2$ ?

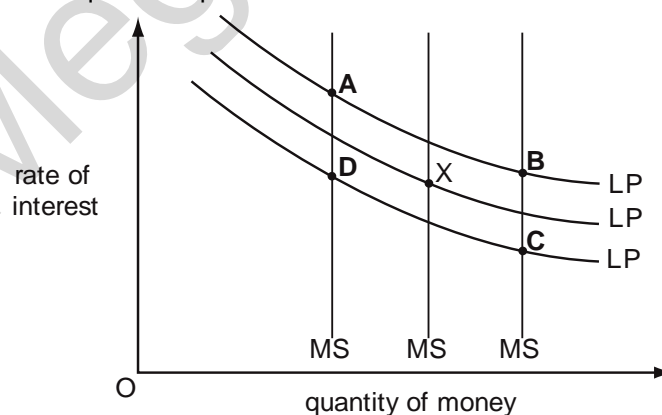
- A an increase in national income
- B an increase in the money supply
- C a reduction in investment expenditure
- D a reduction in the loans made by the private sector

N/03/3/25

- 2 The diagram shows three different levels of money supply (MS) and three different demand curves for holding money balances (LP). The initial equilibrium is at point X.

Banks create more credit and people decide to hold more money as a precaution against emergencies.

What is the new equilibrium point?





J/04/3/21

3 What will cause interest rates to rise?

- A an unexpected increase in the prices of bonds
- B an increase in the nominal money supply
- C an increase in the volume of output
- D a reduction in the price level

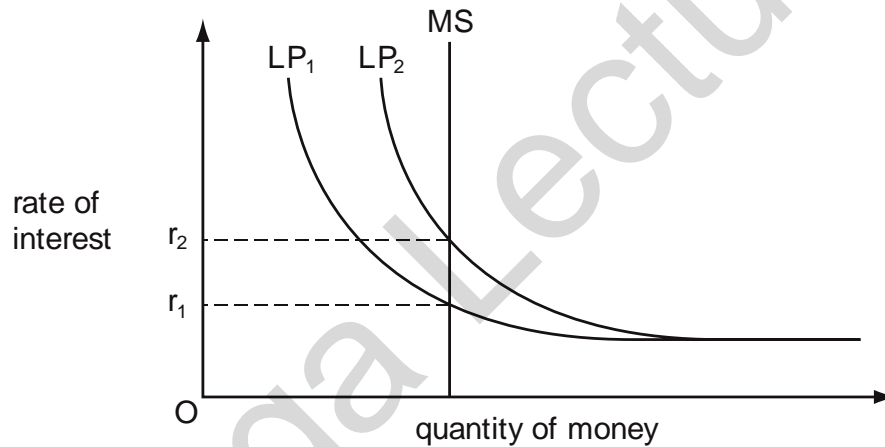
N/04/3/25

4 What would cause an increase in the transactions demand for money?

- A an increase in the rate of interest
- B an increase in nominal national income
- C a fall in the price of bonds
- D an increase in unemployment

J/05/3/23

5 The diagram shows the determination of the rate of interest in an economy where MS represents the money supply and LP represents liquidity preference.



The rate of interest rises as a result of a shift in the liquidity preference curve from LP<sub>1</sub> to LP<sub>2</sub>.

Which policy might be used to try to maintain the rate at r<sub>1</sub>?

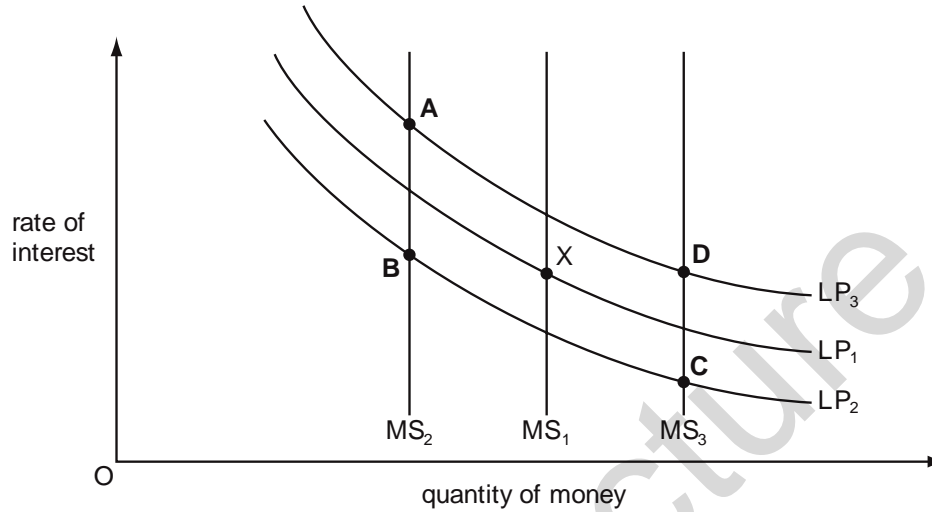
- A the purchase of bonds in the open market
- B reductions in income tax rates
- C increases in indirect taxes
- D increased government expenditure

N/05/3/22

**6** The diagram shows three different levels of the supply of money (MS) and three different demand for money curves (LP). The initial equilibrium is at point X.

There is an increase in the level of money income and at the same time there is a contraction in bank credit.

Which point could be the new equilibrium point?



J/06/3/23

**7** What is most likely to cause the public to hold less cash in relation to the level of money income?

- A** a fall in interest rates
- B** a fall in the level of output
- C** a greater availability of cash substitutes
- D** a rise in the general price level

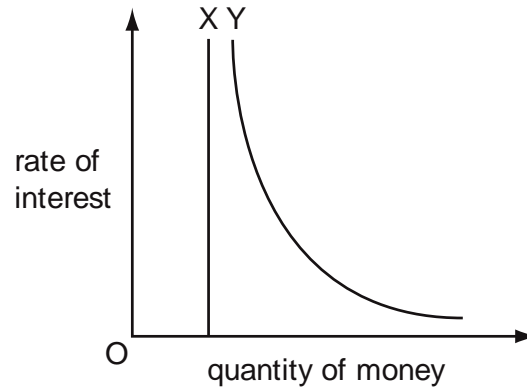
N/06/3/22

**8** According to Keynesian theory, what would cause individuals to want to hold more idle money balances?

- A** an increase in bond prices
- B** an increase in the rate of interest
- C** an increase in the rate of inflation
- D** an increase in the level of output

N/07/3/23

9 The diagram shows the two main components (X and Y) of the liquidity preference curve.

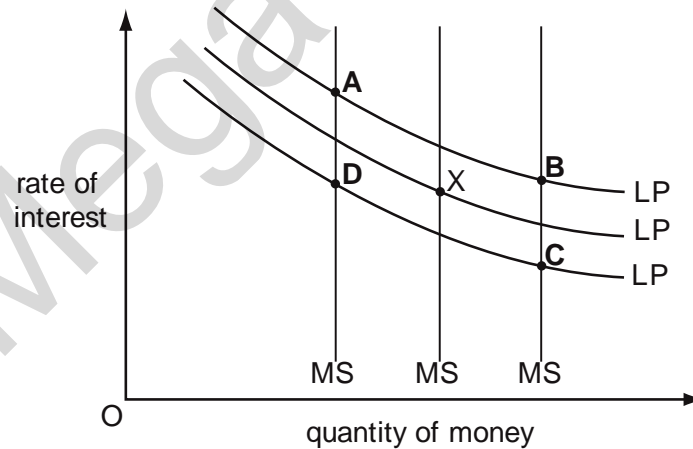


What can be concluded about component X?

- A It is an active balance and is interest-elastic.
- B It is an active balance and is interest-inelastic.
- C It is an idle balance and is interest-elastic.
- D It is an idle balance and is interest-inelastic.

N/08/3/20

10 The diagram shows three different levels of money supply (MS) and three different demand curves for holding money balances (LP). The initial equilibrium is at point X. Banks create more credit and people decide to hold less money as a precaution against emergencies. What is the new equilibrium point?



J/09/3/22

- 11** According to Keynesian theory, in which circumstance would there always be an increase in the demand for money?

	real income	price level	interest rates
<b>A</b>	increase	decrease	increase
<b>B</b>	constant	constant	increase
<b>C</b>	increase	increase	decrease
<b>D</b>	constant	decrease	decrease

J/11/32/19

- 12** According to Keynesian theory, in which circumstance will there always be an increase in the demand for money?

	real income	price level	interest rates
<b>A</b>	constant	decrease	increase
<b>B</b>	constant	increase	decrease
<b>C</b>	increase	decrease	decrease
<b>D</b>	increase	increase	increase

N/11/32/22

- 13** According to Keynesian analysis, what will be the result of a decrease in the money supply?

- A** The rate of interest will be reduced, thereby reducing the levels of investment and income.
- B** The rate of interest will be increased, thereby reducing the levels of investment and income.
- C** The level of income will be increased as a result of a lower rate of interest and a higher level of investment.
- D** The price level will fall by the same percentage change as the decrease in the money supply.

N/11/32/23

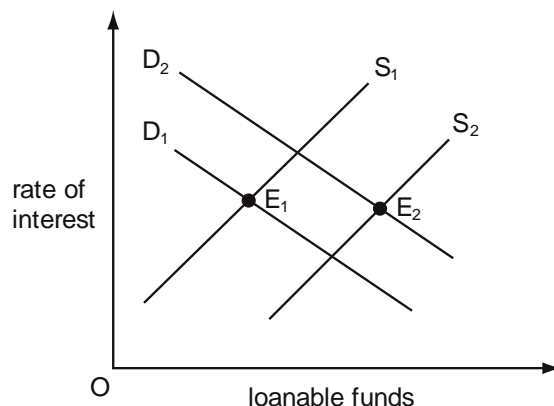
- 14** What will be the likely effects on interest rates and bond prices of an increase in the demand for money?

	interest rates	bond prices
<b>A</b>	fall	fall
<b>B</b>	fall	rise
<b>C</b>	rise	fall
<b>D</b>	rise	rise

**Loanable Fund Theory**

J/05/3/21

**15** The diagram shows the market for loanable funds.

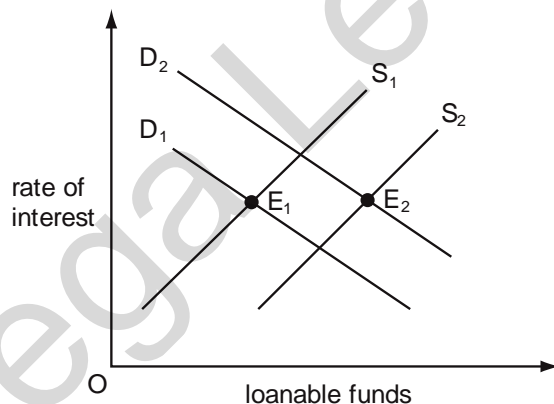


Which changes could cause the equilibrium to move from  $E_1$  to  $E_2$ ?

- A** an increase in the propensity to save and an increase in bank lending
- B** the discovery of oil reserves and an increase in the propensity to save
- C** advances in technology and a decrease in bank lending
- D** a decrease in the propensity to save and the introduction of new products

J/06/3/22

**16** The diagram shows the demand curves and supply curves of loanable funds.

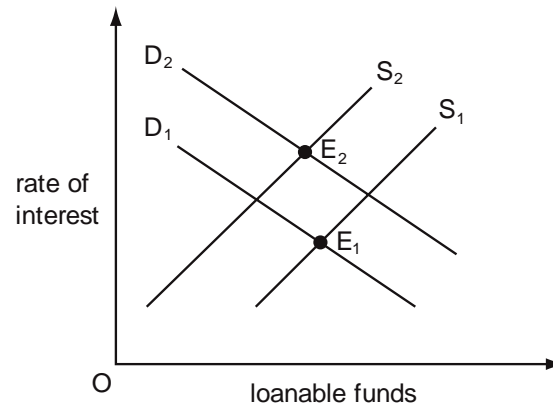


Which changes could cause the equilibrium in the market for loanable funds to move from  $E_1$  to  $E_2$ ?

- A** an increase in the money supply combined with a decrease in the propensity to save
- B** a decrease in bank lending combined with an increase in the productivity of capital
- C** an increase in bank lending combined with an increase in business confidence
- D** a decrease in the money supply combined with an increase in the propensity to save

N/06/3/23

17 The diagram shows the market for loanable funds.

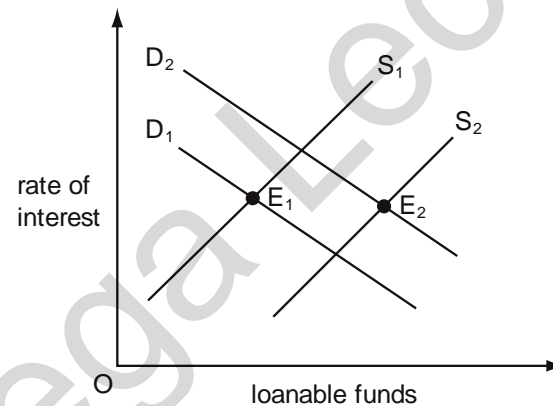


Which changes could cause the equilibrium to move from  $E_1$  to  $E_2$ ?

- A an increase in bank lending and a depletion of natural resources
- B an increase in the propensity to save and the discovery of new mineral deposits
- C advances in technology and a reduction in the propensity to save
- D a decline in business confidence and a decrease in bank lending

J/08/3/25

18 The diagram shows the market for loanable funds.



Which changes could cause the equilibrium to move from  $E_1$  to  $E_2$ ?

- A an increase in the propensity to save and an increase in bank lending
- B the discovery of oil reserves and an increase in the propensity to save
- C advances in technology and a decrease in bank lending
- D a decrease in the propensity to save and the introduction of new products

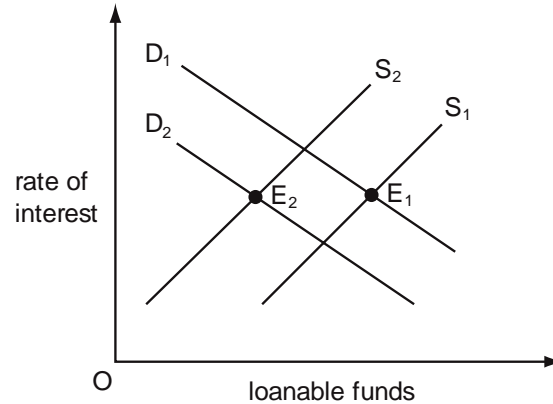
N/09/3/23

19 According to loanable funds theory, what will cause the rate of interest to rise?

- A an increase in the rate of investment
- B an increase in liquidity preference
- C an increase in the level of savings
- D an increase in the supply of money

J/10/3/21

**20** The diagram shows the demand curves and supply curves of loanable funds.

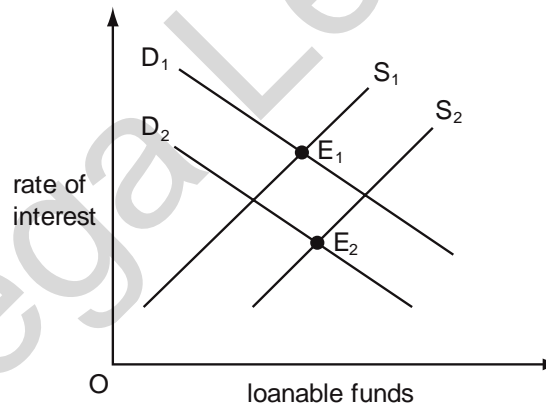


Which changes could cause the equilibrium in the market for loanable funds to move from  $E_1$  to  $E_2$ ?

- A** a decrease in bank lending combined with a decrease in business confidence
- B** a decrease in the money supply combined with an increase in the propensity to consume
- C** an increase in bank lending combined with an increase in the productivity of capital
- D** an increase in the money supply combined with a decrease in the productivity of labour

N/10/3/23

**21** The diagram shows the market for loanable funds.



Which changes could cause the equilibrium to move from  $E_1$  to  $E_2$ ?

- A** a decline in business confidence and an increase in bank lending
- B** a decrease in bank lending and depletion of natural resources
- C** an increase in the propensity to save and the discovery of new mineral deposits
- D** improvements in technology and reduction in the propensity to save

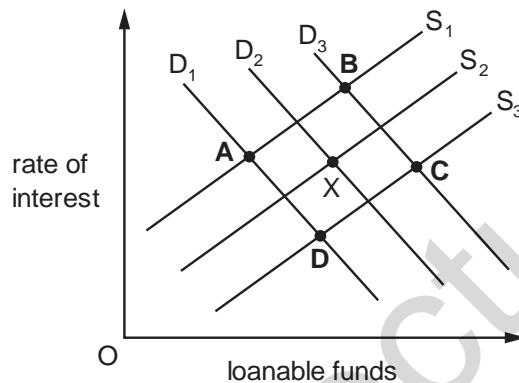
N/13/32/21

**22** According to loanable funds theory, what will cause the rate of interest to rise?

- A** a decrease in the demand for money
- B** an increase in the level of savings
- C** an increase in the rate of investment
- D** an increase in the supply of money

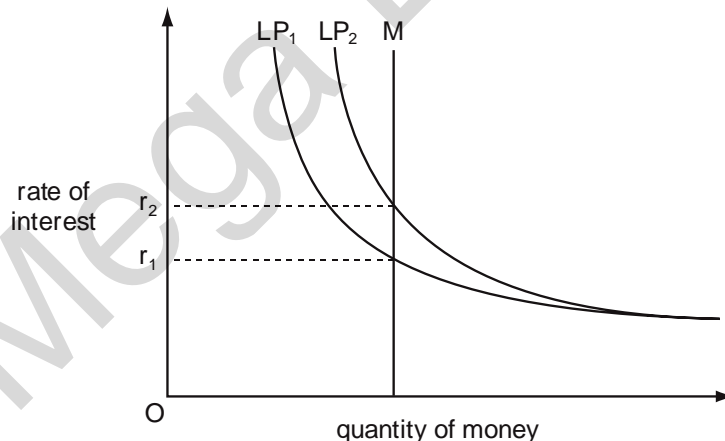
J/14/32/21

**23** The diagram shows the market for loanable funds. The market is in equilibrium at point X. What could be the new equilibrium point if there was a decline in business confidence and an increase in bank lending?



J/15/32/24

**24** The diagram shows the determination of the rate of interest in the economy, where M represents the money supply and LP represents liquidity preference.



What could cause the rise in the rate of interest from  $r_1$  to  $r_2$ ?

- A** an increase in national income
- B** an increase in the money supply
- C** a reduction in investment expenditure
- D** a reduction in the loans made by the private sector



N/15/32/21

**25** What is likely to be the effect on interest rates and the supply of money of a purchase of government securities by a central bank?

	interest rates	money supply
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	decrease
<b>D</b>	decrease	increase

Mega Lecture

## Section: 26 Quantity Theory of Money

Quantity Theory of Money (QTM) presents one of the most important theories of inflation according to which money supply and price level are directly and proportionately related. So for instance, doubling or halving money supply doubles or halves the price level respectively. Irving Fisher, a mathematician turned economist, reaffirmed the quantity theory of money using the following equation:

$$MV = PT$$

where

- M = Stock of money
- V = Velocity of circulation i.e. number of times money changes hands
- P = Price level
- T = Volume of goods and services traded (it is also the real income)

The left hand side of the equation, MV represents the supply of money whereas the other side, PT shows demand for money (PT also gives the value of money income). For equilibrium to hold, MV must always equal PT, that is supply must always equal demand. An increase in quantity of money by 10% raises money income by 10% assuming an unchanged velocity of circulation (try N/02/3/21).

Quantity Theory of Money assumes that:

- Changes in money supply do not affect velocity of circulation
- There is always full employment in the economy and changes in money supply do not change volume of goods and services traded.

$$MV = PT \qquad P = \frac{MV}{T}$$

Given the two assumptions mentioned above, a 100% increase in money supply raises price level by 100% since V and T do not change. The value or the purchasing power of money is halved.

$$\text{Value of money} = \frac{1}{\text{Price level}}$$

### Keynesian criticism on the Quantity Theory of Money

Keynesians argue that the assumption of velocity remaining unchanged with changes in money supply is unrealistic. Increased supply of money decreases interest rates and the opportunity cost of being liquid. As a result, people use their liquidity rather slowly, thus decreasing velocity of circulation. This view is supported by empirical evidence, as supply of money has indeed proven to be inversely related to velocity of circulation.

Secondly, as stated earlier, demand side economists believe that unemployed resources and excess capacity always exist. Increased supply of money may therefore increase the volume of goods and services produced, having little or no impact on the price level.

According to Keynes, increased supply of money is not spent in the product market so has no impact on the price level. The extra liquidity is more likely to go into purchasing financial assets such as bonds, increasing their market prices and lowering interest rate.

Lastly, Keynes argued that money supply does not determine the price level but is itself, price determined. Increased price level raises the demand for money and people use near money to fulfill increased liquidity requirements, raising money supply.

### Credit Creation Process

Banks attract households to deposit their cash surplus with them, so that deposits become the liability of banks and deposit holders earn a markup. On the other hand, banks lend money to consumers and firms for consumption and investment and charge borrowers a markup, since these loans are banks' assets. The difference between the lending rate (average rate at which bank lends money) and the deposit rate (average rate which bank pays to deposit holders) measures a commercial bank's profit margin.

However, depositors may approach banks to withdraw their deposits any time they like. In order to fulfill such requirements, commercial banks maintain a portion of bank deposits in the form of liquid assets. The percentage of bank deposits which must be kept in liquid form may be decided by banks themselves, with profit maximizing ones keeping a very low percentage. In most countries however, it is the Central Bank which declares a compulsory ratio commercial banks must maintain to remain liquid and solvent enough to meet their depositors' obligations. Such regulation is expected to help the banking system operate smoothly.

Commercial banks thus create credit by lending money. Assume that:

- People keep all their liquid assets in banks.
- Liquid asset ratio is 10% i.e. banks lend 90% of deposits and keep the remainder in the form of cash.
- There is infinite demand for bank loans.

Suppose £100 is deposited in bank A, which lends £90 and keeps £10 in the form of cash. £90 do not go out of the banking system since the borrower, buying either consumer or investment goods sooner or later deposits them in either the same or another bank. Assuming £90 get deposited in bank B, it would lend £81 and keep cash worth £9. £81 may become bank C's deposit and the process repeats infinitely. This process of credit creation is shown below, assuming an initial deposit worth £1 for simplicity.

Banks	Δ Deposits	Δ Loans	Δ Cash
A	£1	£0.9	£0.1
B	£0.9	£0.81	£0.09
C	£0.81	£0.719	£0.081
D	£0.719	£0.656	£0.073
E	£0.656		
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	10	9	1

Column 2 appears as liabilities on a commercial bank's balance sheet whereas columns 3 & 4 are recorded as assets.

The deposit multiplier, derived in a manner similar to the expenditure multiplier (see section 18) is 10 in this example. Deposit or monetary multiplier is the inverse of liquid asset ratio and loan multiplier is always less than deposit multiplier by 1.

$$\text{Deposit(monetary) multiplier} = \frac{1}{\text{Liquid asset ratio}} \quad \text{Loan multiplier} = \frac{1}{\text{Liquid asset ratio}} - 1$$

Excess reserves are the difference between liquid assets actually held by commercial banks and the minimum amount of assets which must be kept liquid. Assuming a liquid asset ratio of 10%, bank X with liquid assets worth £100 has excess reserves of £90.

$$\text{Excess reserves} = \text{Actual liquid assets} - \text{required liquid assets}$$

The credit creation ability of a banking system, £900 in the example above, is given by:

$$\text{Credit creation ability} = \text{Excess reserves} \times \text{monetary multiplier}$$

The credit creation ability of an individual bank however, is restricted to excess reserves since it is impossible to guarantee that money lent by it is re deposited in it too. Credit creation ability of bank X therefore becomes £90.

Mega Lecture

## Multiple Choice Questions (Section 26)

J/02/3/18

- 1 In which circumstance will an increase in the public sector deficit **not** lead to an increase in the money supply, other things being equal?
- A The deficit is financed by an increase in government borrowing from private individuals.
  - B The rate of interest is held constant.
  - C There is large-scale unemployment.
  - D Commercial bank lending to the private sector is held constant.

J/02/3/28

- 2 A country has a floating exchange rate, full employment and an expansionary fiscal policy. The government decides to make the central bank independent with the power to determine monetary policy. If the central bank adopts a zero inflation target, what is likely to happen to interest rates and the exchange rate?

	Interest rates	Exchange rates
A	fall	fall
B	fall	rise
C	rise	fall
D	rise	rise

J/02/3/29

- 3 Which measure could be expected to reduce the pressure of demand-pull inflation in an open economy?
- A a depreciation of the foreign exchange rate
  - B a reduction in interest rates
  - C a reduction in the rate of tax on goods and services
  - D a removal of import controls

N/02/3/21

- 4 A 6% increase in the money supply leads to a 4% increase in the level of money income. What can be deduced from this?
- A There has been an increase in interest rates.
  - B There has been a decrease in the level of output.
  - C There has been a decrease in the velocity of circulation.
  - D The price level has increased by 2%.

N/02/3/22

- 5 What would result in a reduction in the volume of bank deposits?
- A an increase in the public's desire to hold cash
  - B an increase in government expenditure financed by borrowing from the central bank
  - C a reduction in the proportion of their deposits that banks hold in cash
  - D an open market purchase of securities by the central bank

J/03/3/24

- 6** Assuming a constant income velocity of circulation of money, if real output grows by 3 %, and the rate of growth of the money supply is 10 %, what will be the approximate change in the price level?
- |          |        |          |        |
|----------|--------|----------|--------|
| <b>A</b> | - 7 %  | <b>B</b> | + 7 %  |
| <b>C</b> | + 10 % | <b>D</b> | + 13 % |

N/03/3/24

- 7** Which method of financing a government deficit will leave the money supply unchanged?
- |          |   |
|----------|---|
| <b>A</b> | the sale of government securities to the central bank     |
| <b>B</b> | the sale of government securities to the commercial banks |
| <b>C</b> | the sale of government securities to domestic residents   |
| <b>D</b> | the sale of government securities to overseas residents   |

J/04/3/24

- 8** A closed economy has a banking system consisting of a single bank. The bank operates with a cash ratio of 10 %.
- Customers deposit \$10 000 in cash.
- Assuming no subsequent change in notes and coins in circulation what is the maximum amount of loans that the bank can create?
- |          |          |          |           |
|----------|----------|----------|-----------|
| <b>A</b> | \$1000   | <b>B</b> | \$9000    |
| <b>C</b> | \$90 000 | <b>D</b> | \$100 000 |

J/04/3/30

- 9** What would represent a monetarist anti-inflationary policy?
- |          |   |
|----------|---|
| <b>A</b> | an increase in indirect taxation          |
| <b>B</b> | direct foreign exchange rate intervention |
| <b>C</b> | the introduction of maximum prices        |
| <b>D</b> | the sale of securities on the open market |

N/04/3/24

- 10** Assuming a constant income velocity of circulation of money, if real output grows by 5 %, and the money supply grows by 2 %, what will be the approximate change in the price level?
- |          |      |          |      |
|----------|------|----------|------|
| <b>A</b> | -3 % | <b>B</b> | +2 % |
| <b>C</b> | +3 % | <b>D</b> | +7 % |

N/04/3/30

- 11** An economy has a low level of unemployment. The government increases its expenditure.
- Which method of financing the additional expenditure is most likely to cause inflation?
- |          |   |
|----------|---|
| <b>A</b> | an increase in borrowing from the Central Bank              |
| <b>B</b> | an increase in income taxes                                 |
| <b>C</b> | an increase in sales of state assets to the non-bank public |
| <b>D</b> | an issue of bonds to the non-bank public                    |

J/05/3/22

- 12** In a closed economy, if the income velocity of circulation of money remains constant, what will be the result of an increase in the money supply?
- A** a proportionate increase in the level of money income
  - B** a proportionate increase in the level of output
  - C** a proportionate increase in the rate of growth of money income
  - D** a proportionate increase in the rate of growth of output

J/07/3/24

- 13** What is likely to happen to interest rates and aggregate demand when a central bank sells government securities?

	interest rates	aggregate demand
<b>A</b>	fall	fall
<b>B</b>	fall	rise
<b>C</b>	rise	fall
<b>D</b>	rise	rise

N/07/3/20

- 14** A country's government runs a budget surplus of \$10 billion. What must the country's central bank do to prevent cash reserves of the commercial banks from falling?

- A** buy bonds of a value at least equal to \$10 billion
- B** buy bonds of a value less than \$10 billion
- C** sell bonds of a value at least equal to \$10 billion
- D** sell bonds of a value less than \$10 billion

N/07/3/29

- 15** In which combination of circumstances is an increase in government expenditure likely to result in the largest increase in output?

	initial level of unemployment	means of financing additional expenditure
<b>A</b>	high	borrowing from the banking system
<b>B</b>	high	increase in tax rates
<b>C</b>	low	increase in tax rates
<b>D</b>	low	issues of bonds to non-bank private sector

J/08/3/23

- 16** In a banking system, all banks maintain 20 % of deposits as cash. One bank receives a new cash deposit of \$200. Subsequent net withdrawals of cash from the banking system are zero. What will be the resulting increase in bank loans and the total increase in bank deposits?

	increase in bank loans	total increase in deposits
<b>A</b>	\$160	\$200
<b>B</b>	\$160	\$360
<b>C</b>	\$800	\$1000
<b>D</b>	\$1000	\$1000

N/08/3/18

- 17** In an economy, the volume of output rises by 3 % in a year, while the quantity of money rises by 5%.  
If the velocity of circulation of money remains the same, what will be the approximate increases in the money value of national income and the price level?

	increase in money value of national income	increase in price level
<b>A</b>	5%	2%
<b>B</b>	5%	3%
<b>C</b>	8%	2%
<b>D</b>	8%	3%

N/08/3/19

- 18** What is likely to be the effect on interest rates and the supply of money of a sale of government securities to the public by a central bank?

	interest rates	money supply
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	decrease
<b>D</b>	decrease	increase

N/09/3/16

- 19** Assuming a constant income velocity of circulation of money, if the rate of growth of the money supply is 8 % and the average price level increases by 5 %, what will be the approximate change in real output?

**A** -3 %                      **B** +3 %                      **C** +8 %                      **D** +13 %

N/09/3/22

- 20** The government sells \$1 million of bonds to the commercial banks. It uses the proceeds from the sale to provide subsidies to sugar producers who pay them into their bank accounts.

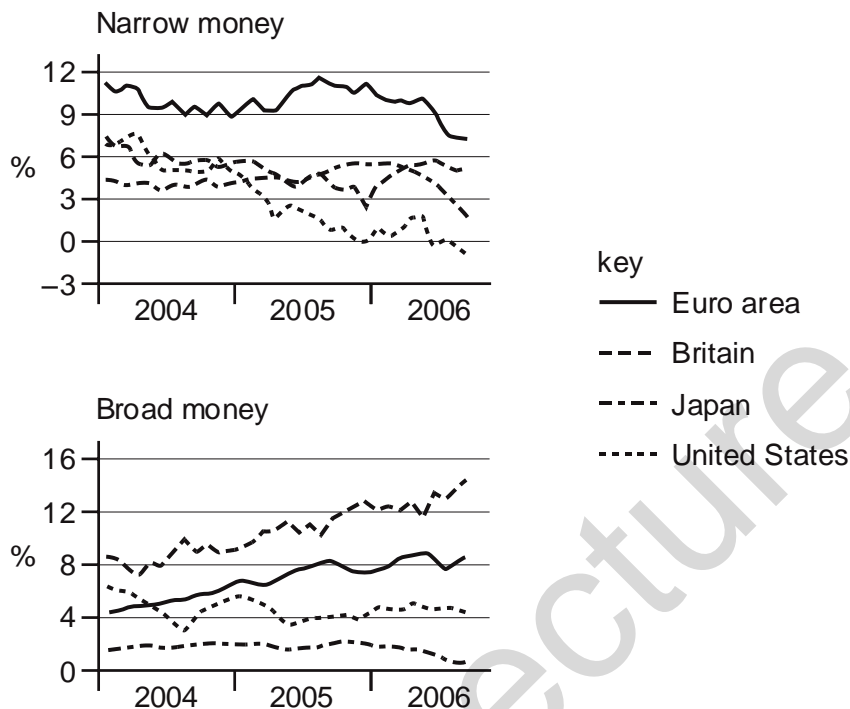
Assuming that notes and coins in circulation remain unchanged, what will be the immediate effect on the assets and liabilities of the commercial banks?

	assets	liabilities
<b>A</b>	bonds +\$1 million reserves -\$1 million	unchanged
<b>B</b>	bonds +\$1 million	deposits +\$1 million
<b>C</b>	reserves -\$1 million	deposits -\$1 million
<b>D</b>	unchanged	unchanged



J/10/3/15

**21** The diagram shows changes in broad and narrow measures of money supply between 2004 and 2006.



Which is the only area to have experienced a contraction in either of its measures of money supply?

- A** Euro area    **B** Britain    **C** Japan    **D** United States

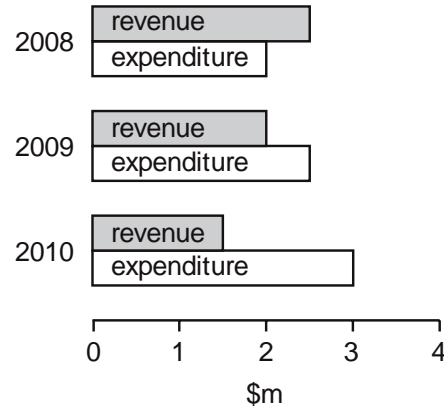
N/10/3/22

**22** An increase in the money supply leads to a fall in interest rates. What else will decrease as a result of these changes?

- A** the desire to hold idle money balances  
**B** the price of equities  
**C** the price of government bonds  
**D** the velocity of circulation of money

J/11/32/24

**23** The diagram shows a government's revenue and expenditure for three years.



What can be concluded from the diagram?

- A** A budget deficit was replaced by a budget surplus.
- B** A government borrowing requirement emerged.
- C** The economy moved from a recession into a boom period.
- D** The yield from taxation continuously increased.

N/11/32/17

**24** Despite a government budget deficit, a country's money supply remains unchanged. What could explain this?

- A** The country has a balance of payments surplus equal to the government budget deficit.
- B** The country's foreign exchange rate is fixed.
- C** The government budget deficit is financed by borrowing from the central bank.
- D** The government budget deficit is financed by selling government bonds to members of the public.

J/12/32/23

**25** What would result in an increase in the volume of bank deposits?

- A** an increase in the public's desire to hold cash
- B** an increase in government expenditure financed by borrowing from the central bank
- C** an increase in the proportion of their deposits that banks hold in cash
- D** an open market sale of securities by the central bank

J/12/32/24

**26** In a banking system all banks maintain 10 % of deposits as cash. Customers withdraw \$20 000 in cash. Assuming no subsequent net change in notes and coins in circulation, by how much will the banks have to reduce their net loans?

- A** \$2000    **B** \$18 000    **C** \$180 000    **D** \$220 000

N/12/32/20

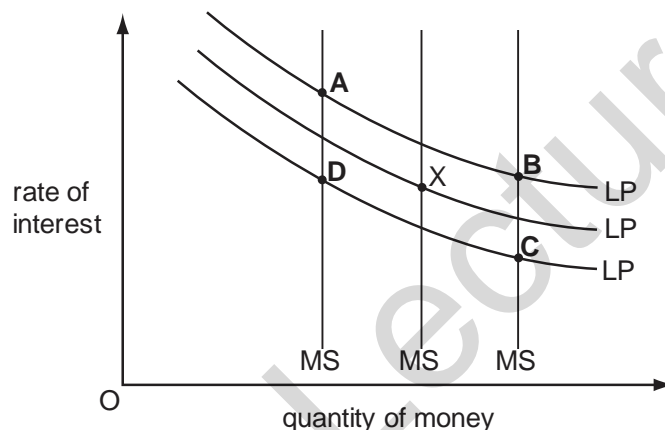
**27** In 2009 the US central bank, the Federal Reserve, increased the money supply. Which policy measure taken by the Federal Reserve would have achieved this outcome?

- A** a purchase of government securities in the open market
- B** a reduction in the issue of short-term government debt
- C** a requirement for commercial banks to increase their liquidity ratios
- D** an increase in the bank rate

N/12/32/21

**28** The diagram shows three different levels of money supply (MS) and three different demand curves for holding money balances (LP). The initial equilibrium is at point X. Banks create more credit and people decide to hold more money as a precaution against emergencies.

What is the new equilibrium point?



J/13/32/18

**29** A country's central bank engages in a policy of quantitative easing (open market purchase of securities). How is this policy meant to affect the quantity of narrow money and the quantity of broad money?

	effect on narrow money	effect on broad money
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	increase
<b>D</b>	decrease	decrease

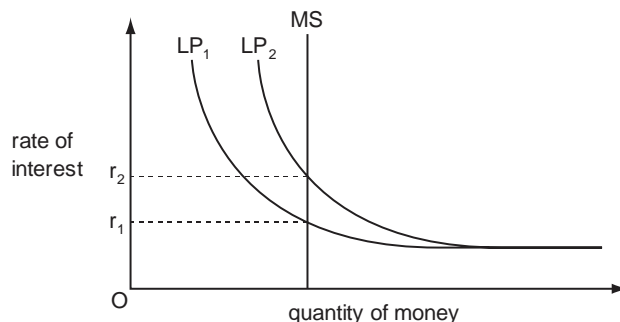
J/13/32/21

**30** Other things remaining unchanged, what is likely to be a consequence of an increase in net cash withdrawals from the commercial banks?

- A** an inflationary spiral
- B** an increase in the cash reserves of the commercial banks
- C** an increase in the liquidity of the commercial banks
- D** a restriction in the ability of the commercial banks to lend

J/13/32/22

**31** The diagram shows the determination of the rate of interest in an economy where MS represents the money supply and LP represents liquidity preference.



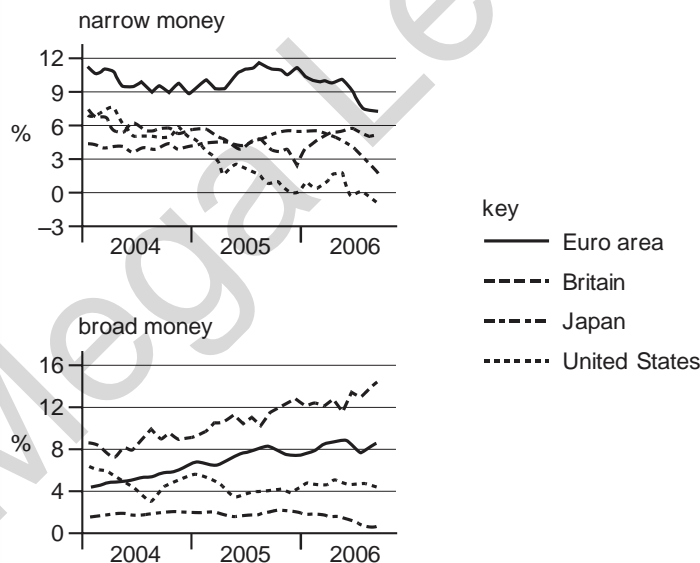
The rate of interest rises as a result of a shift in the liquidity preference curve from  $LP_1$  to  $LP_2$ .

Which policy might be used to try to maintain the rate at  $r_1$ ?

- A** increased government expenditure
- B** increases in indirect taxes
- C** reductions in income tax rates
- D** the purchase of bonds in the open market

N/13/32/18

**32** The diagram shows changes in broad and narrow measures of money supply between 2004 and 2006.



Which is the only area to have experienced a contraction in either one of its measures of money supply?

- A** Euro area
- B** Britain
- C** Japan
- D** United States

N/13/32/19

**33** Which assertion could be described as monetarist rather than Keynesian?

- A** The interest elasticity of investment expenditure is close to zero.
- B** The money supply is the main determinant of aggregate monetary expenditure.
- C** The money supply is the main determinant of output in the long-run.
- D** The velocity of circulation of money is unstable over time.

J/14/32/17

**34** A closed economy has a banking system consisting of a single bank. The bank operates with a cash ratio of 10%. Customers deposit \$20 000 in cash. Assuming subsequent net withdrawals of cash from the banking system are zero, what is the maximum amount of loans that the bank can create?

- A** \$2000
- B** \$18 000
- C** \$180 000
- D** \$200 000

N/14/32/21

**35** A central bank pursues a policy of quantitative easing by purchasing government securities.

What is likely to happen to interest rates and aggregate expenditure?

	interest rates	aggregate expenditure
<b>A</b>	fall	fall
<b>B</b>	fall	rise
<b>C</b>	rise	fall
<b>D</b>	rise	rise

N/14/32/27

**36** A government decides to pursue a more reflationary fiscal policy and a more deflationary monetary policy.

Which combination of changes in policy instruments is consistent with this?

	government expenditure	interest rate	taxation
<b>A</b>	decrease	decrease	decrease
<b>B</b>	decrease	decrease	increase
<b>C</b>	increase	increase	decrease
<b>D</b>	increase	increase	increase

J/15/32/18

**37** Other things being equal, the money supply in an open economy will increase if

- A** domestic banks increase their lending to foreign borrowers.
- B** the central bank buys foreign currency in the foreign exchange market.
- C** the government sells bonds to domestic residents.
- D** there is an increase in the volume of imports to the economy.

J/15/32/22

**38** Assuming a constant income velocity of circulation of money, if the price level increases by 5% and the money supply grows by 2%, what will be the approximate change in real output (transactions)?

- A** -3%                      **B** -2.5%                      **C** +3%                      **D** +7%

J/15/32/23

**39** Why will an inflationary process be brought to a halt if the money supply is held constant?

- A** Consumption will decrease as money incomes decline.  
**B** Government expenditure will have to be reduced as government revenues decline.  
**C** The rate of interest will rise as more money is required for transactions purposes.  
**D** The stimulus to invest will decline as the real burden of company debt rises.

N/15/32/20

**40** Over one year the money income in an economy increased by 6%. In the same period prices rose by 4%.  
What can be concluded from this?

- A** Real incomes decreased by 2%.  
**B** The velocity of circulation decreased by 2%.  
**C** The money supply increased by 10%.  
**D** The volume of output increased by 2%.

N/15/32/28

**41** The table shows how the government finances its budget deficit in a closed economy.

	\$
budget deficit	200 billion
sale of government securities to the central bank	50 billion
sale of government securities to the non-bank private sector	150 billion

If there is no change in notes and coins in circulation and commercial banks maintain a 10% cash reserve ratio, what will be the resulting increase in the money supply?

- A** \$50 billion                      **B** \$150 billion  
**C** \$200 billion                      **D** \$500 billion

## Section: 27

## Unemployment

### The main types of unemployment

#### Frictional unemployment

- This occurs when people are 'between jobs' and the number of job vacancies provides a rough estimate of the size of frictional unemployment.
- The longer the 'search time', the higher the number of frictionally unemployed people. (Search time is the time taken by workers in finding out a job)
- The availability of unemployment benefits slows down workers' efforts in searching for jobs and also increases their aspirations, hence increasing search time.
- Frictional unemployment may be reduced by reducing unemployment benefits and/or improving communication between employers with vacancies and job applicants
- Governments can help by setting up a computerized job information service in Job Centres.

#### Casual unemployment

- People are casually unemployed when changing jobs becomes frequent
- Daily wagers and workers working in construction are casually unemployed

#### Seasonal unemployment

- Frictional unemployment, when frequent and taking place at regular intervals, becomes seasonal unemployment
- This is caused by the seasonal variation of demand in certain industries or sectors of the economy such as construction, tourism and agriculture
- Affected industries may be encouraged to diversify their products to attract demand throughout the year, such as tourism venues competing for income from the conference market
- Employees in the affected sectors may be encouraged to compete for jobs in sectors unaffected by seasonal variation in demand

#### Structural unemployment

- This type of unemployment is caused by a mismatch between the characteristics i.e. the requirements of a job and the abilities, qualifications and expertise of workers
- Rapid technological developments create a divergence between workers' skills and job requirements leading to increased technological and structural unemployment.
- As the structure of the economy alters over time, people have to adapt to find new jobs in new parts of the economy. In UK for instance, the process of deindustrialization i.e. a move from industrial sector to tertiary (service) sector caused massive unemployment
- This may mean that unemployed workers have to relocate or retrain or do both, in order to get a new job
- Due to labour immobility, large pockets of unemployment can remain trapped in particular regions where the old industries were located
- Governments can help by providing subsidies to employers in regions with high levels of unemployment or by improving labour mobility

### **Cyclical unemployment**

- This is caused by low levels of demand and prevails during recessions. Falling demand in the economy leads to reduced demand for labour
- Governments can help by boosting the level of aggregate demand in the economy. This would involve increasing public expenditure and/or cutting taxation

### **Technological unemployment**

- This is seen when firms use capital investment to reduce their reliance on unskilled or semi-skilled labour
- A good example is car production where automation and computer-aided manufacture has been introduced or administrative jobs where the use of information technology has become widespread
- Workers affected by technological unemployment must retrain to seek new jobs

### **Regional unemployment**

- This is where high levels of unemployment prevail in specific areas
- It exists in areas of high concentration of industries, which have declined with changes in the structure of the economy
- Governments can help by offering regional aid, including incentives for new industries to relocate in affected areas
- Governments can also help by encouraging local pay agreements instead of setting a minimum national wage

### **International unemployment**

- This is where domestic producers are replaced by firms based overseas. The attempt of domestic producers to find cheaper production opportunities in overseas markets i.e. outsourcing, is one reason of this type of unemployment
- The home country may be seen as uncompetitive in terms of price or quality
- Governments may choose to use trade policies such as quotas or tariffs to avoid this, but may face pressure from the World Trade Organization if it does so
- Artificially lowered exchange rates could be used to make domestic goods less expensive to overseas buyers

### **Voluntary unemployment**

- Some of the economically inactive may be so through choice
- Powerful trade unions and their ability to win high real wages reduce job opportunities
- Some people may find it more attractive to live off social security benefits. Such people are victims of the famous 'unemployment trap'
- Governments can make working more attractive by using the tax system to allow low-paid workers to keep more of their income. At the same time, these people could have their benefit payments reduced if they refuse to accept suitable job opportunities
- Classical economists believe that people are unemployed only voluntarily. According to them, there won't be unemployment if workers and strong trade unions didn't insist on too high real wages. However, Keynes maintains a distinction between voluntary and involuntary unemployment. According to him, demand deficient unemployment is involuntary and can be overcome by an active government role targeting an increased aggregate demand.



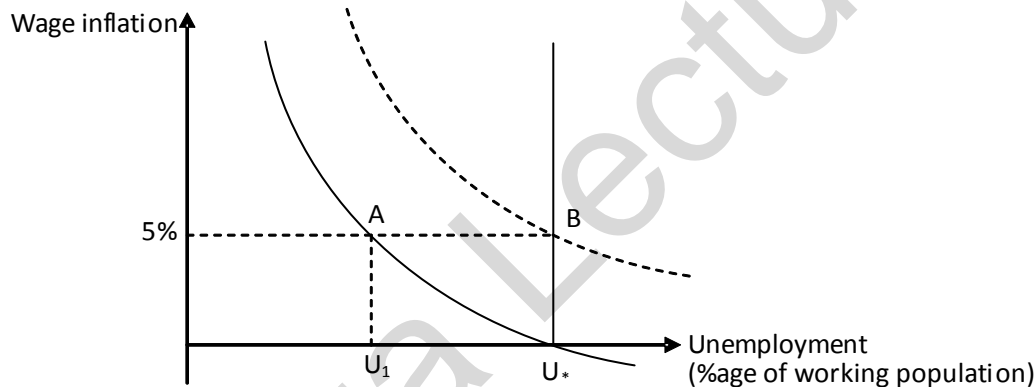
Unemployment cannot be dealt with effectively, without identifying its type. The following table summarises few policy options to reduce various types of unemployment.

Type of Unemployment	Possible solution
Frictional	Reduce welfare spending on benefits, improve information about job vacancies
Cyclical and Demand deficient	Reduce tax rates, reduce interest rates, increase government spending (try J/03/3/29)
Structural	Education and train workers (try N/02/3/27)

### Philips Curve

On analyzing the 90 year data (1860-1950) of the UK economy, A. W. Philips discovered a stable but non-linear relationship between wage inflation and the rate of unemployment, as shown in diagram 27.1. The downward sloping curve represents a trade off between the two important macro economic objectives of reducing unemployment and stabilizing price level.

Diagram 27.1



At an unemployment rate of  $U^*$  in the diagram above, wages and hence prices are stable. Assume that the government finds  $U^*$  too high a level of unemployment and wishes to trade off along the Philips curve. It may very well succeed in decreasing unemployment from  $U^*$  to  $U_1$ , but wages and price level are no longer stable. Increased wages raise price level through both demand pull (increased wages raise purchasing power and hence aggregate demand) and cost push effects (increase in wages in excess of productivity improvements raises unit labour cost and results in cost push inflation).

Increasing wages by 5% increases unit labour cost by 5%, given that labour productivity remains unchanged. At point A, the government has reduced unemployment to  $U_1$  but inflation rate has increased to 5%. More workers are willing to work thinking their wages have increased but fail to see that real wages are unchanged (Real wage is the ratio of money wage and price level and a proportionate increase in money wages and price level leaves real wages unchanged). Likewise, firms believe their profits have risen after the price increase whereas in reality, profits are unchanged since costs of production have also risen (due to increased wages). According to Keynes the economy rests at point A with a reduced unemployment at  $U_1$  since both workers and firms remain victims of money illusions.

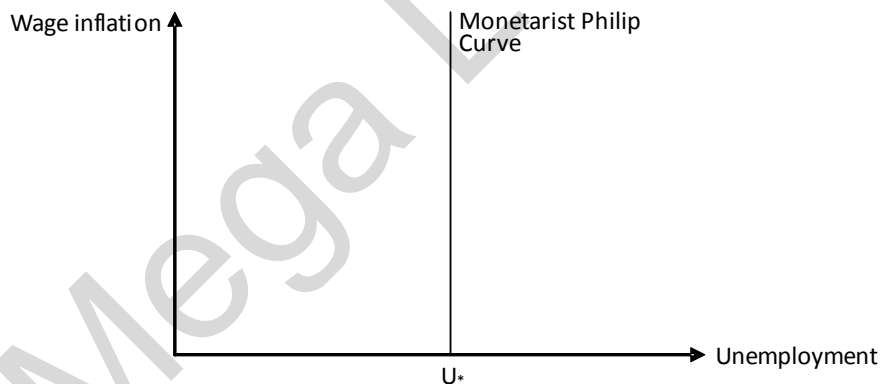
However, monetarists disagree and assert that the economy may temporarily move to point A since increased money supply and aggregate demand are unanticipated. However long run provides sufficient time to economic agents to make necessary adjustments to expectations about future price levels and see through money illusions, workers exit the job market and firms also lay off 'additional' workers employed and economy moves back to point B. Unemployment increases to the previous level of  $U^*$ , but wages and price level are no longer stable. Hence, the short run trade off or conflict between the objectives of full employment and price stability does not exist in the long run. (try J/05/3/17).

$U^*$  is natural rate of unemployment, the level of unemployment where the labour market is in equilibrium. Frictionally, casually and structurally unemployed people all form part of natural unemployment. Any attempt to reduce unemployment below this level will only inflate the price level and Philips curve shifts upward. Height of the curve at natural rate of unemployment i.e.  $U^*$  gives the expected inflation rate. Expected inflation rate which was 0% has now risen to 5%. There is a separate Philips curve for every expected inflation rate and a higher rate shifts the curve upwards. See N/02/3/28

At point B, both the current and expected inflation rate is 5%, so workers demand a wage increase of 5%. Wages and price continue to rise at 5%. The economy may stay at point B if the government does not repeat its 'mistake' of trading off along the Philips curve. If the latter happens, unemployment remains unchanged whereas the price level increases continuously (try J/03/3/26).

Philips curve is a straight vertical line in the long run, implying that any attempt to reduce unemployment below the natural rate only inflates the price level but leaves the employment level unchanged. This natural rate, however, may itself be decreased when the long run Philips curve shifts leftwards.

Diagram 27.2



## Supply Side Policies And Natural Rate Of Unemployment

What follows is a list of supply side measures that shift the long run Philips curve towards left, decrease the natural rate of unemployment, shift the production possibility curve outwards and increase potential rate of economic growth.

- Government decreases or restricts the provision of unemployment benefits. This pressurizes unemployed workers into searching for jobs more aggressively, thus decreasing frictional unemployment.

- Government increases expenditures on training and education. A trained and educated work force is occupationally more mobile and results in reduced structural unemployment
- Lowering top tax rates (tax rates at higher income level) encourages workers and investors to work and invest more, increasing the pace of economic growth and lowering unemployment.
- Improved infrastructure increases workers' geographical mobility, helping them find jobs quickly and reducing overall unemployment.
- Widening inter-regional wage differentials incentivize workers to move to other areas, increasing their geographical mobility and reducing the natural rate of unemployment.
- Narrowing inter-regional house price differentials makes sale and purchase of houses easier, raising the level of geographical mobility and reducing the natural rate of unemployment.
- Checking the number of trade union members weakens their power to demand high wages, in excess of productivity and helps reduce the natural rate of unemployment (try J/07/3/29)
- Abolishing national pay legislation and encouraging local pay agreements also helps reduce natural unemployment.

### **Potential versus Actual Rate of Economic Growth**

Factors such as increase in resources, technology improvements, increased spending on training/education of workforce and increased female participation in workforce shift the production possibility and aggregate supply curves rightwards, showing an increase in potential output. The actual growth, on the other hand, requires the use of unemployed, idle and newly discovered resources. Increased rate of potential growth may increase unemployment if governments fail to utilize the additional resources. Unemployment falls only when the actual rate of economic growth exceeds potential rate of economic growth (try N/07/3/27). Factors raising potential rate of economic growth also raise actual rate of economic growth except the following ones which may increase actual rate of economic growth in the short run but diminish the potential rate of economic growth in the long run.

- Increased government budget deficit injects demand and increases the actual rate of economic growth. However, the increased role of a less efficient public sector at the expense of the so called more efficient private sector crowds out resources, diminishing the potential rate of economic growth in the long run (try J/06/3/26).
- Import barriers and devaluation of the national currency make local goods relatively cheap and switch expenditures towards them, increasing the actual rate of economic growth in the short run. However, elimination of competition makes local producers complacent and inefficient, diminishing the potential rate of economic growth in the long run. Therefore, a stronger currency and removal of trade barriers promote competition and enhance efficiency, increasing the rate of potential growth (try J/07/3/25).

### **Poverty Trap**

A poverty trap is a 'bad' equilibrium that exists at an individual, societal or national level and involves a vicious cycle of poverty and underdevelopment breeding more poverty and underdevelopment, often from one generation into the next. For poorest countries, it may involve an income level too low to generate the savings necessary for initiating the process of sustained growth. Total saving may be too small to compensate depreciation, let alone add to capital stock.

**Classical versus Keynesian school of thought- A summary**

<b>Classical/Monetarists</b>	<b>Keynesians</b>
Price mechanism has the capacity to allocate resources efficiently and solve all economic problems automatically without any intervention. The role of government is thus restricted to upholding property rights. "Less government is the best government".	Price mechanism alone is highly insufficient and government intervention is essential for smooth running of economic systems.
Unemployment is only voluntary and can be decreased by allowing real wages to fall till demand for labour equals its supply and unemployment becomes zero. Likewise, the price level falls whenever Aggregate Demand falls short of Aggregate Supply. Thus flexible price and wage mechanisms help the economy recover from recessions.	Keynes maintains a distinction between voluntary unemployment and involuntary or demand deficient unemployment. Wages and prices are sticky downwards as neither workers accept lower wages nor firms lower prices. Government intervention is required to overcome demand deficiency and reduce unemployment by injecting demand.
People are rational enough to see through money illusions and their behaviour is influenced by changes in real wages. For example, workers raise supply of labour only when real wages increase and won't mind a cut in wage as long as prices fall as well.	People are victims of money illusion and attach more importance to nominal figures
Saving is a function of interest rate and investments also respond to changes in interest rates, thus changes in interest rates are sufficient to bring equality between savings and investments.	Saving is a function of income. Changes in interest rate have little or no effect on investment and the interest elasticity of investment expenditure is close to zero. Future expectations and expected rate of return determine the level of investment instead of changes in interest rate. Thus changes in interest rates can't bring equality between savings and investments.
Increased money supply increases Aggregate Demand and hence the price level. Thus, the money supply is the main determinant of aggregate monetary expenditure.	Increased money supply reduces interest rates. Aggregate Demand increases when either government or consumers increases their spending.
An attempt to reduce unemployment below its natural rate accelerates inflation in the short run- thus a trade off between unemployment and inflation is possible in the short run. However in the long run, such a trade off does not exist and any attempt to reduce unemployment below its natural rate only accelerates inflation but leaves the level of employment unchanged (try J/08/3/19). Increased budget deficit and trade restrictions increase Aggregate Demand and might increase actual rate of economic growth but diminish the potential rate of economic growth.	There is a trade off between unemployment and inflation. Unemployment can be decreased by allowing price level to increase. Demand injections through budget deficits reduce unemployment and raise economic growth.

## Multiple Choice Questions (Section 27)

J/02/3/26

- 1** An economy is operating initially at its natural rate of unemployment. According to monetarist theory, compared to the initial position, what will be the effect on unemployment in the short run and in the long run of an unanticipated increase in the money supply?

	short run	long run
<b>A</b>	no change	no change
<b>B</b>	no change	reduction
<b>C</b>	reduction	no change
<b>D</b>	reduction	reduction

J/02/3/27

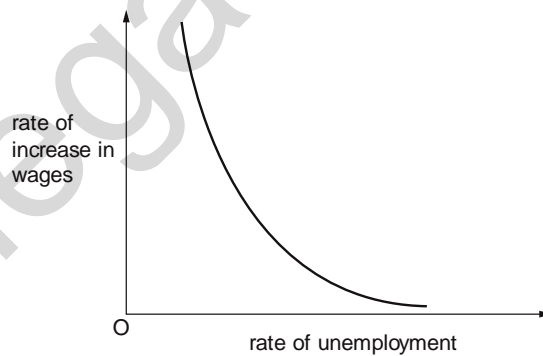
- 2** What is likely to increase a country's actual output but may reduce its long-run rate of growth of potential output?
- A** an increase in the size of the labour force
  - B** increased government spending on education
  - C** an increase in the size of the government's budget deficit
  - D** increased female participation in the labour force

N/02/3/27

- 3** Which of the following policies is specifically designed to reduce the level of structural unemployment?
- A** a reduction in interest rates
  - B** a reduction in the level of direct taxation
  - C** the provision of retraining schemes
  - D** an increase in the level of state benefit paid to the unemployed

N/02/3/28

- 4** The diagram shows the relationship between the rate of increase in wages and the rate of unemployment.



Which of the following would be likely to cause the curve in the diagram to shift upwards and to the right?

- A** a reduction in regional differences in unemployment rates
- B** a reduction in the proportion of the workforce belonging to trade unions
- C** an increase in the unemployment rate
- D** the expectation of a higher rate of inflation

J/03/3/17

- 5** The government of a centrally planned economy decides to replace central planning with a market system.  
What does the experience of the former Communist states suggest is likely to happen in the early stages of the transition process to national output and to the inflation rate?

	national output	inflation rate
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	increase
<b>D</b>	increase	decrease

J/03/3/20

- 6** Which statement is consistent with a Keynesian view of the workings of the macroeconomy?
- A** Recessions can result from fluctuations in private investment expenditure.
  - B** Interest rates move to ensure continuous equality between savings and investment plans.
  - C** Money wages in the economy in the short run are perfectly flexible.
  - D** Changes in aggregate demand cannot occur without equivalent changes in the money supply.

J/03/3/26

- 7** A government uses monetary policy in an attempt to keep actual unemployment continuously below the 'natural' rate of unemployment.  
What is likely to be a consequence of this policy?
- A** a high but constant rate of inflation
  - B** a low but constant rate of inflation
  - C** a decelerating rate of inflation
  - D** an accelerating rate of inflation

J/03/3/28

- 8** Real output in an economy grows by 1.5 % but at the same time the level of unemployment increases.  
What can be deduced from this information?
- A** Labour productivity has decreased.
  - B** Actual output has grown more slowly than potential output.
  - C** Population of working age has fallen.
  - D** There has been an increase in the rate of inflation.

J/03/3/29

- 9** If the unemployment that exists in a country is judged to be mainly cyclical, which is the most effective policy the government could implement?
- A** cut welfare spending on benefits
  - B** improve information about job vacancies
  - C** reduce tax rates
  - D** raise interest rates

N/03/3/20

- 10** An economy is operating initially at its natural rate of unemployment. According to monetarist theory, what will be the effect on unemployment in the short run and in the long run of an unanticipated increase in the money supply?

	short run	long run
<b>A</b>	no change	no change
<b>B</b>	no change	reduction
<b>C</b>	reduction	no change
<b>D</b>	reduction	reduction

N/03/3/28

- 11** Which type of unemployment arose from the worldwide decline in the demand for electronic goods beginning in the summer of 2001?

- A** seasonal
- B** voluntary
- C** frictional
- D** structural

J/04/3/22

- 12** According to monetarist theory, what will be the short-run effect of an unexpected increase in the money supply?

- A** an appreciation of the foreign exchange rate
- B** an increase in employment
- C** an increase in real wages
- D** an increase in the rate of interest

J/04/3/25

- 13** Between 2000 and 2002 national output in the United States increased by 2 %. Over the same period the unemployment rate increased from 4 % to 6 %. What would explain this?

- A** There was a decrease in labour productivity.
- B** There was a decrease in the size of the labour force.
- C** There was a fall in the rate of inflation.
- D** Potential growth in national output was above actual growth.

J/04/3/26

- 14** The natural rate of unemployment in an economy is 5 %. What will happen if a government persists in trying to achieve a target rate of unemployment of 3 % by expansionary monetary policy?

- A** an accelerating rate of inflation
- B** a diminishing rate of inflation
- C** a high but constant rate of inflation
- D** a negative rate of inflation

J/04/3/27

15 Which policy is most likely to result in a decrease in the natural rate of unemployment?

- A a reduction in interest rates
- B an increase in government expenditure on goods and services
- C an increase in trade union membership
- D a decrease in the level of government payments to the unemployed

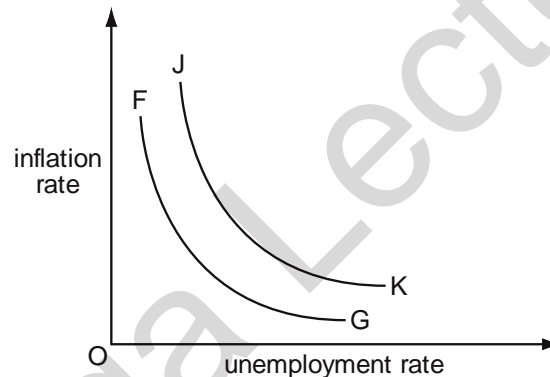
N/04/3/26

16 In the long run, productive potential in an economy grows at an average rate of 3 % per year. In a particular year actual growth is zero because of a fall in domestic consumption. What is likely to occur?

- A an increase in the rate of inflation
- B an increase in the trade deficit
- C an increase in unemployment
- D a reduction in the government budget deficit

N/04/3/27

17 The diagram shows the relationship between the rate of inflation and the rate of unemployment.



What would cause the curve FG to shift to JK?

- A a decrease in government expenditure
- B a fall in the level of employment
- C an increase in the rate of change of wages
- D the expectation of an increase in inflation

J/05/3/17

18 According to monetarist theory, which policy objectives are in conflict in the short run, but not in the long run?

- A economic growth and full employment
- B economic growth and price stability
- C full employment and price stability
- D price stability and equilibrium in the balance of payments



J/05/3/25

**19** What will assist a country's potential growth in national output?

- A** a reduction in cyclical unemployment
- B** an increase in the rate of inflation
- C** an increase in the government's budget deficit
- D** increased participation in the labour force

N/05/3/14

**20** The value of government benefits that households are able to claim currently depends on their level of income.

What would reduce the extent of the resulting poverty trap?

- A** a campaign to encourage more households to apply for the benefits to which they are entitled
- B** an increase in the level of government benefits
- C** a reduction in the rate at which benefits are withdrawn as a household's income increases
- D** the targeting of benefits on those in greatest need

N/05/3/17

**21** According to monetarist theory, when will an increase in the money supply leave the level of output unchanged?

- A** when the increase in the money supply was not anticipated
- B** when the exchange rate is flexible
- C** when the liquidity trap is operative
- D** when there is an immediate adjustment to expectations about future price levels

N/05/3/24

**22** In an economy the long-run rate of growth of potential output is 2.5 %.  
What must happen in the short run if actual output grows at 5 %?

- A** an increase in employment
- B** an increase in the rate of inflation
- C** a deterioration in the balance of trade
- D** an increase in labour productivity

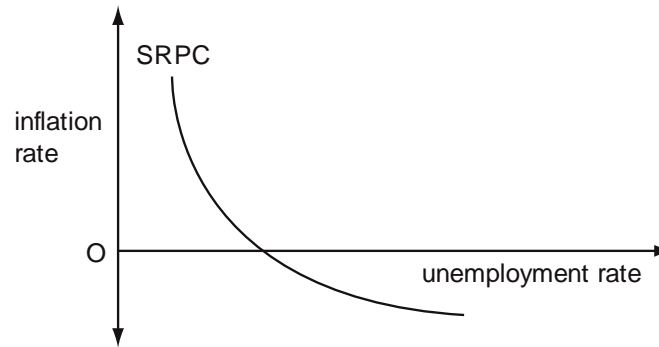
N/05/3/25

**23** All else remaining unchanged, which measure would be most likely to increase the natural rate of unemployment?

- A** an increase in expenditure on education and training
- B** an increase in the rate of unemployment benefits
- C** a reduction in the government's budget deficit
- D** a reduction in the general level of interest rates

N/05/3/26

24 The diagram shows an economy's short-run Phillips curve.



What is assumed to remain constant when drawing this curve?

- A the average price level
- B the money supply
- C the exchange rate
- D the natural rate of unemployment

J/06/3/18

25 What is a central assertion of 'Monetarist' economics?

- A Fiscal policy should be used for the continuous management of the economy.
- B Major recessions can occur despite an unchanged money supply.
- C The money supply dominates the determination of aggregate monetary expenditure.
- D The velocity of circulation of money is unstable over time.

J/06/3/25

26 What is likely to increase a country's actual output in the short run but may reduce its long-run rate of growth of potential output?

- A an increase in the size of the labour force
- B increased government spending on education
- C an increase in the size of the government's budget deficit
- D increased female participation in the labour force

J/06/3/27

27 Which type of unemployment is associated with a deficiency in aggregate demand?

- |              |              |
|--------------|--------------|
| A cyclical   | B frictional |
| C structural | D voluntary  |

N/06/3/18

28 Which statement is consistent with a Keynesian view of the workings of the macroeconomy?

- A Recessions can result from fluctuations in private investment expenditure.
- B Interest rates move to ensure continuous equality between savings and investment plans.
- C Money wages in the economy in the short run are perfectly flexible.
- D There is no short-run trade off between inflation and unemployment.

N/06/3/27

- 29** In an economy the proportion of the working age population in employment increases from 70 % to 80 %.  
What is likely to be the effect on labour productivity and on GDP per head?

	labour productivity	GDP per head
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	increase
<b>D</b>	decrease	decrease

N/06/3/28

- 30** What would be most likely to result in an increase in an economy's long-run rate of growth of potential output?
- A** an appreciation of the currency
  - B** an increase in interest rates
  - C** an increase in the government's budget deficit
  - D** an increase in the level of private investment

J/07/3/21

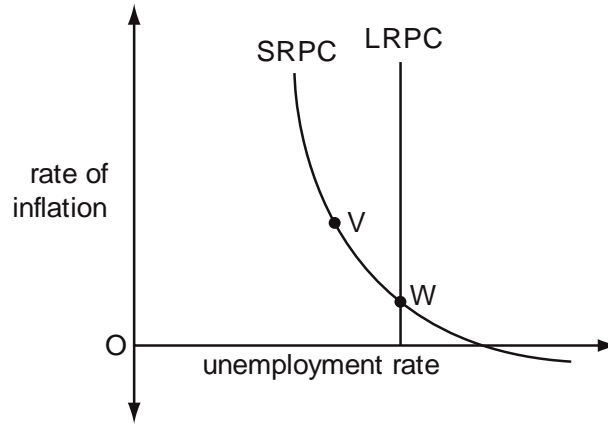
- 31** Which assertion could be described as monetarist rather than Keynesian?
- A** Central banks must directly control interest rates to influence the money supply.
  - B** The interest elasticity of investment expenditure is close to zero.
  - C** The money supply is the main determinant of aggregate monetary expenditure.
  - D** The velocity of circulation of money is unstable over time.

J/07/3/25

- 32** What will be most likely to decrease a country's national output in the short run but to increase its potential for long-run growth?
- A** a decrease in the level of import tariffs
  - B** a decrease in the rate of immigration
  - C** an increase in female participation in the labour force
  - D** an increase in the money supply

J/07/3/26

**33** In the diagram SRPC is an economy's short-run Phillips curve and LRPC is its long-run Phillips curve.



The economy is initially at point W.  
 An increase in monetary growth moves the economy to point V.  
 Why is it that the economy cannot stay at point V?

	rate of inflation at point V	unemployment rate at point V
<b>A</b>	above the expected rate	above the natural rate
<b>B</b>	above the expected rate	below the natural rate
<b>C</b>	below the expected rate	above the natural rate
<b>D</b>	below the expected rate	below the natural rate

J/07/3/27

**34** What is most likely to lead to an increase in the natural rate of unemployment?

- A** more rapid technological change
- B** a widening in inter-regional wage differentials
- C** a narrowing in inter-regional house price differentials
- D** a decrease in the number of workers who are members of trade unions

J/07/3/29

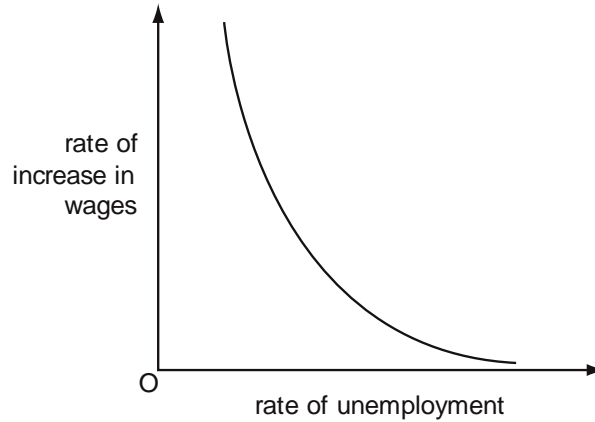
**35** Legal reforms to reduce the power of trade unions have in many countries reduced inflationary pressures.

Of which policy is this an example?

- A** monetary policy
- B** demand side policy
- C** fiscal policy
- D** supply side policy

N/07/3/26

**36** The diagram shows the relationship between the rate of increase in wages and the rate of unemployment.



What would be likely to cause the curve in the diagram to shift upwards and to the right?

- A** a reduction in regional differences in unemployment rates
- B** a reduction in the proportion of the workforce belonging to trade unions
- C** an increase in the unemployment rate
- D** the expectation of a higher rate of inflation

N/07/3/27

**37** What would be most likely in the short run to cause an increase in a country's unemployment rate?

- A** an increase in its potential output
- B** an increase in its balance of trade surplus
- C** an increase in the government's budget deficit
- D** an increase in the money supply

N/07/3/28

**38** What is an example of an expansionary supply side policy?

- A** an increase in tariffs
- B** an increase in interest rates
- C** an increase in spending on welfare
- D** an increase in spending on training benefits

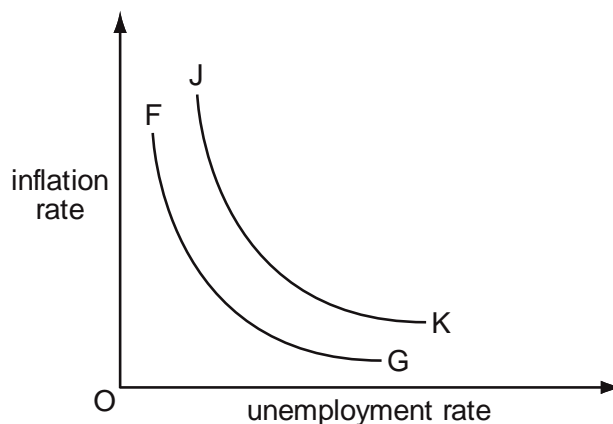
J/08/3/19

**39** An economy is operating initially at its natural rate of unemployment. According to monetarist theory, what will be the effect on unemployment in the short run and in the long run of an unanticipated increase in the money supply?

	short run	long run
<b>A</b>	no change	no change
<b>B</b>	no change	reduction
<b>C</b>	reduction	no change
<b>D</b>	reduction	reduction

J/08/3/28

**40** The diagram shows the relationship between the rate of inflation and the rate of unemployment.



What would cause the curve FG to shift to JK?

- A** a decrease in government expenditure
- B** a fall in the level of employment
- C** an increase in the rate of change of wages
- D** the expectation of an increase in inflation

N/08/3/15

**41** What will be the short-run effect on the level of output of an increase in the money supply, according to Keynesian theory (assuming the liquidity trap does not apply) and according to monetarist theory (assuming the increase is unanticipated)?

	effect on output	
	Keynesian theory	monetarist theory
<b>A</b>	increase	increase
<b>B</b>	increase	unchanged
<b>C</b>	unchanged	increase
<b>D</b>	unchanged	unchanged

N/08/3/21

**42** Real output in an economy grows by 1.5 % but at the same time the level of unemployment increases.

What can be deduced from this information?

- A** Labour productivity has decreased.
- B** Actual output has grown more slowly than potential output.
- C** Population of working age has fallen.
- D** There has been an increase in the rate of inflation.

N/08/3/22

- 43** Which pattern of labour market data is likely to indicate an increase in cyclical unemployment?

	changes in	
	compulsory redundancies	voluntary resignations
<b>A</b>	decrease	increase
<b>B</b>	increase	increase
<b>C</b>	decrease	decrease
<b>D</b>	increase	decrease

N/08/3/23

- 44** The natural rate of unemployment in an economy is 5%.  
What will happen if a government persists in trying to achieve a target rate of unemployment of 3 % by expansionary monetary policy?

- A** an accelerating rate of inflation
- B** a diminishing rate of inflation
- C** a high but constant rate of inflation-
- D** a negative rate of inflation

N/08/3/25

- 45** What would increase an economy's actual output but not its potential output?

- A** an increase in the capital available to the labour force
- B** an increase in the labour force's skill level
- C** an increase in the number in the labour force
- D** an increase in the proportion of the labour force employed

N/08/3/30

- 46** A country's government wishes to switch demand away from private consumption towards investment and net exports.  
Which combination of policy measures would be most likely to help it achieve this objective?

	interest rates	rate of income tax
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	increase
<b>D</b>	decrease	decrease

J/09/3/17

- 47** According to monetarist theory, which policy objectives are in conflict in the short run, but not in the long run?

- A** economic growth and full employment
- B** economic growth and price stability
- C** price stability and full employment
- D** price stability and equilibrium in the balance of payments

J/09/3/26

**48** Which combination of factors is most likely to result in more rapid economic growth?

- A** increases in employment and in the balance of payments deficit
- B** increases in the level of investment and in the size of the working population
- C** more equal distribution of wealth and a higher level of unemployment benefits
- D** more rapid inflation and an increase in the national debt

N/09/3/17

**49** According to monetarist theory, what will be the short-run effect of an unexpected increase in the money supply?

- A** an appreciation of the foreign exchange rate
- B** an increase in employment
- C** an increase in real wages
- D** an increase in the rate of interest

N/09/3/24

**50** In the diagram, the curve  $X_1$  shows an economy's initial trade-off between inflation and unemployment.



What could cause the curve to shift to  $X_2$ ?

- A** an increase in the natural rate of unemployment
- B** a decrease in the money supply
- C** the expectation of a decrease in the inflation rate
- D** an increase in the rate of interest

J/10/3/16

**51** What is a central assertion of monetarist economics?

- A** Fiscal policy should be used for the continuous management of the economy.
- B** Major recessions can occur despite an unchanged money supply.
- C** The money supply is the main determinant of aggregate monetary expenditure.
- D** The velocity of circulation of money is unstable over time.



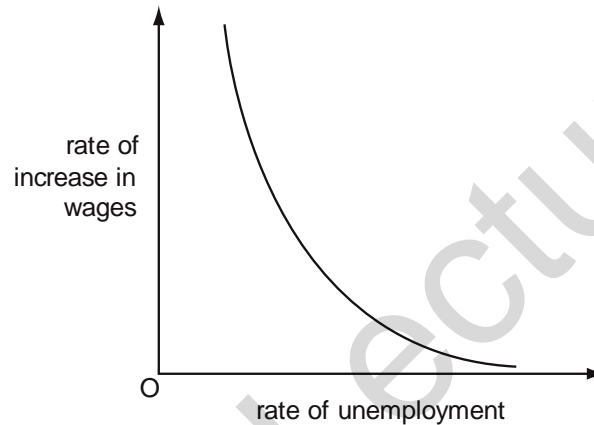
J/10/3/24

- 52** An economy is operating at its natural rate of unemployment. According to monetarist theory, what will be the effect on unemployment in the short run and in the long run of an unanticipated increase in the money supply?

	short run	long run
<b>A</b>	no change	no change
<b>B</b>	no change	reduction
<b>C</b>	reduction	no change
<b>D</b>	reduction	reduction

J/10/3/25

- 53** The diagram shows the relationship between the rate of increase in wages and the rate of unemployment.



What would be likely to cause the curve in the diagram to shift downwards and to the left?

- A** a reduction in regional differences in unemployment rates
- B** an increase in the proportion of the workforce belonging to trade unions
- C** an increase in the unemployment rate
- D** the expectation of a higher rate of inflation

J/10/3/27

- 54** Which is most likely to result in an increase in the natural rate of unemployment?

- A** a decrease in government expenditure on goods and services
- B** a decrease in the level of government payments to the unemployed
- C** an increase in trade union membership
- D** an increase in interest rates

N/10/3/17

**55** According to Keynesian theory, when will an increase in the money supply leave the level of output unchanged?

- A** when the liquidity trap is operative
- B** when the money supply increase was not anticipated
- C** when there is a floating exchange rate
- D** when there is an immediate adjustment to expectations about future price levels

N/10/3/18

**56** According to monetarist theory, what will be the short-run and the long-run effect of an unexpected increase in the money supply on the real wage level?

	short-run	long-run
<b>A</b>	decrease	increase
<b>B</b>	decrease	unchanged
<b>C</b>	unchanged	increase
<b>D</b>	unchanged	unchanged

N/10/3/25

**57** What is likely to be the effect of a fall in oil prices on the global economy?

- A** a decrease in the rate of economic growth
- B** a decrease in unemployment
- C** a strengthening of cost-push inflation
- D** a weakening of demand-pull inflation

N/10/3/26

**58** What is an unavoidable cost of long-run economic growth?

- A** an increase in inflation
- B** an increase in the working hours of the population
- C** a sacrifice of potential present consumption
- D** greater inequality in the distribution of income

N/10/3/27

**59** What could be expected to increase the pressure of demand-pull inflation in an open economy?

- A** an appreciation of the foreign exchange rate
- B** an increase in indirect taxes
- C** an increase in interest rates
- D** the imposition of import controls

J/11/32/14

- 60** An economy is operating at its natural rate of unemployment. According to monetarist theory, what will be the effect on unemployment in the short run and in the long run of an unanticipated increase in the money supply?

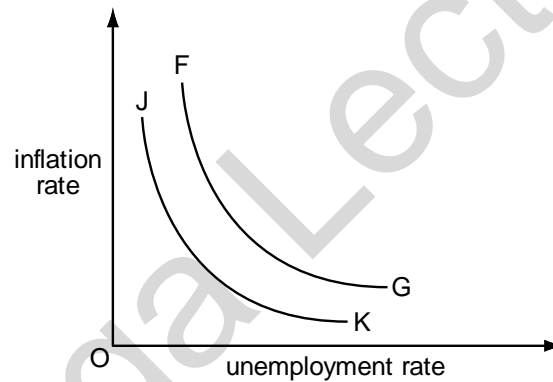
	short run	long run
<b>A</b>	no change	no change
<b>B</b>	no change	reduction
<b>C</b>	reduction	no change
<b>D</b>	reduction	reduction

J/11/32/21

- 61** Which cause of economic growth would involve the least cost for present and future generations of a country's population?
- A** increased exploitation of a country's mineral resources
  - B** investment financed by borrowing from abroad
  - C** investment financed by high rates of domestic savings
  - D** technological innovations in productive processes

J/11/32/23

- 62** The diagram shows the relationship between the rate of inflation and the rate of unemployment.



What would cause the curve FG to shift to JK?

- A** a lower exchange rate
  - B** a lower expected rate of inflation
  - C** an increase in government expenditure
  - D** a rise in the level of employment
- J/11/32/27
- 63** What would be classified as a supply side policy measure?
- A** additional legislation to restrict the power of trade unions
  - B** a reduction in the government's fiscal deficit
  - C** an open market sale of securities
  - D** the imposition of a tariff on imported goods

N/11/32/06

**64** The table shows the labour market for an economy in four separate years. In which year was there excess demand in the labour market?

	working population (millions)	unemployment rate (%)	job vacancies (thousands)
<b>A</b>	19	1.0	180
<b>B</b>	19	2.0	80
<b>C</b>	20	1.1	240
<b>D</b>	20	1.5	100

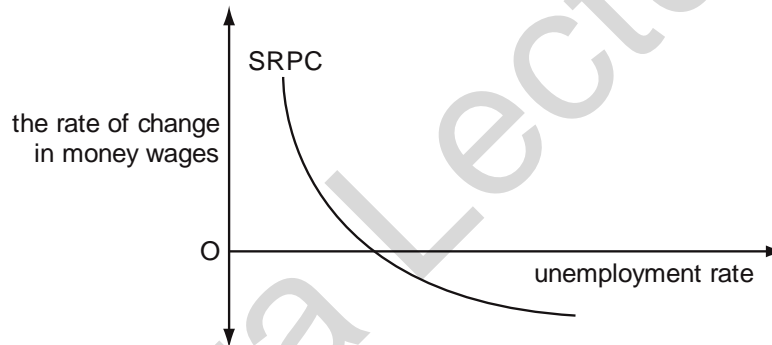
N/11/32/13

**65** What would economists agree should be the aim of any health care system?

- A** to meet all the health care demands of the population
- B** to provide every patient with the latest and best available treatment
- C** to provide free medical treatment
- D** to secure the maximum health gain from the resources available

N/11/32/26

**66** The diagram shows an economy's short-run Phillips curve (SRPC).



What is assumed to remain constant when drawing this curve?

- A** the average price level
- B** the exchange rate
- C** the expected rate of inflation
- D** the money supply

J/12/32/20

**67** According to monetarist theory, what will be the short-run effect of an unexpected increase in the money supply?

- A** an appreciation of the foreign exchange rate
- B** an increase in output
- C** an increase in real wages
- D** an increase in the rate of interest

J/12/32/25

**68** Which change is most likely to increase both economic growth and economic development in the long-run?

- A** a decrease in the savings ratio
- B** an increase in investment in human capital
- C** the depletion of non-renewable resources
- D** the greater use of compulsory overtime working of labour

J/12/32/26

**69** What is likely to result from the discovery of oil reserves in a developing economy?

- A** a more equal distribution of income and wealth
- B** an increase in the real exchange rate
- C** an increase in the competitiveness of commercial agriculture
- D** a reduction in the volume of imports of manufactured goods

J/12/32/27

**70** What will be most likely to decrease a country's national output in the short run but to increase its potential for long-run growth?

- A** a decrease in the level of import tariffs
- B** a decrease in the rate of immigration
- C** an increase in female participation in the labour force
- D** an increase in the money supply

J/12/32/28

**71** The number of people employed in a country and the level of unemployment both decrease. What could explain this?

- A** net inward immigration
- B** an increase in the level of unemployment benefits
- C** an increase in the age at which state pensions are payable
- D** an increase in the number of students

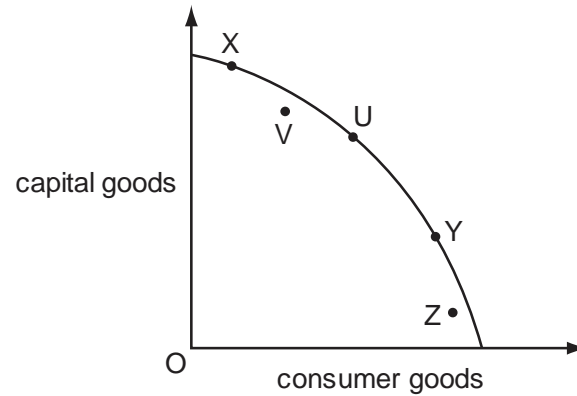
N/12/32/22

**72** An economy's unemployment rate is below the natural rate. What is likely to be the implications of this for inflation and what can be deduced from this about the economy's actual level of output?

	<b>inflation</b>	<b>actual output</b>
<b>A</b>	accelerating	below potential output
<b>B</b>	accelerating	above potential output
<b>C</b>	decelerating	below potential output
<b>D</b>	decelerating	above potential output

N/12/32/23

**73** The diagram shows a country's production possibility curve and a number of alternative production points.



Which change in the country's output would be most likely to lead to a fall in potential growth?

- A** U to V      **B** U to X      **C** Y to X      **D** Y to Z

N/12/32/24

**74** What is most likely to lead to an increase in the natural rate of unemployment?

- A** more rapid technological and structural change  
**B** a widening in regional wage differentials  
**C** a narrowing in regional house price differentials  
**D** a decrease in trade union membership

N/12/32/25

**75** Which type of unemployment arose from the worldwide decline in the demand for electronic goods beginning in the summer of 2001?

- A** seasonal  
**B** voluntary  
**C** frictional  
**D** structural

N/12/32/26

**76** What will assist a country's potential growth in national output?

- A** an increase in cyclical unemployment  
**B** an increase in the rate of inflation  
**C** an increase in the government's budget deficit  
**D** increased participation in the labour force

J/13/32/19

**77** According to monetarist theory, what will be the short-run effect on the level of output and on the price level of an unanticipated increase in the money supply?

	effect on output	effect on the price level
<b>A</b>	increase	increase
<b>B</b>	increase	no change
<b>C</b>	no change	increase
<b>D</b>	no change	no change

J/13/32/24

**78** Which policy is specifically designed to reduce the level of structural unemployment?

- A** an increase in the level of state benefits paid to the unemployed
- B** a reduction in interest rates
- C** a reduction in the level of direct taxation
- D** the provision of retraining schemes

J/13/32/25

**79** What would be most likely to stimulate long-run growth in an economy?

- A** employment protection legislation
- B** government policy to raise aggregate demand
- C** technical innovations by firms
- D** the development of trade unions

J/13/32/28

**80** What is the main objective of supply side policies?

- A** to bring a country's potential output up to the level of its actual output
- B** to ensure a budget surplus
- C** to ensure that the composition of output matches the pattern of demand
- D** to increase potential output by increasing efficiency

N/13/32/15

**81** What is most likely to contribute to households finding themselves in a poverty trap?

- A** means-tested benefits
- B** progressive taxation
- C** regressive taxation
- D** universal benefits

N/13/32/22

**82** What is most likely to contribute to high long-term growth rates of GNP per head?

- A** government imposition of maximum prices for particular goods
- B** high rates of trade union membership amongst the labour force
- C** high ratios of saving to GNP
- D** restrictions on inward foreign investment

N/13/32/23

**83** A country experiences cyclical unemployment due to a decrease in domestic spending. If the government takes no action in response, what will be a likely consequence?

- A** an increase in the current account deficit on the balance of payments
- B** an increase in the government's budget deficit
- C** an increase in the rate of inflation
- D** an increase in the volume of investment

N/13/32/24

**84** What is a possible combination of a cost and a benefit of rising levels of unemployment?

	cost	benefit
<b>A</b>	a deterioration in human capital	an increase in capital expenditure
<b>B</b>	an increase in import expenditure	a decrease in government tax revenue
<b>C</b>	an increase in the rate of economic growth	a more responsive workforce
<b>D</b>	an irretrievable loss of output	a reduction in inflationary pressure

N/13/32/25

**85** What would increase an economy's actual output but not its potential output?

- A** an increase in the capital available to the labour force
- B** an increase in the labour force's skill level
- C** an increase in the number in the labour force
- D** an increase in the proportion of the labour force employed

N/13/32/29

**86** A government aims to achieve steady and stable growth, in line with the economy's long-run increase in productivity. If this objective is achieved, how is this likely to affect average living standards and the level of unemployment?

	average living standards	level of unemployment
<b>A</b>	constant	falling
<b>B</b>	falling	unchanged
<b>C</b>	rising	rising
<b>D</b>	rising	unchanged

J/14/32/23

**87** An economic recession leads to an increase in unemployment. Why might this cause a fall in an economy's long-term growth rate?

- A** It is impossible to regain consumption lost in recession.
- B** Rising unemployment is likely to raise real wage levels.
- C** Social attitudes become less accepting of unemployment.
- D** There will be a harmful effect on human capital.



J/14/32/26

**88** It is often argued that the present rate of economic growth will soon lead to the exhaustion of reserves of material resources, such as minerals and oil. What does this argument fail to take into account?

- A** the drawbacks of present GDP levels as an indicator of the 'happiness' of the population
- B** the effect of increasing resource prices on the discovery and exploitation of new reserves
- C** the right of future generations to enjoy present standards of living
- D** the role of education in economic development

N/14/32/22

**89** According to monetarist theory, if there is an unanticipated increase in the money supply what will be the short-run effect on money wages, real wages and the level of employment?

	money wages	real wages	employment
<b>A</b>	decrease	decrease	increase
<b>B</b>	decrease	increase	decrease
<b>C</b>	increase	decrease	increase
<b>D</b>	increase	increase	decrease

N/14/32/24

**90** A developing economy experiences a rapid growth in labour productivity. What is most likely to result from this?

- A** an increase in the country's balance of trade deficit
- B** an increase in the country's relative labour costs
- C** a depreciation of the country's currency
- D** an increase in real income per head

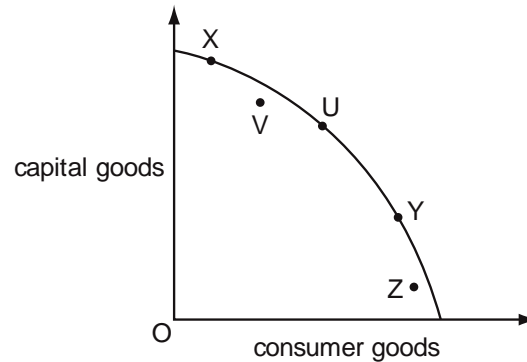
N/14/32/26

**91** Real output in an economy grows by 2.5% but at the same time the level of employment decreases. What can be deduced from this information?

- A** Actual output has grown more quickly than potential output.
- B** Labour productivity has increased.
- C** Population of working age has fallen.
- D** There has been an increase in the rate of inflation.

J/15/32/26

92 The diagram shows a country's production possibility curve and a number of alternative production points.



Which change in the country's output would be **most** likely to lead to a fall in potential growth?

- A** U to V      **B** U to X      **C** Y to X      **D** Y to Z

J/15/32/27

93 A developing country receiving foreign financial aid is most likely to experience economic growth in the long-run if it uses the money to

- A** boost welfare benefits for the poorest households.  
**B** pay for imports of capital goods.  
**C** reduce environmental pollution.  
**D** reduce income tax for all households.

J/15/32/28

94 Increased borrowing by the government results in higher interest charges and this leads to less private investment expenditure. Of what is this an example?

- A** an automatic stabiliser  
**B** crowding out  
**C** the accelerator  
**D** the substitution effect

N/15/32/25

95 An economy is operating at its natural rate of unemployment. According to monetarist theory, what will be the effect on unemployment in the short run and in the long run of an unanticipated increase in the money supply?

	short run	long run
<b>A</b>	no change	no change
<b>B</b>	no change	reduction
<b>C</b>	reduction	no change
<b>D</b>	reduction	reduction

J/16/32/22

**96** Which change is most likely to increase both economic growth and economic development in the long run?

- A** a decrease in the saving ratio
- B** an increase in investment in human capital
- C** the depletion of non-renewable resources
- D** the greater use of compulsory overtime working of labour

J/16/32/23

**97** Which type of unemployment occurs when aggregate demand is deficient?

- A** cyclical unemployment
- B** regional unemployment
- C** seasonal unemployment
- D** structural unemployment

J/16/32/24

**98** The diagram shows the annual percentage (%) change in employment and output in the UK private sector between 2000 and 2012.



In which year did labour productivity increase the most?

- A** 2003
- B** 2007
- C** 2009
- D** 2012

J/16/32/25

**99** According to Keynesian theory, when will an increase in the money supply leave the level of output unchanged?

- A** when the liquidity trap is operative
- B** when the money supply increase was not anticipated
- C** when there is a floating exchange rate
- D** when there is an immediate adjustment to expectations about future price levels

J/16/32/28

**100** What will be most likely to rise if unemployment is increasing in an economy?

- A** the human capital of unemployed workers
- B** the living standards of all workers
- C** the nominal money wage rate of employed workers
- D** the tax burden on employed workers

## Section: 28 Interdependence of Economic Policies

The Philips curve brought forth an important trade off between the macroeconomic objectives of inflation and unemployment. Such trade offs and interdependence, as will be observed in the ensuing text, is not uncommon in economic objectives and economic policies.

Consider an economy facing both inflation and a trade deficit. In such a situation, deflation helps solve both problems simultaneously. Deflationary policies, by withdrawing demand, not only control inflation but also help increase net exports, as locally made goods become more price competitive both at home and abroad. However, a country facing a trade deficit and unemployment confronts a trade off between the two policy objectives. The use of the deflationary policies can help reduce trade deficit but intensifies the problem of unemployment. In order to reduce unemployment, officials must reflate the economy, which is likely to increase the trade deficit. To cut down both unemployment and the trade deficit, officials can decide to forego the aim of defending exchange rates and revert to flexible exchange rate mechanism. Flexible exchange rates take care of the trade deficit and officials are free to employ reflationary policies to reduce unemployment. In case reflationary policies raise the inflation rate, the national currency automatically depreciates to keep the balance of trade balanced.

Generally speaking, contractionary demand management policies have an expenditure reducing impact- thus their use to decrease trade deficit is more likely to intensify the problem of unemployment. However, inflationary trends, if any, will be neutralized.

The use of expenditure switching strategies such as devaluation of national currency, trade barriers and exchange controls reduce trade deficit as well as unemployment. However, extra demand injected into the economy can trigger inflation.

The following table summarizes the impacts of the use of expenditure reducing and expenditure switching strategies on unemployment and inflation.

	Trade Deficit	Aggregate Demand	Unemployment	Inflation
Expenditure reducing/dampening policies e.g. deflationary policies (increased interest rates and taxes, lower government spending)	Decreases	Decreases	Increases	Decreases
Expenditure switching strategies such as devaluation, trade barriers and exchange controls	Decreases	Increases	Decreases	Increases

**Trade offs between macro-economic objectives**

The following paragraphs discuss policy options for achieving different macro-economic objectives.

As stated earlier, deflation helps economies solve the problems of trade deficit and inflation simultaneously. However, countries facing unemployment and a trade deficit face a trade off- demand management policies used to reduce unemployment increase the trade deficit and any attempt to decrease trade deficit by deflating the economy increases unemployment. Such countries may use any of the following options:

**Option 1**

The government can revert to flexible exchange rate mechanism to solve the problem of trade deficit and use demand management policies to reduce unemployment.

**Option 2**

It can employ supply side tools, such as providing more incentives and tax concessions to producers to increase production and exports. Subsidies can also be given for producing import substitutes. This export led growth can increase employment as well as net export revenues.

**Option 3**

The two demand management policies, fiscal and monetary policy, can be used in differing directions to simultaneously reduce unemployment and trade deficit. Contractionary monetary policy i.e. increased interest rates may be used to attract capital inflows to finance the trade deficit and its effects on economic activity and employment can be off set using expansionary fiscal policy i.e. increasing government spending or decreasing taxes.

Officials can reflate an economy using demand management policies to simultaneously solve the problems of trade surplus and unemployment. However, a trade off occurs when trade surplus and unemployment co-exist. In such a case, officials can forget about defending exchange rate and revert to flexible exchange rate regime. Flexible exchange rate regime gives the freedom to officials to use demand management policies to solve the problem of inflation.

The table below summarizes the policy options discussed so far

	<b>Inflation</b>	<b>Unemployment</b>
Trade deficit	Use deflationary policies to solve both problems simultaneously	Flexible exchange rate to solve the problem of trade deficit and reflationary policies to reduce unemployment OR The use of expenditure switching strategies such as devaluation, trade barriers and exchange controls
Trade surplus	Flexible exchange rate to solve the problem of trade surplus and deflationary policies to control inflation OR The use of expenditure switching strategies such as revaluation, export controls	Use reflationary policies to solve both problems simultaneously

Students must understand the impact of changes in interest rate on domestic employment, price level and balance of payment. An increase in the interest rate attracts (financial) capital inflows and discourages capital outflows, increasing the demand and reducing the supply of national currency in the world market. Increased capital inflows and decreased capital outflows improve the financial (capital) account of balance of payment. National currency appreciates if exchange rate is flexible and official reserves of foreign currencies pile up if exchange rate is fixed.

Increased exchange rate (appreciation of national currency) makes exports expensive and imports cheaper. Decreased demand for exports and increased demand for imports causes a worsening of visible section of current account (balance of trade). On the other hand, increased interest rate slows down domestic economic activity and forces consumers to reduce expenditures on domestically produced goods as well as on imports, resulting in improved balance of trade. Thus the impact of increased interest rate on balance of trade (when exchange rate is flexible) is uncertain. However, increased interest rate is likely to improve trade balance if exchange rate is fixed.

Government and financial institutions have to make higher interest payments on borrowed funds from overseas. This causes a worsening of invisible section of current account.

Briefly speaking, increased interest rates

- Increase demand for national currency in international market
- Decrease supply for national currency in international market
- Increase net capital inflows
- Improve financial account of balance of payment
- Increase exchange rate
- Have an uncertain effect on trade balance if exchange rate is flexible
- Improve trade balance if exchange rate is fixed
- Deteriorate invisible section of current account
- Slow down the pace of economic activity
- Decrease consumers' expenditures
- Decrease investment expenditures
- Decrease national income and employment
- Decrease inflation rate
- Increase unemployment

The impacts of changes in exchange rates (appreciation or depreciation of national currency) on balance of payment and on domestic economy are summarized in the following table:

	Description	Price of export	Price of import	Terms of trade	Volume of export	Volume of import	Net export revenue	Aggregate Demand	Demand pull inflation	Cost push inflation	Unemployment
Increase in exchange rate	Appreciation/rev aluation of national currency	Increases	Decreases	Increases	Decreases	Increases	Increases If $E_d (X_n) < 1$	Decreases	Decreases	Decreases	Increases
Decrease in exchange rate	Depreciation/de valuation of national currency	Decreases	Increases	Decreases	Increases	Decreases	Increases If $E_d (X_n) > 1$	Increases	Increases	Increases	Decreases

## Multiple Choice Questions (Section 28)

J/02/3/30

1 What is most likely to increase as a result of a rise in interest rates in a country?

- A the level of house prices
- B the inflow of short-term foreign capital
- C the level of private investment
- D the return on capital investment

N/02/3/23

2 If a country has a surplus in its balance of payments, all else being equal, what is likely to happen to its money supply?

- A It will fall, because more of its goods were purchased by foreign consumers than by consumers at home.
- B It will remain unchanged, because its exports are bought with foreign currency.
- C It will remain unchanged, because the surplus is automatically offset by a loan for the deficit countries.
- D It will rise, because the foreign currency received for exports will be exchanged for domestic currency.

J/03/3/30

3 Which policy is likely to reduce a balance of payments deficit without causing inflation?

- A a reduction in government spending
- B a devaluation of the exchange rate
- C an increase in import tariffs
- D an increase in indirect taxes

J/04/3/28

4 The monetary authorities increase interest rates in order to control inflation.

What is likely to increase as a result of this?

- A firms' sales revenue
- B investment expenditure
- C net capital outflows
- D the exchange rate

N/04/3/28

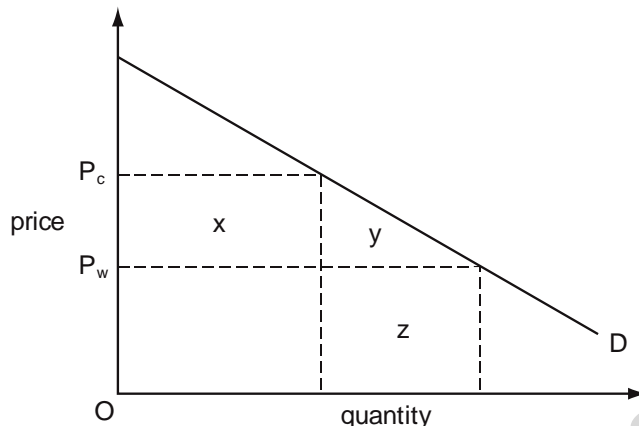
5 Why might a rise in domestic interest rates improve a country's balance of payments on current account?

- A Domestic firms will become more competitive.
- B It will result in a fall in the exchange rate.
- C It will result in a reduction in spending.
- D There will be an inflow of short-term capital.



J/05/3/15

6 In the diagram D is a country's demand curve for an imported good. The world price of the good is  $OP_w$ .



Which area measures the deadweight loss to the country of imposing an import tariff equal to  $P_w P_c$  on the good?

- A x      B y      C x + y      D y + z

J/05/3/26

7 In an economy with flexible exchange rates an increase in government spending is financed by borrowing from the public.

What is likely to be the effect on interest rates and on the level of net exports?

	effect on interest rates	effect on net exports
A	increase	increase
B	increase	decrease
C	decrease	decrease
D	decrease	increase

J/05/3/29

8 What is most likely to increase as a result of a rise in interest rates in a country?

- A the inflow of short-term foreign capital  
 B the level of company profits  
 C the level of private investment  
 D the level of share prices

J/05/3/30

9 A country introduces import quotas. The suppliers of imported goods charge market-clearing prices.

Assuming the demand for imports is price-elastic, what will be the impact on the country's balance of trade and on its terms of trade?

	balance of trade	terms of trade
A	improves	improves
B	improves	worsen
C	worsen	worsen
D	worsen	improves

N/05/3/27

- 10** The economy of a country is simultaneously experiencing a balance of payments deficit, a budget deficit, demand inflation and unemployment. The government decides to cut personal income taxes.  
 What does this suggest is its main macroeconomic objective?

- A** to improve the balance of payments position
- B** to reduce the budget deficit
- C** to reduce the level of unemployment
- D** to reduce the rate of inflation

N/05/3/28

- 11** A developing economy attracts additional foreign direct investment.  
 What is likely to be the effect on its visible trade balance and on its invisibles balance?

	visible trade balance	invisibles balance
<b>A</b>	improve	improve
<b>B</b>	improve	worsen
<b>C</b>	worsen	improve
<b>D</b>	worsen	worsen

J/06/3/28

- 12** Which combination indicates that a country has a freely floating exchange rate?

	nominal exchange rate	foreign currency reserves
<b>A</b>	depreciates by 20%	decrease by \$1 billion
<b>B</b>	depreciates by 20%	unchanged
<b>C</b>	unchanged	decrease by \$1 billion
<b>D</b>	unchanged	unchanged

J/06/3/29

- 13** A government decides to pursue a more deflationary fiscal policy and a more reflationary monetary policy.  
 Which combination of changes in policy instruments is consistent with this?

	government expenditure	interest rate	taxation
<b>A</b>	decrease	decrease	increase
<b>B</b>	decrease	decrease	decrease
<b>C</b>	increase	increase	decrease
<b>D</b>	increase	increase	increase

N/06/3/26

- 14** An economy has unemployed resources and a flexible exchange rate. It lowers interest rates below the level prevailing in other countries.  
 What will be the likely effect on the level of domestic demand for goods and services and on the demand for the country's exports?

	domestic demand	export demand
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	decrease
<b>D</b>	decrease	increase

N/06/3/29

**15** An economy with a floating exchange rate is in recession and at the same time has a deficit on the current account of its balance of payments.

Which policy combination would be most likely to help with both of these problems?

	interest rates	tax rates
<b>A</b>	decrease	unchanged
<b>B</b>	decrease	increase
<b>C</b>	increase	unchanged
<b>D</b>	increase	increase

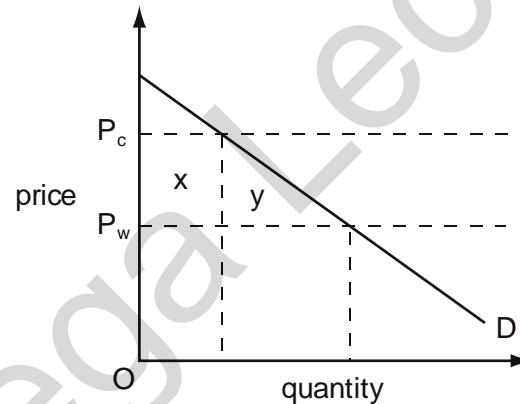
J/07/3/30

**16** Which combination of policy measures is most likely to reduce unemployment?

- A** lowering both the exchange rate and domestic interest rates
- B** lowering the exchange rate and increasing direct taxation
- C** raising both the exchange rate and domestic interest rates
- D** raising both the exchange rate and direct taxation

N/07/3/15

**17** In the diagram, (D) is a country's demand curve for an imported good which cannot be produced domestically. The world market price is  $OP_w$ .

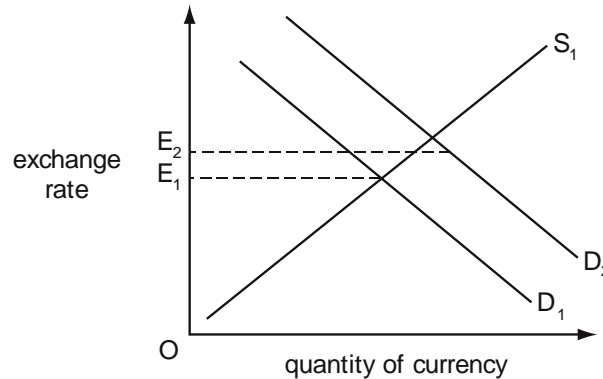


Which area measures the deadweight loss to the country of imposing an import tariff equal to  $P_w P_c$  on the good?

- A**  $x + y$
- B**  $x$
- C**  $y$
- D**  $x - y$

N/07/3/30

- 18** In the diagram,  $D_1$  is the initial demand curve for a country's currency,  $S_1$  is the initial supply curve, and  $OE_1$  is the initial exchange rate.



The demand curve then shifts to  $D_2$  and the exchange rate moves to  $E_2$ .  
 What can be deduced from this?

- A** Exchange rates are freely fluctuating.
- B** The country's authorities are operating a managed float.
- C** At  $E_2$ , the country's foreign exchange reserves will fall.
- D** Interest rates have fallen.

J/08/3/29

- 19** Other things being equal, what is likely to result from an increase in interest rates in a country?

- A** a capital outflow from the country
- B** a depreciation of the country's currency
- C** a decrease in consumption
- D** an increase in investment

J/08/3/30

- 20** Why might a reduction in domestic interest rates improve the current account of a country's balance of payments?

- A** It will cause an appreciation in the exchange rate.
- B** It will reduce the amount of interest paid to foreign holders of the country's financial assets.
- C** The resulting higher level of economic activity is likely to increase imports.
- D** There will be an outflow of capital from the country.

N/08/3/28

- 21** The European Union imposes a quota on the volume of garments imported from China. What is likely to be a consequence?

- A** a reduction in the profit margins on garments produced by Chinese textile firms
- B** a reduction in the inflation rate in the EU
- C** a switch to producing higher-value garments by Chinese textile firms
- D** the closure of Chinese-owned textile factories in Thailand

J/09/3/28

- 22** An economy with a floating exchange rate is in recession and at the same time has a deficit on the current account of its balance of payments.  
 Which policy combination would be most likely to help with both of these problems?

	interest rates	tax rates
<b>A</b>	decrease	unchanged
<b>B</b>	decrease	increase
<b>C</b>	increase	unchanged
<b>D</b>	increase	increase

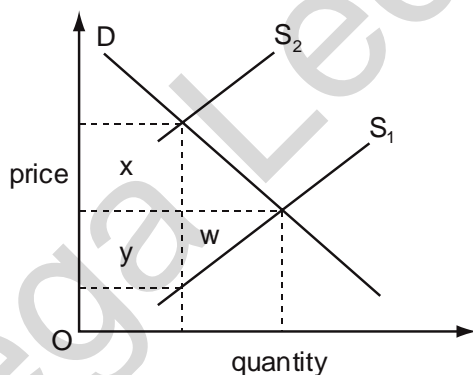
J/09/3/29

- 23** In 2004 China's ability to exploit its comparative advantage in cotton production increased.  
 What could explain this change?

- A** a fall in the value of the currency of India, a major cotton producer
- B** a reduction of the import quota on Chinese cotton into the European Union
- C** a rise in the wages of Brazilian cotton workers matched by an increase in their productivity
- D** the removal of the United States of America's subsidy to its cotton growers

J/09/3/30

- 24** In the diagram D is the demand curve for Indian tea exports and  $S_1$  is the initial supply curve.



The Indian government imposes a tax on tea exports, which causes the supply curve to shift to  $S_2$ .

Which areas in the diagram measure the resulting gain in tax revenue to the Indian government and the resulting loss in producer surplus to its tea producers?

	gain in tax revenue	loss in producer surplus
<b>A</b>	x	w + y
<b>B</b>	x + y	y
<b>C</b>	x	y
<b>D</b>	x + y	w + y

N/09/3/27

- 25** An economy has unemployed resources and a flexible exchange rate. It lowers interest rates below the level prevailing in other countries.  
 What will be the likely effect on the level of domestic demand for goods and services and on the demand for the country's exports?

	domestic demand	export demand
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	decrease
<b>D</b>	decrease	increase

N/09/3/28

- 26** Which policy is most likely to help to correct an adverse balance on the current account of the balance of payments?

- A** abolishing tariffs                      **B** devaluing the currency  
**C** reducing direct taxes                **D** reducing indirect taxes

N/09/3/29

- 27** A government decides to pursue a more deflationary fiscal policy and a more reflationary monetary policy.  
 Which combination of changes in policy instruments is consistent with this?

	government expenditure	interest rate	taxation
<b>A</b>	decrease	decrease	increase
<b>B</b>	decrease	decrease	decrease
<b>C</b>	increase	increase	decrease
<b>D</b>	increase	increase	increase

N/09/3/30

- 28** An economy is operating at a point on its production possibility curve.  
 What is true about the way the economy's resources are being used at this point?

	allocatively efficient	productively efficient	socially desirable
<b>A</b>	possibly	yes	yes
<b>B</b>	yes	possibly	possibly
<b>C</b>	possibly	Yes	possibly
<b>D</b>	yes	possibly	Yes

J/10/3/22

- 29** If the money supply is fixed, a decrease in economic activity

- A** increases interest rates.  
**B** increases the transactions demand for money.  
**C** raises the liquidity preference schedule.  
**D** reduces the income velocity of circulation.

J/10/3/26

**30** Which policy is most likely to reduce a balance of payments deficit without causing inflation?

- A** a devaluation of the exchange rate
- B** an increase in import tariffs
- C** an increase in indirect taxes
- D** an increase in direct taxes

N/10/3/30

**31** A country introduces import quotas.

The suppliers of imported goods charge market-clearing prices.

Assuming the demand for imports is price-inelastic, what will be the impact on the country's balance of trade and on its terms of trade?

	balance of trade	terms of trade
<b>A</b>	improves	improve
<b>B</b>	improves	worsen
<b>C</b>	worsens	improve
<b>D</b>	worsens	worsen

J/11/32/22

**32** The table shows some indicators of macro-economic performance in the US economy for five decades.

economic target	1950s	1960s	1970s	1980s	1990s
real GDP growth (average %)	4.18	4.43	3.28	3.02	3.03
inflation (average %)	2.07	2.33	7.09	5.66	3.00
unemployment (average %)	4.51	4.78	6.22	7.27	5.76

Between which decades did the US government achieve an overall improvement in its performance with no trade-off between individual policy goals?

- A** 1950s to 1960s
- B** 1960s to 1970s
- C** 1970s to 1980s
- D** 1980s to 1990s

J/11/32/26

**33** Why might a reduction in domestic interest rates have an adverse effect on a country's balance of payment on current account?

- A** It will cause a rise in the exchange rate.
- B** It will make the country's industry less competitive.
- C** The resulting higher level of economic activity is likely to increase imports.
- D** There will be an outflow of capital from the country.

J/11/32/28

**34** A country decides to join a group of countries which maintain fixed parities for their currencies and forbid any restriction on foreign trade and payments. What will the country have to forgo to maintain a fixed parity for its currency?

- A** an independent anti-monopoly policy
- B** an independent fiscal policy
- C** an independent interest rate policy
- D** an independent prices and incomes policy

J/11/32/29

**35** What would be an economic benefit to a major economy of imposing a tariff on imported goods?

- A** It would increase labour productivity.
- B** It would increase pressure on foreign suppliers to reduce their prices.
- C** It would make the country's exports more competitive.
- D** It would reduce the prices paid by consumers for imported goods.

N/11/32/24

**36** A developing country experiences a rapid growth in labour productivity. What is likely to result from this?

- A** an appreciation of the country's nominal exchange rate
- B** an increase in the country's balance of trade deficit
- C** an increase in the country's inflation rate
- D** an increase in the country's relative labour costs

N/11/32/27

**37** The economy of a country is simultaneously experiencing a balance of payments deficit, a budget deficit, demand-pull inflation and unemployment. The government decides to cut personal income taxes. What does this suggest is its main macroeconomic objective?

- A** to improve the balance of payments position
- B** to reduce the budget deficit
- C** to reduce the level of unemployment
- D** to reduce the rate of inflation

N/11/32/28

**38** What is not a valid economic argument for developing economies to pursue a policy of import substitution?

- A** to embark on industrialisation as a basis for export-led growth
- B** to exploit their relative abundance of labour in order to produce labour intensive manufacturing goods
- C** to increase the opportunities for exporting goods in which they already have a comparative advantage
- D** to reduce their dependence on a narrow range of primary products



N/11/32/30

**39** An economy has a flexible exchange rate. It raises interest rates above the level existing in other countries.

What will be the likely effect on the level of domestic demand for goods and services and on the demand for the country's exports?

	domestic demand	export demand
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

J/12/32/29

**40** What would be an appropriate government action to reduce both a balance of payments current account surplus and the rate of inflation?

- A** increase the money supply      **B** increase direct taxes  
**C** remove tariffs on imports      **D** devalue the currency

J/12/32/30

**41** The government of Lesotho introduces a programme to promote exports and to encourage firms to grow by subsidising local entrepreneurs. What effect is this likely to have on incomes, the balance of payments current account deficit and government expenditure in Lesotho?

	incomes	balance of payments current account deficit	government expenditure
<b>A</b>	fall	uncertain	rise
<b>B</b>	rise	reduce	no change
<b>C</b>	fall	reduce	rise
<b>D</b>	rise	uncertain	rise

N/12/32/27

**42** How might a developing economy gain from a multilateral reduction in import tariffs and the removal by developed economies of subsidies on food exports?

- A** through increased specialisation leading to higher productivity  
**B** through increased ability to protect infant industries  
**C** through a reduction in the cost to the economy of imported food  
**D** through increased tariff revenues

N/12/32/28

**43** During a recession, a government increases its expenditure on goods and services by \$10 million but leaves tax rates unchanged.

Why might the subsequent increase in national income be less than \$10 million?

- A** Increased government borrowing increases interest rates.  
**B** The marginal propensity to consume is less than 1.  
**C** The marginal propensity to import is greater than 0.  
**D** There is no accelerator effect on investment.

J/13/32/26

**44** The European Union imposes a quota on the volume of garments imported from Brazil. What is likely to be a consequence?

- A** a decrease in the price paid by EU consumers for Brazilian garments
- B** a reduction in the inflation rate in the EU
- C** a switch to producing lower-value garments by Brazilian textile firms
- D** the closure of Brazilian-owned textile factories

J/13/32/27

**45** Other things being equal, what is likely to result from an increase in interest rates in a country?

- A** a capital outflow from the country
- B** a depreciation of the country's currency
- C** a decrease in consumption
- D** an increase in investment

N/13/32/26

**46** Which combination indicates that a country is operating a 'dirty float'?

	nominal exchange rate	foreign currency reserves
<b>A</b>	depreciates by 20%	decrease by \$1 billion
<b>B</b>	depreciates by 20%	unchanged
<b>C</b>	unchanged	decrease by \$1 billion
<b>D</b>	unchanged	unchanged

N/13/32/28

**47** A country's government wishes to switch demand away from private consumption towards investment and net exports. Which combination of policy measures would be most likely to help it achieve this objective?

	interest rates	rate of value added tax
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

J/14/32/28

**48** A central bank increases interest rates in order to control inflation. What is likely to increase as a result of this?

- A** firms' sales revenue
- B** investment expenditure
- C** net capital outflows
- D** the exchange rate

J/14/32/29

**49** What is most likely to result from a devaluation of the £ sterling?

- A** an increase in foreign direct investment in the UK by global manufacturing firms
- B** an increase in the number of UK residents taking holidays abroad
- C** an increase in the number of UK students applying for places in North American universities
- D** an increase in the supply of foreign workers seeking temporary employment over the summer in the UK

J/14/32/30

**50** A fair trade scheme encourages consumers in developed countries to buy food produced by farming cooperatives in developing countries at a higher price than that charged by commercial firms.

Why might this be harmful to economic development?

- A** It will cause a worsening in the terms of trade of developing economies.
- B** It will reduce the amount of government aid provided to developing economies.
- C** It will reduce the prices subsistence farmers receive for their produce.
- D** It will slow the process of economic diversification in developing economies.

N/14/32/28

**51** The table shows some indicators of macro-economic performance in the US economy for five decades.

economic target	1950s	1960s	1970s	1980s	1990s
real GDP growth (average %)	4.18	4.43	3.28	3.02	3.03
inflation (average %)	2.07	2.33	7.09	5.66	3.00
unemployment (average %)	4.51	4.78	6.22	7.27	5.76

Between which decades did the US government achieve an overall improvement in its performance with no trade-off between individual policy goals?

- A** 1950s to 1960s
- B** 1960s to 1970s
- C** 1970s to 1980s
- D** 1980s to 1990s

N/14/32/29

**52** Why might a reduction in domestic interest rates have an adverse effect on a country's balance of payments on the current account?

- A** It will cause a rise in the exchange rate.
- B** It will make the country's industry less competitive.
- C** The resulting higher level of economic activity is likely to increase imports.
- D** There will be an outflow of capital from the country.

N/14/32/30

- 53** At present, a country's government has set its central bank a target rate of inflation of 2%.  
 What is likely to happen to interest rates and the exchange rate if the target inflation rate is raised to 3%?

	interest rates	exchange rate
<b>A</b>	fall	fall
<b>B</b>	fall	rise
<b>C</b>	rise	fall
<b>D</b>	rise	rise

J/15/32/25

- 54** An economy is experiencing economic growth.  
 What will be the effect on its rate of inflation, level of unemployment and current account surplus?

	rate of inflation	level of unemployment	current account surplus
<b>A</b>	lower	lower	lower
<b>B</b>	raise	lower	raise
<b>C</b>	raise	raise	uncertain
<b>D</b>	uncertain	uncertain	Uncertain

N/15/32/26

- 55** What are likely to be the impacts on an economy of increased competition from abroad?

	impact on trade balance	impact on rate of inflation	impact on unemployment rate
<b>A</b>	improve	raise	decrease
<b>B</b>	improve	reduce	decrease
<b>C</b>	worsen	raise	increase
<b>D</b>	worsen	reduce	increase

## Section: 29 Developing Economies

It is easy to find characteristics that are common to and typical of developing economies. Some of the most important ones are briefly discussed below:

- **Low per capita income-** most developing economies possess a low level of per capita income, since citizens mostly take up subsistence occupations and population growth is high
- **Low saving ratio-** just as relatively poor people tend to spend more and save less, developing economies too, possess a low saving ratio. In fact, as mentioned earlier, many are likely to be caught up in the poverty trap where the level of savings and hence investment is too low to promote growth in the economy.
- **High external debt and high national debt to GDP ratio-** given that developing economies possess a low level of per capita income and low saving ratios, their reliance on high external debt does not come as a surprise.
- **Low capital-labour ratio-** developing economies are labour abundant and as emphasized by the resource endowment theory, specialize in labour intensive products. Capital- labour ratio remains low partly because of initial endowments and partly because capital is difficult to obtain and employ, given poor resources and unskilled workers etc.
- **Low and fluctuating terms of trade-** exports of developing economies typically comprise primary products, which possess low price elasticities of demand and supply. This is why prices of primary commodities fluctuate widely, resulting in fluctuating terms of trade (try N/02/3/26)
- **High trade deficit-** developing economies typically exchange low value added, low priced products against sophisticated manufactured goods with a high degree of value addition. This runs them into a trade deficit.
- **Low literacy rates-** majority of the population in developing economies does not gain access to educational facilities. Low private and public spending on education and training results in an unskilled and uneducated labour force with low productivity. Low spending is however, part of the problem- the effectiveness of education in terms of learning outcomes remains a big question mark. Also, increasing the supply of education is not enough- it must be complemented with an increase in the demand for education and educated workers, as the incentive to seek education would be lost otherwise.
- **High population growth-** whereas developed economies succeed in maintaining low population growth rates, developing economies strive to check population growth and birth rates. Some of them may be bound by social/cultural factors where checking population by artificial means may become a source of conflict and instability.
- **High unemployment-** Low literacy rates and high population growth rates together translate into the problem of unemployment. With rapid increases in population, it becomes increasingly difficult to maintain a supply of jobs for all. Where jobs do become available however, people lack the level of education and skills required to take them up.
- **High inflation-** factors like a weaker currency tied in with import cost push inflation, unregulated markets, supply bottlenecks with low production against pressing demand all result in high inflation rates for developing economies.
- **High percentage of rural population-** majority of the population in developing economies like Pakistan dwells in rural areas. When labor does move out of them however in search of better wages, it presents the challenges of increased urbanization like congestion and strain on other facilities in urban areas.

## Multiple Choice Questions (Section 29)

J/02/3/25

1 Which of the following combinations is usually found in less developed economies?

	low	high
A	capital : output ratio	saving ratio
B	external debt	capital : output ratio
C	population growth	external debt
D	saving ratio	population growth

N/02/3/26

2 What would explain why the prices of the primary commodities produced by less developed countries fluctuate widely from year to year?

- A the development of artificial substitutes for natural products
- B the introduction of more capital-intensive methods of production by mineral producers
- C inelasticity of both the supply and demand for these products
- D improvements in agricultural productivity

N/02/3/29

3 Which of the following is most likely to lead to an increase in a developing country's long-run rate of growth of income per head?

- A a higher birth rate
- B a higher saving ratio
- C the imposition of import controls
- D an increase in government spending on defence

J/03/3/25

4 Which of the following is most likely to be found in a developing economy?

- A a low capital : labour ratio
- B a high capital : labour ratio
- C a high capital : output ratio
- D a low labour : output ratio

J/03/3/27

5 Workers in poor countries are often less productive than workers using the same technology in rich countries.

What would be most likely to remedy this situation?

- A an increase in the saving ratio in poor countries
- B increased investment in education in poor countries
- C increased freedom of migration from poor countries to rich countries
- D the removal of trade barriers imposed by rich countries on imports from poor countries

N/03/3/26

- 6** The table shows the figures for consumption, capital formation and depreciation in four economies, all measured in US \$.

Assuming that the state of technology remains unchanged, which economy is most likely to experience economic growth?

economy	consumption (\$ m)	capital formation (\$ m)	depreciation (\$ m)
<b>A</b>	100	20	10
<b>B</b>	500	200	200
<b>C</b>	1 000	1 200	1 400
<b>D</b>	20 000	5 000	6 000

N/03/3/27

- 7** What is the major cause of high rates of inflation in many developing economies?
- A** balance of payments deficits
  - B** budget deficits
  - C** low levels of unemployment
  - D** overvalued exchange rates

N/03/3/29

- 8** What is most likely to result from foreign direct investment in developing economies?
- A** a deterioration in the visible trade balances of developing economies
  - B** a reduction in migration to urban areas
  - C** a reduction in the transfer of technology to developing economies
  - D** a rise in per capita levels of consumption in developing economies

J/05/3/24

- 9** A developing economy experiences a rapid growth in labour productivity. What is likely to result from this?
- A** an increase in the country's balance of trade deficit
  - B** an increase in the country's relative labour costs
  - C** a depreciation of the country's currency
  - D** an increase in real income per head

N/05/3/23

- 10** What is likely to increase GDP per worker in a developing economy?
- A** a decrease in the numbers engaged in subsistence agriculture
  - B** a decrease in the numbers engaged in manufacturing
  - C** an increase in the employment rate
  - D** an increase in the population of working age

J/06/3/24

- 11** Which change would best indicate that a country has experienced economic development?
- A** an improvement in the average citizen's quality of life
  - B** an increase in the country's real GDP
  - C** an improvement in the country's trade balance
  - D** an appreciation in the country's currency

J/06/3/26

12 What is most likely to lead in the long run to an increase in world real GDP per head?

- A faster population growth
- B trade liberalisation
- C a lower propensity to save
- D faster growth of the money supply

J/06/3/30

13 What is likely to be the effect of an oil price increase on the global economy?

- A a strengthening of demand inflation
- B a weakening of cost inflation
- C a decrease in the rate of growth
- D a decrease in unemployment

N/06/3/24

14 Which of the following are characteristics of most developing economies?

	high government debt: GDP ratio	a high average propensity to save
A	X	X
B	X	✓
C	✓	✓
D	✓	X

J/07/3/28

15 What is likely to be the effect on developing economies of an increase in inward foreign direct investment?

- A an increase in the burden of debt
- B a slowdown of rural-urban migration
- C an increase in visible trade deficits
- D an acceleration of technology transfers

N/07/3/25

16 What would explain why the prices of the primary commodities produced by less developed countries fluctuate widely from year to year?

- A the development of artificial substitutes for natural products
- B the introduction of more capital-intensive methods of production by producers
- C inelasticity of both the supply and demand for these products
- D improvements in agricultural productivity

J/08/3/24

17 What is likely to result in an increase in GDP per worker in a developing economy?

- A an increase in the employment rate
- B an increase in the population of working age
- C a shift from working in subsistence agriculture to working in manufacturing
- D a shift from working in manufacturing to working in subsistence agriculture



N/08/3/24

- 18** A developing economy experiences a rapid growth in labour productivity. What is most likely to result from this?
- A** an increase in the country's balance of trade deficit
  - B** an increase in the country's relative labour costs
  - C** a depreciation of the country's currency
  - D** an increase in real income per head

N/08/3/27

- 19** What is a necessary feature of economic growth?
- A** the elimination of an economy's output gap
  - B** a continuing increase in the level of employment
  - C** a continuing outward shift in an economy's production possibility frontier
  - D** an increase in an economy's nominal GDP

J/09/3/23

- 20** How is outward migration from a developing economy likely to affect its balance of payments?
- A** It may improve its balance of payments by increasing its export capacity.
  - B** It may improve its balance of payments by increasing inflows of current transfers.
  - C** It may worsen its balance of payments by causing a currency depreciation.
  - D** It may worsen its balance of payments by increasing consumer expenditure on imported goods.

J/09/3/25

- 21** Which change would best indicate that a country has experienced economic development?
- A** an improvement in the average citizen's quality of life
  - B** an increase in the country's real GDP
  - C** an improvement in the country's trade balance
  - D** an appreciation in the country's currency

J/09/3/27

- 22** How might a developing economy gain from a multilateral reduction in import tariffs and the removal by developed economies of subsidies on food exports?
- A** through increased specialisation leading to higher productivity
  - B** through increased ability to protect infant industries
  - C** through a reduction in the cost to the economy of imported food
  - D** through increased tariff revenues

N/09/3/26

- 23** What is most likely to be the impact on economic growth and on the rate of inflation in developed economies of an inflow of migrant labour from developing economies?

	impact on economic growth	impact on rate of inflation
<b>A</b>	increase	increase
<b>B</b>	increase	decrease
<b>C</b>	decrease	increase
<b>D</b>	decrease	decrease

J/10/3/23

- 24** What could explain why the terms of trade of most developing economies tend to worsen over time?
- A** Their currencies are over-valued in foreign exchange markets.
  - B** They impose lower barriers on imports than developed economies.
  - C** They produce a narrower range of goods than developed economies.
  - D** They produce goods with a low income elasticity of demand.

J/11/32/20

- 25** Which characteristics are usually found in developing countries?

	saving ratio	capital output ratio
<b>A</b>	low	low
<b>B</b>	high	low
<b>C</b>	low	high
<b>D</b>	high	high

J/13/32/23

- 26** The table gives the percentage of employment in the primary, secondary and tertiary sectors in four countries. Which country is most likely to be a developing country?

	primary sector %	secondary sector %	tertiary sector %
<b>A</b>	15	40	45
<b>B</b>	30	40	30
<b>C</b>	35	45	20
<b>D</b>	45	35	20

J/14/32/24

- 27** The table shows the annual income thresholds per person used by the World Bank to classify countries according to their nominal Gross National Income (GNI) in 2000 and 2010.

	2000	2010
<b>low income</b>	\$755 or less	\$1005 or less
<b>lower middle</b>	\$756 to \$2995	\$1006 to \$3975
<b>upper middle</b>	\$2996 to \$9625	\$3976 to \$12 275
<b>high income</b>	\$9266 or more	\$12 276 or more

What could explain the changes recorded in the table?

- A** Income inequality between countries increased between 2000 and 2010.
- B** On average, real GNI in low income countries increased by roughly one third between 2000 and 2010.
- C** On average, world prices increased by roughly one third between 2000 and 2010.
- D** Some of the countries in the upper middle income category in 2000 were re-classified as high income countries in 2010.

J/14/32/25

**28** What is likely to result in an increase in GDP per worker in a developing economy?

- A** an increase in the employment rate
- B** an increase in the population of working age
- C** a shift from working in subsistence agriculture to working in manufacturing
- D** a shift from working in manufacturing to working in subsistence agriculture

J/15/32/29

**29** The data below relate to a particular country for the four years shown:

Year	1	2	3	4
real GNP / head (Year 1 = 100)	100	110	121	121
life expectancy at birth (years)	65	64	65	67
% of age group enrolled in secondary education	40	38	42	42

What can definitely be concluded from these data?

- A** Economic growth between Year 2 and Year 3 was 11%.
- B** The level of economic development was better in Year 2 than in Year 1.
- C** There was both economic growth and an improvement in economic development between Year 2 and Year 3.
- D** No conclusions can be drawn as to whether the level of economic development was better in Year 4 than Year 3.

N/15/32/29

**30** What is likely to be the effect on developing economies of an increase in inward foreign direct investment?

- A** an acceleration of technology transfer
- B** an increase in the burden of debt
- C** an increase in visible trade deficits
- D** a slowdown of rural-urban migration

N/15/32/30

**31** Economists have proposed that the best policy to promote development is 'trade not aid'. What is implied by this proposal?

- A** Developing countries should become self-sufficient.
- B** Developing countries should be given greater access to markets in developed countries.
- C** Developing countries should use foreign aid to invest in their export industries.
- D** Developing countries should use trade barriers to promote import substitution.

J/16/32/21

**32** Which combination is usually found in less developed economies?

	low	high
<b>A</b>	capital : output ratio	saving ratio
<b>B</b>	external debt	capital : output ratio
<b>C</b>	population growth	external debt
<b>D</b>	saving ratio	population growth

J/16/32/29

**33** What is most likely to result from foreign direct investment in developing economies?

- A** a deterioration in the trade balances of developing economies
- B** a reduction in migration to urban areas in developing economies
- C** a reduction in the transfer of technology to developing economies
- D** a rise in per capita levels of consumption in developing economies

Mega Lecture

## Answer Key

### Section 1

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

### Section 2

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

### Section 3

1	2	3	4	5	6	7
C	D	A	A	D	D	A

### Section 4

1	2	3	4	5	6	7	8	9	10
C	A	C	B	A	D	B	C	D	D
11	12	13	14	15	16	17	18	19	20
C	C	D	B	C	B	C	D	B	B
21	22	23	24	25	26	27	28	29	
D	B	C	C	B	C	B	D	A	

### Section 5

1	2	3	4	5	6	7	8	9	10
C	C	B	D	B	B	D	C	A	A
11	12	13	14	15	16	17	18	19	20
B	C	C	C	C	D	C	B	C	C
21	22	23	24	25	26	27	28	29	30
D	A	B	C	B	C	A	D	B	B
31	32	33	34	35	36	37	38	39	40
B	D	D	A	C	A	C	C	B	D
41	42	43	44	45	46	47	48	49	50
C	A	C	B	A	D	A	B	B	A

**Section 6**

1	2	3	4	5	6	7	8	9	10
D	B	C	A	B	C	D	B	D	A

11	12	13	14	15	16	17	18	19	20
D	C	D	D	B	C	B	C	A	C

21
B

**Section 7**

1	2	3	4	5	6	7	8	9	10
B	A	D	D	C	A	A	C	C	B

11
C

**Section 8**

1	2	3	4	5	6	7	8	9	10
C	A	B	D	C	C	C	C	C	B

11	12	13	14	15	16	17	18	19	20
D	B	B	B	D	A	C	B	C	B

21	22	23	24	25	26
B	B	C	B	C	B

**Section 9**

1	2	3	4	5	6	7	8	9	10
C	D	A	B	B	C	D	D	D	C

11	12	13	14	15	16	17	18	19	20
B	A	B	A	C	C	D	D	B	B

21	22	23	24	25	26	27	28	29	30
A	D	A	B	D	A	A	A	C	A

31	32	33	34
C	B	C	A

**Section 10**

1	2	3	4	5	6	7	8	9	10
B	C	A	C	D	C	D	D	C	B

11	12	13	14	15	16	17	18	19	20
D	C	C	D	A	A	A	D	B	C

21	22	23	24	25	26	27	28
B	A	C	A	B	D	D	C

**Section 11**

1	2	3	4	5	6	7	8	9	10
C	B	A	A	A	D	C	C	C	B
11	12	13	14	15	16	17	18	19	20
B	B	A	A	B	C	C	B	C	A
21	22	23	24	25	26	27	28	29	30
C	D	C	B	C	C	C	B	A	C
31	32	33	34	35	36	37	38	39	40
A	A	D	C	D	B	B	A	C	B
41	42	43	44	45	46	47	48	49	50
C	D	D	B	C	C	C	B	A	C
51	52	53	54	55	56	57	58	59	60
D	C	A	A	C	D	D	B	D	B
61	62	63	64	65	66	67	68	69	70
D	A	D	C	A	D	C	A	D	D
71	72	73	74	75	76	77	78		
D	B	C	D	D	B	B	A		

**Section 12**

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

**Section 13**

1	2	3	4	5	6	7	8	9	10
D	A	B	B	D	A	C	A	B	A
11									
B									

**Section 14**

1	2	3	4	5	6	7	8	9	10
C	C	D	C	B	D	D	C	A	D
11	12	13	14	15	16	17	18	19	20
C	C	B	A	C	B	C	D	D	D
21	22	23	24	25	26	27	28	29	30
D	D	C	C	D	D	C	C	A	C
31	32	33	34	35	36				
B	C	C	B	C	A				

**Section 15**

1	2	3	4	5	6	7	8	9	10
A	C	B	B	A	B	C	C	B	C

11	12	13
A	A	D

**Section 16**

1	2	3	4	5	6	7	8	9	10
D	B	A	C	C	D	C	A	D	A

11	12	13	14	15	16	17	18	19	20
B	D	D	B	C	D	B	B	C	C

21	22	23	24	25	26	27	28	29	30
A	D	B	D	C	D	A	B	C	A

31	32	33	34	35	36	37	38	39	40
C	A	C	D	C	D	D	D	D	B

41
C

**Section 17**

1	2	3	4	5	6	7	8	9	10
D	D	B	A	C	B	D	D	D	A

11	12	13	14	15	16	17	18	19	20
A	C	B	C	A	D	C	D	B	D

21	22	23	24	25	26	27	28	29	30
B	A	C	A	A	B	A	D	C	B

31	32	33	34	35	36	37	38
A	B	B	B	D	B	C	B

**Section 18**

1	2	3	4	5	6	7	8	9	10
A	D	B	D	D	A	C	D	C	A

11	12	13	14	15	16	17	18	19	20
C	D	A	D	B	C	B	A	B	D

21	22	23	24	25	26	27
C	B	A	C	A	A	C

**Section 19**

1	2	3	4	5	6	7	8	9	10
A	C	C	A	A	B	A	D	B	C

11	12	13	14	15	16	17	18	19	20
B	A	D	C	A	C	D	B	D	D



**Section 20**

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

**Section 21**

1	2	3	4	5	6	7	8	9	10
C	D	C	A	A	C	C	D	B	D
11	12	13	14	15	16	17	18	19	20
A	C	C	B	C	D	B	B	D	A
21	22	23	24	25	26	27	28	29	30
D	C	C	B	B	B	B	B	C	B
31	32	33	34	35	36	37	38	39	40
A	D	B	D	D	B	D	B	B	D
41	42	43	44	45	46				
A	A	C	A	D	B				

**Section 22**

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

**Section 23**

1	2	3	4	A	6	7	8	9	10
A	A	C	B	C	C	B	C	A	B
11	12								
B	B								

**Section 24**

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

**Section 25**

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

**Section 26**

1	2	3	4	5	6	7	8	9	10
A	D	D	C	A	B	C	C	D	A
11	12	13	14	15	16	17	18	19	20
A	A	C	A	A	C	A	B	B	B
21	22	23	24	25	26	27	28	29	30
D	D	B	D	B	C	A	B	A	D
31	32	33	34	35	36	37	38	39	40
D	D	B	C	B	C	B	A	C	D
41									
D									

**Section 27**

1	2	3	4	5	6	7	8	9	10
C	C	C	D	B	A	D	B	C	C
11	12	13	14	15	16	17	18	19	20
D	B	D	A	D	C	D	C	D	C
21	22	23	24	25	26	27	28	29	30
D	A	B	D	C	C	A	A	C	D
31	32	33	34	35	36	37	38	39	40
C	A	B	A	D	D	A	D	C	D
41	42	43	44	45	46	47	48	49	50
A	B	D	A	D	C	C	B	B	A
51	52	53	54	55	56	57	58	59	60
C	C	A	C	A	B	B	C	D	C
61	62	63	64	65	66	67	68	69	70
D	B	A	C	D	C	B	B	B	A
71	72	73	74	75	76	77	78	79	80
D	B	D	A	D	D	A	D	C	D
81	82	83	84	85	86	87	88	89	90
A	C	B	D	D	D	D	B	C	D
91	92	93	94	95	96	97	98	99	100
B	D	B	B	C	B	A	A	A	D

**Section 28**

1	2	3	4	5	6	7	8	9	10
B	D	A	D	C	B	B	A	B	C
11	12	13	14	15	16	17	18	19	20
B	B	A	A	A	A	C	B	C	B
21	22	23	24	25	26	27	28	29	30
C	A	D	D	A	B	A	C	D	D
31	32	33	34	35	36	37	38	39	40
D	D	C	C	B	A	C	C	A	C
41	42	43	44	45	46	47	48	49	50
D	A	A	D	C	A	B	D	A	D
51	52	53	54	55					
D	C	A	D	D					

**Section 29**

1	2	3	4	5	6	7	8	9	10
D	C	B	A	B	A	B	D	D	A
11	12	13	14	15	16	17	18	19	20
A	B	C	D	D	C	C	D	C	B
21	22	23	24	25	26	27	28	29	30
A	A	B	D	A	D	C	C	C	A
31	32	33							
B	D	D							