Institute of Distance and Open Learning
Gauhati University

M.A./M.Sc. in Economics
Semester III

Paper XII
Public Finance- I

Contents:

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MA/M.Sc. Economics
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COURSE STRUCTURE

A student shall do a total number of sixteen papers in the four Semesters. Each paper will carry 100 marks - 20 marks for internal evaluation during the semester and 80 marks for external evaluation through end semester examination. All the papers in the First, Second and Third Semesters will be compulsory. The paper XIII and XIV of the Fourth Semester will also be compulsory. The remaining two papers for the Fourth Semesters will be chosen by a student from the optional papers. The names and numbers assigned to the papers are as follows.

First Semester

- I Microeconomics Theory
- II Macroeconomics Theory - I
- III Mathematical Methods for Economic Analysis-I
- IV Statistical Methods for Economic Analysis

Second Semester

- V Advanced Microeconomics
- VI Macroeconomic Theory -II
- VII Mathematical Methods for Economic Analysis-II
- VIII Elementary Econometrics

Third Semester

- IX Development Economics-I
- X International Economics
- XI Issues in Indian Economy
- XII Public Finance-I

Fourth Semester

- XIII Development Economics-II
- XIV Public Finance-II

Papers XV and XVI are optional

A student has to choose any two of the following courses.

- (a) Population and Human Resource Development
- (b) Econometric Methods
- (c) Environmental Economics
- (d) Financial System

Detailed Contents of this Paper

Paper - XII
PUBLIC FINANCE- I

Unit-1: The State and its role in the Economy
The role of the government in the economy -*allocation, distribution, and stabilization functions*. Criteria for policy evaluation – *equity, economic efficiency, paternalism and individual freedom and their tradeoff.*

Unit-2: The Provision of Public Goods
The nature of Public goods, Public Goods and market failure, The efficient provision of public goods
Basic concepts- *The Theory of Clubs, Tiebout Hypothesis, Voluntary Bargaining in Small Groups (Coase's analysis)*
Public goods - *externalities, corrective policies, and viability of government intervention*
Public Choice: *Majority Rule and the Median Voter, Logrolling.*

Unit-3: Public Expenditure
Theories of Pubic Expenditure- *Lindahl's Model of Voluntary Exchange, Samuelson's Benefit Theory of Public Expenditure, Musgrave's Optimum Budget Theory*
Public Expenditures on, non-marketed goods, fixed-quantity subsidy for marketed goods, and excise subsidy - their impact on allocation and distribution
Evaluation of public expenditure- *cost-benefit analysis.*

Unit-4: Public Revenue
Concepts- *Tax Ratio, Buoyancy, and Elasticity of taxation, Rate schedules of taxation, Tax Credit, Exemption and Deduction, Excess burden of tax, and Taxable Capacity.*
Principles of Taxation: The Benefit Principle. The Ability to Pay Principle- *Concepts of equal sacrifice, ability to pay and tax rate schedules, the Maximum- Welfare Principle of Budget Determination.*
The Neo-classical Theory of Tax Incidence and Shifting, price-output effect of shifting under different cost conditions and market situations. Musgrave's Budget Incidence Theory. Capitalization of tax.
Value Added Tax.

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Unit 1
The State and its role in the economy

Structure :

1.0 Introduction :

With increased government activities in present day world, the government is expected to design its particular tax or expenditure measures that affect the economy in many ways, so that it work to satisfy some objectives. The main policy objectives that have to be satisfied by the government programmes determine the functions of the government, namely, allocation function, distribution function and stabilization function. The present unit deals with the functions which reflect the role of the government in the economy. It also analyzes the criteria for policy evaluation– equity, economic efficiency, paternalism and individual freedom. The trade-affs among these criteria are also discussed in this unit.

1.1 Objectives :

After reading this unit, the reader will be able to–

→ learn about the role of the government in the economy– allocation, distribution and stabilization functions.

→ know about the criteria for policy evaluation– equity, economic efficiency, paternalism and individual freedom.

→ have an idea about the trade-offs among the criterions used for policy evaluation.

1.2 Role of the government in the economy :

Through the government tax- expenditure programme, the government is entitled to do the following three important functions–

1. **Allocation function :** The provision for social goods or the process by which total resource use is divided between private and social goods and by which the mix of social goods is chosen.

2. **Distribution function :** Adjustment of the distribution of income and wealth to ensure conformance with what society considers a 'fair' or 'just'.

3. **Stabilisation function :** The use of budget policy as a means of maintaining high employment, price stability and an apropriate level of economic growth with allowances for effects on trade and on the balance of payments.

1. Allocation function :

Almost all government policies have an effect on the allocation of resources. The mix of goods and services produced by the economy is changed as a result of government policy. The government has to choose to allocate the resources in supplying various social or public goods– which can not be provided through the market system, that is by transactions between individual consumers and producers. In some cases, the market fails entirely, while in others it can function only in an inefficient way. The basic reason for market failure in case of social goods is not that the need for such goods is felt collectively whereas that for private goods is felt individually. The difference arises because the benefits to which social goods give rise are not limited to one particular individual who consumes or purchases the good as is the case for private goods. So, a need for public provision arises. The issue is to determine how much of these goods is to be produced. The people will refuse to pay for such goods as they can freely ride over it as once provided. It is difficult to decide the type and quality of such goods as exact valuation by people is not known. Just as individual consumers have no reason to offer voluntary payments, so they have no reason to reveal to the government how highly they value the public services. People will prefer to enjoy as free riders what is provided by others. So, a different technique is needed to determine the supply of social goods and the cost allocation. Hence, the political process must work as a substitute for the market mechanism. Votting by Ballot must be resorted to in place of votting by price. Voters will find it in their interest to vote such that the outcome will fall closer to their own preferences. Decision making by voting becomes a substitute for preference revealation through the market. The collection of cost shares decided upon is implemented through the tax system.

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2. Distribution function :

The allocation function, concerned with the provision of social goods departs from the market process. But the problem encounters in dealing with resource allocation given a prevailing distribution of income and consumer preferences.

The issue of distribution is more difficult to handle than allocation of resources. In absence of policy adjustments, the distribution of income and wealth depends on the distribution of factor endowments, including personal earnings abilities and the ownership of accumulated and inherited wealth. The distribution of income is then determined by the process of factor puicing. The economists try to determine the efficient level of resources following the rule– a change in economic condition is said to be efficient if the welfare of some person, say A has increased without other persons, B and C are being harmed. Although this criterion is well accepted in modern welfare economics in assessing the efficiency of markets and also of some public policy, it excludes distributional considerations– that is what constitutes a fair or just state of distribution. It involves considerations of social philosophy and value judgement. Although various criterions are derived yet the translation of a justice rule into an actual state of income distribution encounters two major problems–

1. It is difficult or impossible to compare the levels of utility which various individuals derive from their income.

2. The size of the total wealth which is available for distribution is not unerelated to how it is to be distributed. Redistribution policies may involve an efficiency cost which must be taken into account when one is deciding on the extent to which equity objectives should be pursued.

Fiscal instruments of distribution policy :

1. A tax–transfer scheme– a combination of progressive taxation of high income and a subsidy to low-income households.

2. Progressive taxes used to finance public services, especially those which benefit the low-income households such as public housing.

3. A combination of taxes on goods purchased largely by high-income consumers with subsidies to other goods which are chiefly used by low-income consumers.

In choosing among alternative policy instruments, allowance must be made for resulting deadweight losses or efficiency costs i.e. costs which arise as consumer or producer choices are interfered with.

3. Stabilization function :

Besides allocation and distribution functions, the government has to play an important role in stabilising the economy i.e. it has bearing upon maintaining high employment, a reasonable degree

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of price level stability, soundness of foreign accounts and an acceptable rate of economic growth. Achievement of this target and its maintanance requires some policy guidance.

The level of employment and prices in the economy depends upon the level of aggregate demand. The level of demand depends upon the spending decisions of millions of consumers, corporate managers, financial investors etc. These decisions are determined by certain factors, like past and present income, wealth position, credit availability and expectations. If the level of expenditures are insufficient to secure full employment of labour and other resources in the economy, expansioning measures to raise aggregate demand are needed. On the other hand, if expenditures exceed the available output causing inflations, then contractionary measures are needed to curtail demand.

Instruments of stabilization policy :

Monetary instruments : Monetary policy inclieding the devices of reserve requirements, discount rates, open market policy– is an indispensable component of stabilization policy. Expanding the money supply will tend to increase liquidity, reduce interest rates, and thereby increase the level of demand, while monetary restriction working in the opposite direction.

Fiscal Instruments : Fiscal policy has a direct bearing on the level of demand. Raising public expenditures will be expansionary as demand is increased. Tax reduction may be expansionary as tax payers are left with a higher level of income and may be expected to spend more and vice-versa.

1.3 Criteria for policy evaluation :

The evaluation of a public policy must be based on a value judgement about its consequences. The following criteria are useful for the evaluation of public policies.

1.3.1 Equity :

The most widely used criterion in dealing with any public policy is the equity or fairness. It is well accepted that the government policies should be equitable in their effects on people. But there is a real difficulty of defining exactly what equity means. Very few people have a clearly defined idea of what equity realty means and even if they do, individual interpretations will differ.

Although, equity is a difficult criterion to use in practice yet the concept is important. Generally, a policy that taxes rich people to subsidise the activities improving the economic conditions of the poors is considered as equitable. Generally, the economists consider equity in a very narrow sense indicating only the distributional effects of a policy. If a policy results in an redistribution, the major emphasis is on whether the people benefitted are poorer than the people harmed. Economics is well

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designed to explore how policies affect the distribution of income which is only one dimension of the equity issue.

1.3.2 Economic efficiency :

Economic efficiency or as it is sometimes called, pareto optimality is a criterion widely used by economists in policy evaluation. An efficient allocation of resources is one in which it is impossible, through any change in resource allocation, to make some person or persons better off without making some one else worse off. When the economy is operating efficiently, there is no scope for further improvements in one person's well-being unless someone is harmed. On the contrary, an inefficient allocation of resources in one in which it is possible, through a change in resource allocation, to make some person or persons better off without making someone worse off. Inefficiency emplies waste in the sense that the economy is not catering to the wants of people as well as it could. But the efficiency criteria does not resolve all questions of economic policy. It is neutral with respect to distributional questions, which still require non-objective value judgements. Again, in a complex real world, determing exactly what policies will be most efficient is difficult because a great deal of information is required to make that judgement.

1.3.3 Paternalism :

Government policy may be intentionally designed to provide services that would not be selected by people while the people had a choice. Government overrides or disregards the wants of the people instead of catering to the wants of people. Such a policy is described as paternalistic and the phenomenon is called paternalism.

The following examples illustrate this criterion. The justification for social security is that people would not independently save enough for their old age. Again, many welfare programmes do not permit the poor to spend the government assistance as they with. Government requires to be spent on food, housing, medical care, and so on. Children are required to attend schools until a specified age without considering whether their parents desire or not. Many people support some government policies not because they think these policies satisfy public wants but because they think that the government has better knowledge about what is good for the public.

Paternalism does not supply any clear basis for the evaluation of policies. Because there is no absolute standard by which people's choices can be judged, there is no limit to what could be justified on this basis. However, paternalism contains a definite antidemocratic element. If individuals are not capable or competent to make decisions that mainly affect themselves then they must be even less competent in making decisions that affect everyone in the society through the voting process.

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1.3.4 Individual Freedom :

Individual freedom is given a high value by many people. People expect that the government should restrict their freedom as little as possible. In the economic sphere, individual freedom means that economic arrangements are voluntary. Economic organization is characterized by the exchanges which take place through a series of mutual agreements between buyers and sellers so that the price is determined by both parties.

Whenever the government taxes people to finance public expenditures, it deprives them of the freedom to spend part of their incomes according to their individual choice. A welfare programme of cash transfers that permits the recipients to spend cash assistance according to their choice is more consistent with the notion of individual freedom than is a programme in which the assistance is restricted to food or housing.

1.4 Trade offs among the criteria :

The four criteria– equity, economic efficiency, paternalism and individual freedom provide some idea of the range of effects which can be considered while evaluating economic policies. It is impossible to satisfy all criteria simultaneously in general. For example, a policy that is considered equitable may be quite inefficient or a policy to achieve greater efficiency may necessitate a loss of equity. Some of the criteria are contradictory. For example, paternalism and efficiency. Because efficiency involves catering to the wants of people as they themselves define those wants but paternalism substitutes another judgement of what people should have. A policy evaluation must reflect not only how it performs according to the separate criteria but also how the relative importance of each criterion is judged.

In general, economists emphasize two of these criteria– efficiency and equity. Economic analysis is better suited to identify how efficient policies are likely to be and how they affect the distribution of real income. Economic analysis can not demonstrate that policies are good or bad but helps in making that judgement by examining the effects of tax-expenditure policies.

1.5 Conclusion :

The government, through its tax-expenditure programme, performs three important functions– allocation function, distribution function and stabilization function. The government has to choose to allocate the resources in supplying various social or public goods. The government also deals with distributional aspects of public policy– that is what constitutes a fair or just state of distribution. Moreover, the government has to play an important role in stabilising the economy, that is to maintain high level of employment, price stability, equilibrium in BOP etc. To evaluate the economic policies, various criteria– equity, efficiency, paternalism and individual freedom are used. But it is important to be noted that the policies are contradictory in satisfying the four criteria.

1.6 Self-assessment questions :

1. Discuss the role of the government in allocating resources?

2. What is distribution function? Explain.

3. Explain the stabilization function performed by the government? State the monetary and fiscal policies used by the government in stabilizing the economy.

4. Explain the criteria used for evaluating the policies.

5. What is economic efficiency?

6. What do you mean by paternalism?

7. Discuss the trade-off among the criteria used for policy evaluation..

References :

- Musgrave & Musgrave, "Public Finance in Theory and Practice."
- Browning E.K. & Browning J.M., "Public Finance and the Price System", Pearson.

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Unit 2
The Provision of public goods

Structure :

2.0 Introduction :

The unit deals with the nature of public goods– with non–excludability and non-rivalry. The determination of the efficient provision of public goods are also discussed. The various theories relating to public goods– the theory of clubs, Tiebout Hypothesis, Oase Theorem are explained in this unit. Again, the externalities arising in case of Public goods leading to under production and over production of public goods, the corrective policies, the viability of government intervention are included in this unit. The theories of public choice– majority rule and the median voter, logrolling are also discussed in the unit.

2.1 Objectives :

After reading this unit, the reader will be able to–

- Know about the nature of public goods and the determination of efficient provision of public goods.
- learn the different theories relating to public goods.
- have an idea about the externalities arising in case of public goods and their corrective policies along with the viability of government intemention.
- learn the theories of public choice– majority rule and median voter, logrolling.

2.2 Efficient provision of public goods :

Determination of the efficient output of a public good involves a comparison between the marginal benefits and marginal cost associated with different levels of output. The marginal cost of a public good reflects the cost of resources used to produce the good. But the marginal benefit from public good is the sum of the marginal benefits of all individuals benefitted from the public good.

In the figure 2.1, units of the public good are measured in terms of the height of a dam designed to control flooding. For simplicity, we assume that only two people A and B benefit from the dam.

Fig 2.1

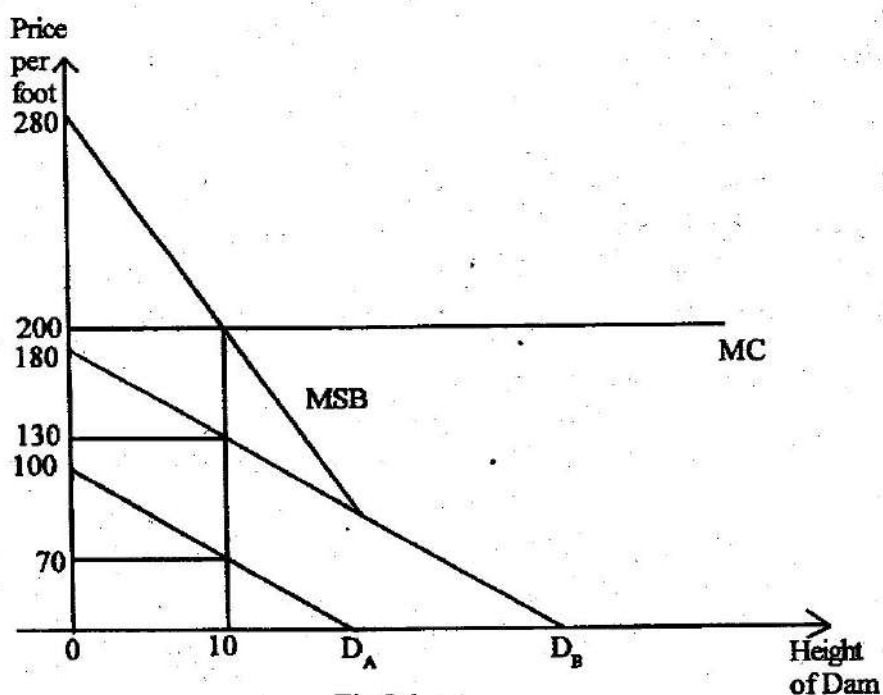The demand curves of the two consumers are as shown as D_A and D_B. To determine the merginal benefit to the society, we must add the demand prices of all consumers. This involves a vertical summation of the consumer's demand curves. Thus, the marginal social benefit curve, MSB is the vertical sum of D_A and D_B. Marginal cost is fixed at 200. At any output below 10, individuals A and

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B together are willing to pay more for another unit of output than the marginal cost of 200 since MSB lies above MC.

At any output gueater than 10, on the other hand, too much of the public good is being produced since the cost of the additional output is greater then the combined benefit to individuals A and B. So, a reduction in output can benefit both the them. Therefore, the most efficient level of output is 10, where A's marginal benefit (70) plus B's marginal benefit (130) equals marginal cost (200).

Hence, the efficient output of a public good is that level of output at which MSB obtained by vertically summing the demand curves of all consumers, equals the marginal cost of production. Hence, a 10 feet dam is the efficient output of the public good.

2.3 Theory of clubs :

Goods that are non-rival in consumption but excludable may be provided in the market by consumption-sharing arrangements. Buchanon (1965) has introduced a theory of clubs to explain the conditions for efficiency in the provision of such goods. Examples of such goods are sports clubs (swimming pool), social clubs etc. In this case, optimal quantity of the good to provide and the optimal number of members of the club are determined. The main objective is to maximise the welfare of club members.

1. Determine optimal membership, given the size of the club.

In figure 2.2, the curve C_1 slows how the average cost per member of the club falls. The average cost of producing a given quantity of the good will fall as more people join the club and share the costs. The benefit per person for the club varies as more join the club.

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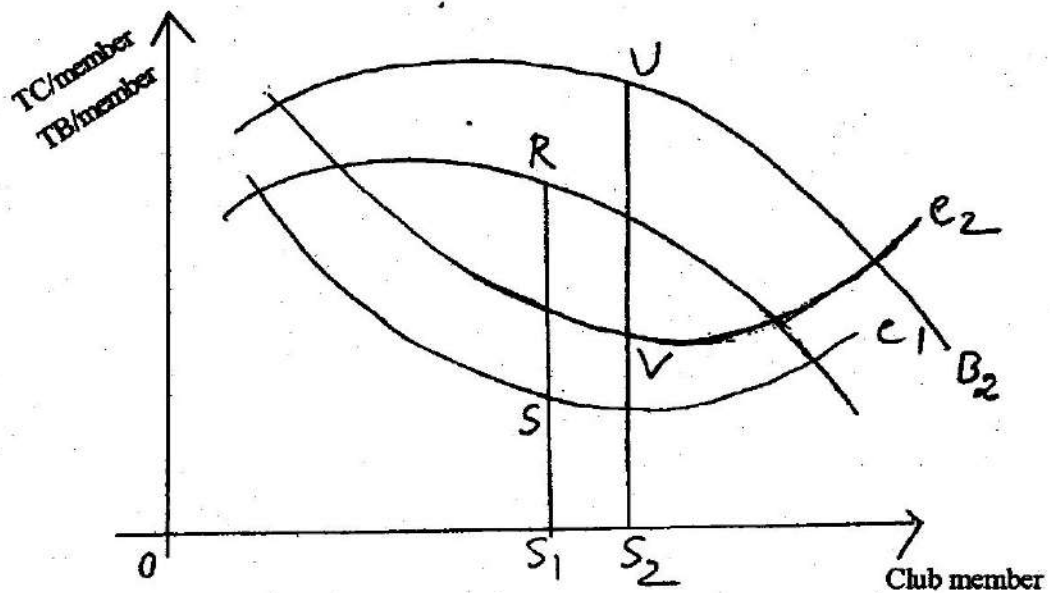
Initially it may rise, however, after a particular member have joined the club, congestion will be experienced and benefit per person will fall. When membership is S_1, the difference between benefit per person S_1 and cost per person C_1 is at a maximum. If the size of the club were larger, then the benefits per person might be greater (B_2) and though the cost per person might rise to C_2, the increase in quantity would increase the optimal membership size to S_2. So, for any quantity of the good, there is an optimal membership.

2. Determine optimal size of the club, given the membership.

Suppose the number of club members are given. At the extreme, a swimming pool may be consumed privately by one individual. The costs to that individual of increasing the size of the pool increase as C_1. If the benefits enjoyed by the individual is shown by B_1, then he would not purchase
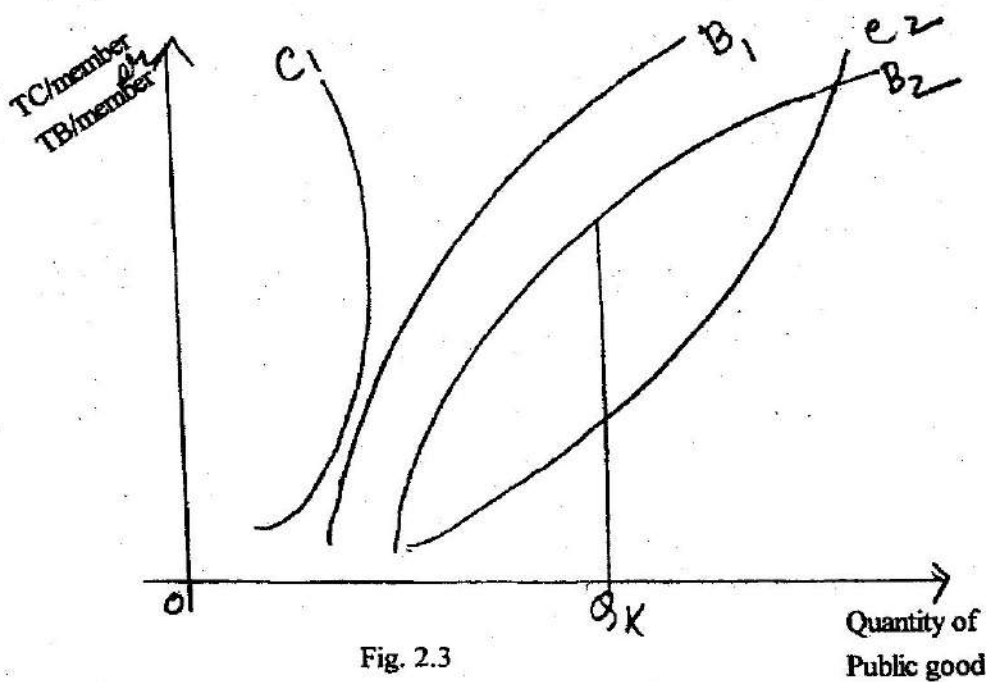

Fig. 2.3

any quantity. But if a group of persons formed a club, the costs per person would be reduced to C_2 while the benefits, because of non-rivalness in consumption would not fall so much (B_2). From this cost and benefit function, the optimal quantity is Q_K i.e. not benefit per club member is maximised at Q_K. For any given club size, there is an optimal quantity.

As it is possible to record the optimal membership size for any given quantity and the optimal quantity for any given membership size, it is possible to solve for the optimal quantity and optimal membership size simultaneously. If the membership is N_K, the optimal quantity is Q_K but at quantity

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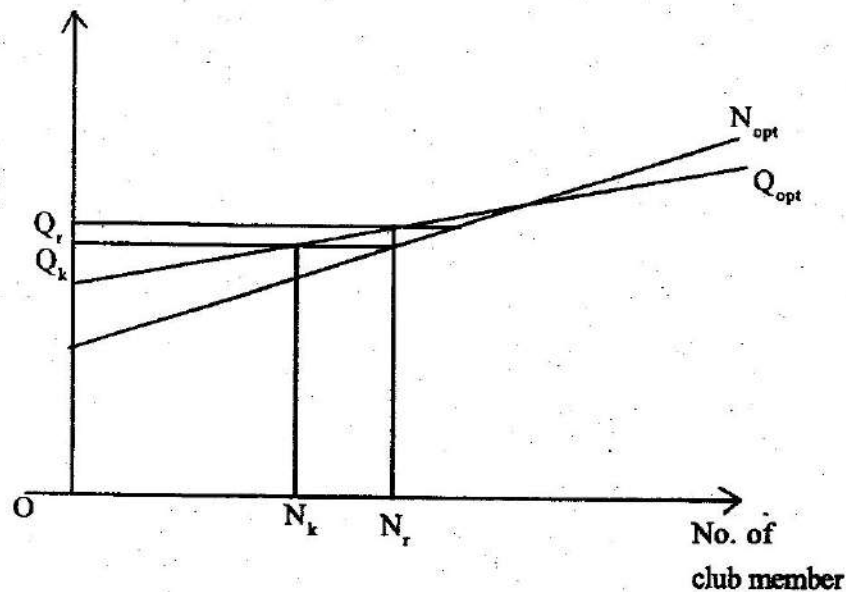
Q_K, the optimal number of members is N_r. With a membership of N_r, the optimal quantity is Q_r and so on. This will continue until the optimal quantity of the club and membership is attained where the two curves N_{opt} and Q_{opt} intersects. N_{opt} records the optimal member of club members for any given quantity of the goods. Q_{opt} records the optimal quantity of clubs for any given membership size.

2.4 The Tiebout Hypothesis :

Tiebout (1956) argued that individuals select the local community whose provision of local public goods and tax prices best satisfies their preferences. If each community offers different public goods– expenditure mix, then individuals reveal their preferences by moving into the community that reflects best their preferred tax– benefit mix. So, the Tiebout hypothesis states that– 'people leveal their preferences with voting with their feet.' It strongly backs the decentralised government or the decentralisation rationale.

Assuming that individuals migrate between districts until the benefit they derive from being resident in one locality is equal to the benefit they derive from being in another. If the total benefit derived from being in locality X is denoted by TB_X and total benefit from being in Y is TB_Y, then equilibrium occurs when

$TB_X = TB_Y$

When an individual moves to a region, he may add congestion costs to already crowded facilities. If MC_X represents marginal congestion costs of adding one more person to region X, then a welfare maximum requires that

$TB_X - MC_X = TB_Y - MC_Y$

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Boadway (1979) discusses the impact of migration on tax costs. Since the arrival of an additional individual reduces the taxes that existing residents have to pay to finance a given level of expenditure, the benefit of one more residents in X will be $TB_X + t_X$ where t_X is the tax paid by the marginal immigrant. Ignoring problems of congestion, welfare optimum requires.

$$TB_X + t_X = TB_Y + t_Y$$

Free migration will result in an optimum only if $t_X = t_Y$, that is if the total tax bill for a marginal individual is the same in the two regions. If $t_X > t_Y$, then individuals move to region Y from X. As a result, total benefit in region Y will fall and total benefit in region X will rise.

2.5 Voluntary Bargaining in Small Groups : Coase Analysis–

In an important theoretical paper, Ronald Coase showed that voluntary bargaining can lead in efficient outcomes even when externalities exist and without government intervention.

Model :

Coase illustrated his analysis by considering a rancher and a farmer. The rancher's cattle would occasionally stray into the farmer's property and destroy some of his crops. If an external cos. associated with cattle raising in the form of damage of crops, the government intervances in terms of tax. But suppose the government does not intervene, then according to coase, there may be two solutions which depends on how property rights are defined and enforced.

Case-I :

If property rights are so defined that if the crops are damaged, then the amount must be compensated by the rancher. The rancher also counts that amount of cost made by the cattle.

If the rancher were ligally liable for damage caused by the cattle, he would bear the cost. The damage caused by the cattle would not then be an external cost, but a direct cost born by the rancher because the rancher would have to compensate the farmer for crop damage.

Case-II :

Coase argued that if the rancher were not liable, an efficient solution could emerge without government action. It would happen because the farmer has an incentive to offer to pay the rancher to reduce the number of cattle because a reduction in crop damage will increase the farmer's profits.

(1) Coase's analysis not only shows that voluntary bargaining can lead to efficient outcomes but also illustrates the intimate connection between external effects and property rights.

(2) As long as property rights are clearly defined and enforced, bargaining between the parties resolves the problem.

(3) The distributional effects of voluntary bargaining depend on exact definition of property

rights. When the rancher is liable, he will compensate the farmer. Alternatively, when the rancher is not liable, the farmer will pay the rancher to reduce cattle straying. In both cases, cattle straying and crop damage are reduced to the efficient level, but different people bear the cost.

Conditions to achieve efficient solution :

(1) Voluntary bargaining between private parties occurs when the number of participants are few, otherwise free rider problem arises in case of large groups.

(2) If there is knowledge asymmetry then pareto optimal solution will not be achieved rather one party cheats other party with blackmail.

(3) Optimal solution is achieved only when the property rights are clearly defined and enforced.

2.6 Public goods and externalities :

Sometimes in the process of production, distribution and consumption of certain goods, there are harmful or beneficial side effects called externalities that are borne by people who are not directly involved in the market exchanges. These side effects are called external benefits when the effects are beneficial and external costs when they are harmful.

Externalities and public goods are similar characterised by two nature– non-rivalry and non-excludability. Extencelities generally lead to an inefficient allocation of resources or market failure just as public goods do.

2.6.1 External benefit and corrective policy :

The competitive supply and demand curves are shown as S and D_p. The demand curve reflects only the private demands of indirecduals who actually purchase and consume the product. Given

Fig 2.5

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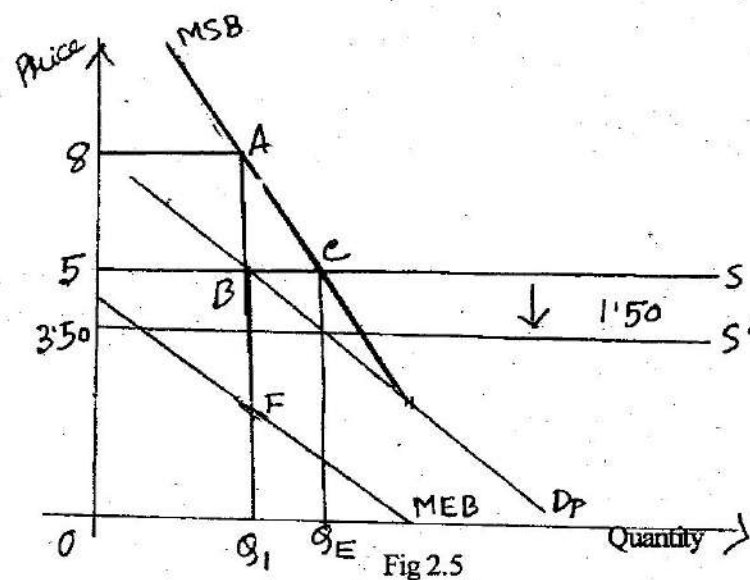
these relationships, the market equiliberium occurs with an output Q_1 and a price of ₹ 5. External benefit can be represented by the marginal external benefit curve, MEB, which reflects the marginal benefit to people other than the direct consumers.

Now, the marginal social benefits are shown by the MSB curve, which is derived by vertically adding MEB and D_P. By comparing MSB and S at Q_1, the competitive output is too low because the relevant marginal benefits of the gueater output exceed the marginal costs. So, the competitive output OQ_1 is inefficient. There is a general tendency to under produce when external benefits are involved and when production is determined in competitive markets. The competitive output is Q_1 but the efficient output is QE where MSB intersects S. At Q_E, marginal social benefit equals marginal cost. When external benefits result in the output in a competitive market being at an inefficient level, there is a welfare cost involved. The welfare cost is the triangle ABC.

Corrective Policy :

It is possible to design a government policy that will increase output to the efficient level. If an excise subsity of 1.50/- per unit of output is paid to the firms, it causes the supply curve to shift downward to S′. Although the cost of production for firms is still 5/- per unit, the government bearing 1.50/- of this cost, so consumers need pay only the net price of 3.50/-. At a price of 3.50/-, consumers would choose to purchase Q_E, as shown by the intersection of D_P and S′, which is efficient output.

2.6.2 External cost and corrective policy :

Suppose a firm produces wastes as a by product of their production and dispose off the efluents irritate people, so the production of the industry's product involves external costs. The competitive output will be too large because of external costs.

The competitive demand and supply curves are D and S_P and the equilibrium output is Q_1 with a price 6 per unit. The marginal damage suffered by people is shown by the marginal external cost,

Fig. 2.6

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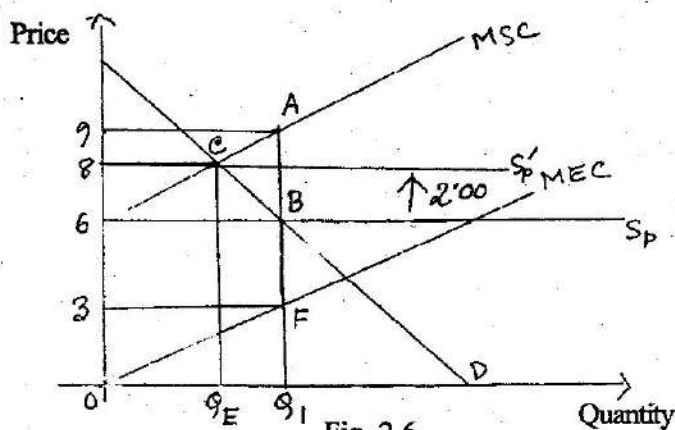
MEC curve. It is upward sleping because as quantity increases, external cost rises. At Q_1, marginal external cost is 3. Firms incur a cost of ₹ 6 per unit just covered by the price paid by the consumers. The marginal social cost of production (MPC + MEC) is ₹ 9 but the marginal benefit to consumers is only ₹ 6. Because the marginal social cost is larger than the marginal benefit of the product at Q_1, the output is too large. The efficient level of output occurs where marginal social cost equals the marginal benefit, shown by the intersection of MSC and D curves at an output of Q_E.

Corrective Policy :

Output must be reduced from the competitive level until consumers are willing to pay a price that covers all if the marginal costs resulting from the production of the product. With external costs, the corrective policy is tax. An excise tax of ₹ 2 per unit of output is levied which shift the supply curve upward by 2 to S_P. This leads to increase in the price by reducing their purchases from Q_1 to the efficient quantity Q_E. For the tax to result in the efficient outputs, it must equal to the merginal external cost at efficient output, 2 per unit. A tax more than this will reduce output too much.

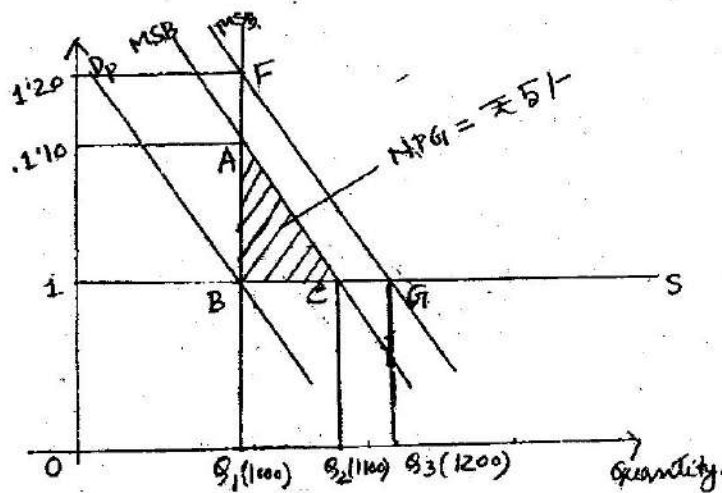**2.6.3 Viability of government intervention :**

Fig. 2.7

The competitive output determined is OQ^1 (1000) and the optinal output is OQ_2 (1100) determined by the equality between MSB and supply curve.

The net potential gain $= \triangle ABC$

$$= \frac{1}{2} \times (BC \times AB)$$

$$= \frac{1}{2} \times 100 \times 0.10$$

$$= 5$$

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The net potential gain is realised if the efficient output of OQ_2 is produced. It requires subsidy of ₹ 0.90 per unit of output. Therefore, the total subsidy will be

$$0.9 \times 1100$$
$$= 99$$
$$= 100 \text{ (approx.)}$$

If the cost of mobilising the total subsidy of ₹ 100 is 5% or ₹ 5 then the cost will be equal to the net potential gain. Then government has not aug role to intermene in the form of lither tax or subsidy. When the gain is greater than the cost, then only the government has to intervene.

When the external benefit is 20% of ₹ 1 or 20% of cost, the MSB curve shifts to MSB' and optional output determined to be OQ_3 (= 1200) and net potential gain will be $\triangle$BGF. Here, marginal external benefit is 0.20 per unit

Welfare cost = net potential gain
$$= \triangle GBF$$
$$= \frac{1}{2} \times BG \times BF$$
$$= \frac{1}{2} \times 200 \times 0.20$$
$$= 20$$

Hence, the provide the efficient output of 1200 units, an approximate subsidy of 0.17 per unit is required. The total subsidy = 1200×0.17
$$= 200 \text{ (approx.)}$$

If the cost of administering tax expenditure programme is 5%, it will 5% of 200 i.e. ₹ 10 which is less than the net potential gain (= 20). In this case, government intermention is viable.

2.7 Public Choice :

The theory of public choice deals with how government decisions are made or what will the government do in different circumstonces. Theory of public choice is based on two premises–

1. Individuals attempt to further their over interests in their political activities just as in their economic activities.

2. The same people cube are consumers and workers in economic models are also voters and politicians in political process.

2.7 Majority Rule and the Median Voter :

Citizens elect their repesentatives who vote on various policies taken up by the government. Ignoring the representatives, we emagine that citizens are voting for various policies competing resources.

Consider a three person community composed of three individuals A, B and C. By majority voting, these three individuals must determine how much output of a public good to finance through taxes. Suppose that the citizens have decided to divide the total cost of the public good equally among A, B and C. If the marginal cost per unit of good is ₹ 30, each citizen will pay ₹ 10 per unit of the good preduced. The number of units produced will be determined by majority voting. In the following diagram, the demand curves of three voters are d_A, d_B and d_C indicating marginal benefits to each voter at different levels of output. The tax costs are summerised in the line TP_i indicating the tax price per unit of the public good for each voter. As shown in the diagram, A prefers 4 units, B prefers 10 units and C prefers 12 units of output. Majority voting will be used to determine the unique level of output.

Fig. 2.8
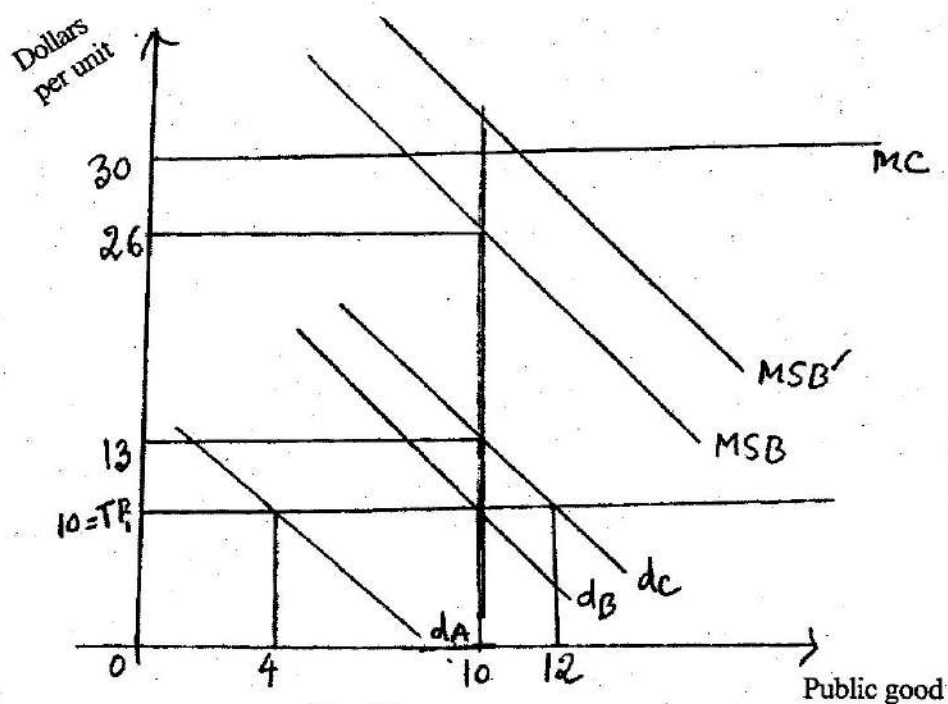
- Suppose three is a proposal to increase output of public good–
→ If output is less than 4 units, A, B, C will say 'yes', then proposal is accepted.
→ if output is equal to 4 units, A will say 'no' but B, C say 'yes', then proposal is accepted.
→ if 4 < output < 10, A will say 'no' but B, C say 'yes', then proposal is accepted.
→ if output is equal to 10 units, A, B say 'no' but C says 'yes', then proposal is rejected.
- Suppose there is a proposal to decrease output–
→ if output is greater than 12 units, A, B, C will say 'yes', then the proposal is accepted.

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→ if output is equal to 12 units, A, B say 'yes' but C 'no' then proposal is accepted.

→ if 10 < output < 12, A, B say 'yes' but C 'no' then proposal is accepted.

→ if output is equal to 10 units, A say 'yes' but B and C will say 'no', then proposal is rejected. Any vote to exchange output 10 units is rejected.

An equilibrium occurs at the level of output where any proposal either to increase or decrease output would be opposed by a majority. A basic implication of the analysis is that the median quantity preferred by voters will be selected by majority voting. Of the three preferred quantities, 10 is median preperred quantity. The quantity favoured by the median voter B becomes the collective choice, for this reason this model is sometimes referred to as median voter model.

For 10 units of output,

total cost = 10 units × ₹ 30 = ₹ 300

For individuals, ₹ 10 × 10 units = ₹ 100

So, total cost of ₹ 300 is covered by ₹ 100 total tax of each of the three individuals.

Characteristics of majority voting :

(1) Only median voter is satisfied. Political process response those whose preference lies somewhere in the middle.

(2) It is unresponsive to individuals. Intensity of individual wants can not be captured by the theory.

(3) Outcomes can only be changed when median vote changes.

2.7.2 Logrolling :

Logrolling is a process of trading votes to achieve the majority necessary for approval. Even when majority voting is the decision rule for detrmining policies, under certain circumstances it is possible for policies to be adopted that are actually opposed by a majority of voters.

Suppose there are three voters– Rita, Rahul and Sanjay. Three spending proposals are considered–to subsidize college students, hospital construction and recuitment of more police personnel. Rita is the only voter who favours the hospital programme, Rahul is the only one who favours college programme and Sanjoy is one who favours the approved (125 – 50). So, it is in their interests to support each other's favoured proposals and put both the proposals.

Voters	Hospital	College	Police
Rita	100	−75	−80
Rahul	−50	125	−100
Sanjoy	−100	−125	150
Total net benefit	−50	−75	−30

a majority vote. Similarly, Rahul and Sanjoy together can secure majority vote for college and police programmes and Rita and Sanjoy for hospital and police programmers. But in all these cases, inefficient outcome results.

Logrolling can lead to the adoption of efficient policies. All the three programmes are efficient, but if voted on separately a majority will oppose each programme. Vote trading can work to adopt the efficient police programme. So, the proposals for all three subsidies would have to fail as each one is opposed by majority of voters. But Rita could go to Rahul and Sanjay if he votes her favoured programme, she too favours in return. Then both the proposals will get the needed majority, though each is really opposed by two of the free voters.

The net gain or loss for each voter if each proposal is adopted is given in the table. In case I, all the three spending programmes are inefficient as the losses to the voters are larger than the gain to the voter who benefits, so net benefit is negative. If each proposal is voted on separately, they will fail to secure majority approval and the result will be efficient.

But logrolling is likely to be changed the outcome. Rita is better off if both the hospital and college programmes are approved (100 − 75). Rahul is better off when hospital and college programmes are programmes that otherwise be rejected under majority voting.

Voter	Hospital	College	Police
Rita	100	−50	−60
Rahul	−50	125	−40
Sanjoy	−20	−50	150
Total net benefit	30	25	50

Conclusion :

(1) Logrolling gives outcomes which is both efficient or inefficient.

(2) The process of logrolling is often defended as a means of protecting minority interests. On a particular issue, a minority of voters may passionatdy favour a particular policy but under majority voting without logrolling their interests will be ignored, implying a 'tyranny of the majority'.

(3) Logrolling among individual voters is not possible when there are large number of voters.

2.8 Self-assessment questions :

1. Discuss the process of defermination of efficient provision of public goods.

2. Explain the theory of-club.

3. Discuss the case of externality in public good. What are the corrective policies to overcome? How does the viability of government intermention determined.

4. Explain how does majority rule determine public choice. Explain the role of median voter.

5. Write short notes on– logrolling.

2.9 Additional Readings :

1. Browning E.K. & Browning J.M., "Public Finance & the Price System", Pearson.
2. Musgrave & Musgrave, "Public Finance in Theory and Practice."

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Unit 3
Public Expenditure

Structure :

3.0 Introduction :

Public expenditure analysis is an important part of public finance. The unit deals with the principles of public expenditure– Lindahl's model of voluntary exchange, Samuelson's Benefit Theory of public expenditure and Musgrave's Optimum Budget Theory. Public expenditures on non-marketed goods, fixed-quantity subsidy for marketed goods and excise subsidy– their allocative and distributive impacts are also discussed. This unit too deals with the evaluation of public expenditure that is the cost benefit analysis.

3.1 Objectives :

After going through this unit, the readers will be able to–

→ learn the various principles of public expenditure such as Lindahl's model of voluntary exchange, Samuelson's benefit theory of public expenditure and Musgeave's optimum budget theory.

→ know about the issues relating to public expenditure on non-marketed goods.

→ have an idea about fixed quantity for marketed goods.

→ learn about excise subsidy its impact on allocation and distribution.

→ know about evaluation of public expenditure– the cost benefit analysis.

3.2 Theories of Public Expenditure :

3.2.1 Lindahl's Voluntary exchange model :

The voluntary exchange model of public expenditure theory is concerned with what Erik Lindahl calls purely fiscal problem of providing fole the satisfaction of public wants. It does not concern itself with the problem of just distribution of income and it is assumed to be given.

Fiscal provision of public goods has two aspects :

(1) Public good is related to public expenditure.

(2) How public goods distributed are determined by taxation.

Determination of these two depends on individual preference. Decisions are based on the three premises :

(1) Public expenditure and taxation.

(2) Allocation of public expenditure among various social wants.

(3) Allocation of taxes among various beneficiaries.

All these have to be done simultaneously.

The Model :

Let us assume a community of two individuals A and B and one type of social good. Since each of A and B consumes the total amount of social goods supplied but receives different amounts of benefit from it, their benefit shares may be considered as joint products.

The cost of provision of social goods is covered in the form of contribution of two beneficiaries in terms of tax. So, A's offer to contribute certain percentage of total cost may be looked upon as B's supply schedule of social goods and B's offer can be interpreted in the same way.

The quantity of social goods is measured along horizontal axis, percentage of total cost contributed by 'A' along left vertical axis and percentage of total cost contributed by B along right vertical axis. The unit cost of supplying social goods is OV. The demand schedule of individual 'A' is aa and that of B is bb, calculated by inverted scale on the right axis.

The demand schedule of A may be viewed as the supply schedule of B and vice-versa.
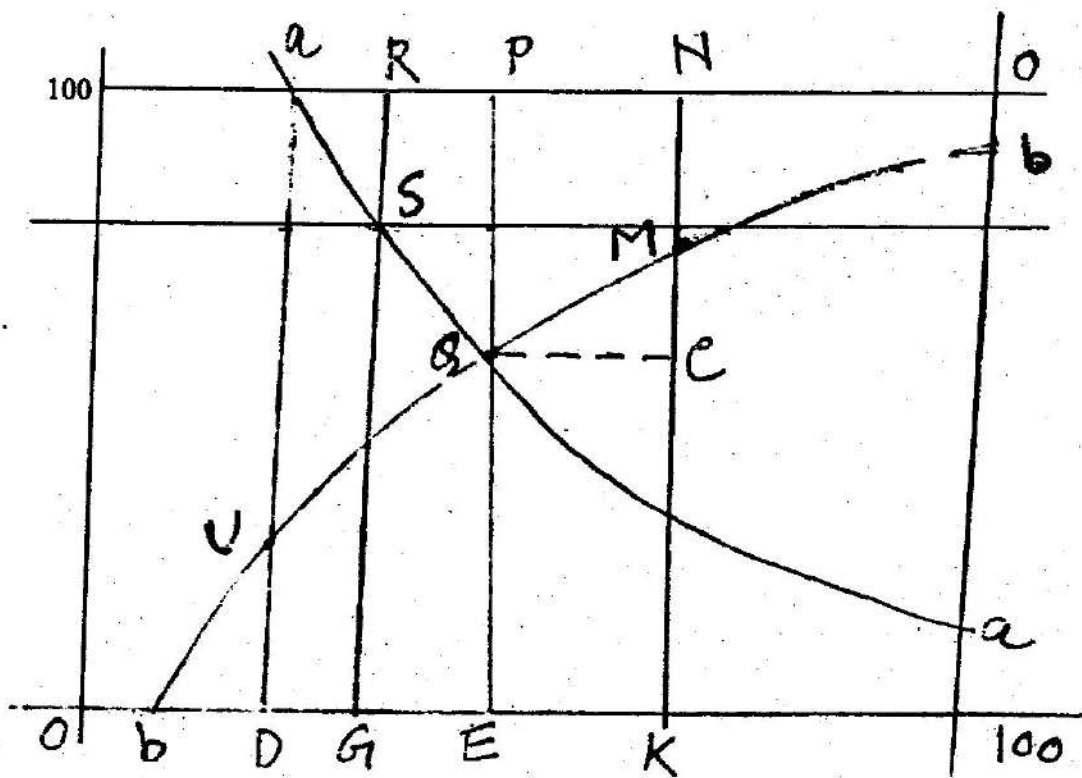
Fig. 3.1

At output level OD

Individual A will be willing to contribute 100 per cent of cost which will be available free to B.

At output level OG

Individual A is willing to contribute GS percent of cost so that the output will be available to B at the cost of RS percent. But B is willing to pay RTpercent of cost. Thus, the total contribution of A and B that is (GS + RT) will exceed the cost of supplying Og social good by ST per cent. It is an indication of their preference for larger amount of social goods.

At output level OE

The optimum level of social good is given by OE at which A contributes EQ per cent and B contributes PQ per cent of cost and hence the combined contribution is exactly equal to the total cost of supplying this level of output.

At output level OK

Individual A will be willing to contribute KL percent and the supply price of social good is NL for individual B. But individual B will offer to contribute only NM percent. So, ML percent of the cost of supplying this output will remain uncovered. If A contributes KC percent and B contributes NC percent of cost so that OK amount can be supplied what is larger than that they are willing to pay.

So, not more than or less than OE level of output will be produced and OE is the optimum level of output.

Criticism :

Lindahl's voluntary exchange model is suffering from the following drawbacks :

1. Though only one public good and two tax payers are assumed, yet increase in the number of public goods and tax payers complexes the model.

2. It is partial analysis because it assumes that the optimum amount of public services can be determined independently of the amount of private goods. Since the production of public goods will require diversion of economic resources from the production of private goods, they are competitive in production and optimum amount can not be determined independently of the other.

3. Lindahl has taken the distribution of income as given. The valuation of individual benefit shares can not be correctly expressed through offer prices on the basis of assumed state of distribution.

4. Both citizens A and B disregard the effect of their votes on the other's cost share. There is some sort of myopia between the two individuals.

5. Since exclusion principle does not apply in case of social goods, preference will not be revealed. Here the entire assumption of voluntary contribution breaks down.

3.2.2 Samuelson's Public Expenditure Theory :

The most recent benefit theory of public expenditure comes from Samuelson as a critique of the voluntary exchange model of Erik Lindahl. The voluntary exchange principle has a partial equilibrium approach in which satisfaction of social wants is considered independently of private wants. Samuelson considers it as an inadequate explanation and thinks that the problem must be restated in terms of general equilibrium.

In general equilibrium analysis, we consider two individuals A and B consuming both social and private goods. The production possibility were EF shows the different combinations of private goods and public goods that the society can produce with given resources. Which particular combination

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among the possibilities will be chosen depends upon preferences of the consumers A and B and upon distribution of income between them.

Transformation Schedule (1) A's consumption (2) B's consumption (3)

Fig. 3.2

The vertical axis measures social goods and herizontal axis measures private goods. If only private goods are produced, individual 'A' will have OC amount and 'B' will have OD amount. The sum total of OC and OD is OE as shown in figure (1). This is the total output of private goods with no public goods produced. Suppose the government now wants to provide for social goods. Both will consume the same amount of social goods but one's consumption of private goods affects the other's consumption due to rivalry character. B's consumption possibility is defined by 'A's choice and vice-versa. If 'A' chooses the point P and consumes OG_1 public gods and ON private goods, the total supply of private goods will be OV in fig. (a). So B must consume OLwhere OL = OV – ON. If, on the other hand, A chooses the point Q on indifference curve i_{1a} and consumes OG_2 of public goods and OM of private goods, B will choose to consume OK of private goods where OK = OC – OM (OC = total supply of private goods) and so on. This is how, we obtain the curve DSZ which defines B's consumption of special and private goods as A moves up along i_{1a}. Now, of all the combinations in DSZ, the consumer B will choose point S beause at this point DSZ is tangent to the highest possible indifference curve i_{2b}. Individual 'B' consumes OK of private goods and OG_2 of public goods. CE amount of private goods is surrendered by the society in order to

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produce OG_2 of public goods. Since 'A' consumes only OM of private goods, the whole amount of surrender of the private goods comes from A. The overall situation is a pareto improvement since 'A' is not worse off remaining on the same i_{1a} and B has been better off moving to higher indifference curve i_{2b}.

Similarly, we can derive 'A's consumption possibility schedule CHW following the movement of B along i_{1b}. In this case, the position of B is not worse off because he remains on the same indifference curve, i_{1b} while A has been better off moving to i_{2b}, the higher indifference curve at point H.

In the following figure, we measure the orderal index of A's welfare along the vertical axis and B's welfare along the horizontal axis. If no public goods are produced, A will be located at C on i_{1a} and B will be located at D on i_{1b}. Both are at the lower limit of their repective welfare levels as shown by point m. Again, corresponding to A's consumption possibility at point H and B at I, we have point x. Again, corresponding to B's consumption possibility at S on i_{2b} and A at Q, we have point Y.
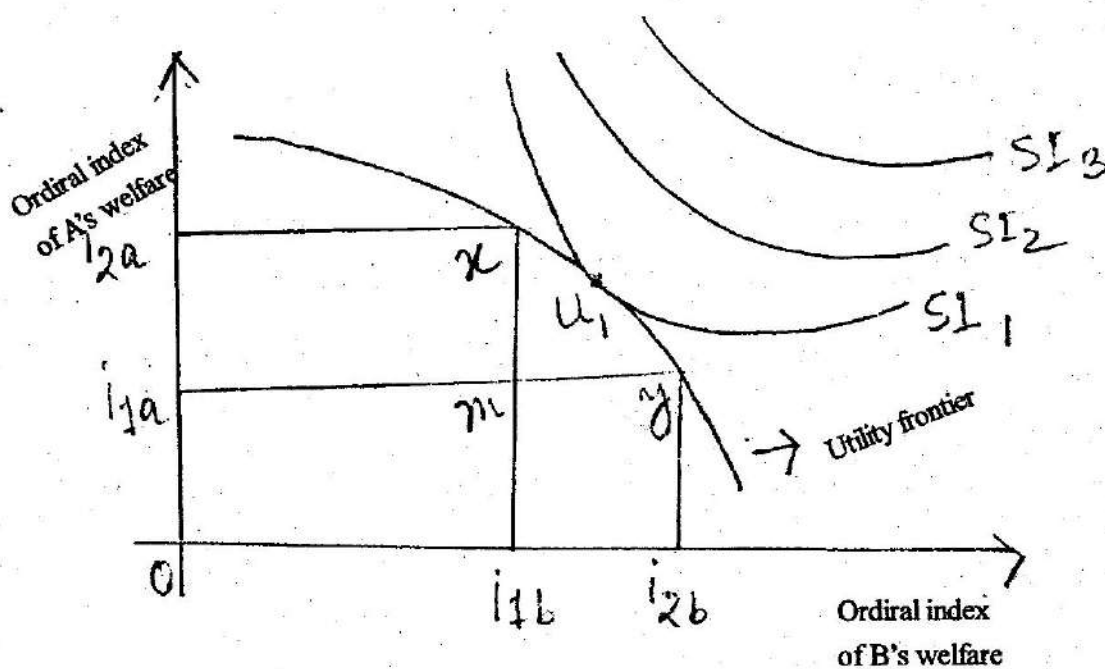

Fig. 3.3

Thus, the area myx shows the infinite number of points at which A or B or both of them are better off than m. So, xy is the utility frontier of which every point will give optimum solution in the pareto sense.

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Criticism :

The thoery is criticised on the following grounds–

1. We are confronted with large number of solutions, all of which are optimal in the pareto sense. To get the best of all pareto optimums like U_1, we have to construct social indifference curves.

2. If the assumption of the given state of proper income is relaxed, the theory will face sence problems.

3. The more basic objection is that since the same amount is consumed by all, the consumer would not reveal their preferences for public goods.

4. Though benefit principle is based on direct link between tax payment and benefit to be accrued to tax payer, only a section of the tax payers are benefitted from budgetary supply of public goods.

3.2.3 Musgrave's Optimum Budget Theory :

The optimum budget theory of Musgrav is a normative approach to budget policy. It seeks to determine the optimum amount of public expenditure. According to Musgrave, a budget should realize three objetives :–

(1) Proper allocation of resources,

(2) Proper distribution of income.

(3) Price level stability with full employment.

For each of the three objectives, a sub-budget should be prepared. When these three sub-budgets are prepared according to their objections, they will be consolidated into a single whole budget plan.

The optimum budget theory seeks to achieve the purpose of allocation branch of the budget. It is based on benefit approach. The people have a choice pattern or preference schedule between public goods, private goods and leisure, heisure is a component of welfare because leisure can be transformed into production of goods and services and hence, into income. Optimum budget theoy seeks to explain the allocation of public expenditure or provide for public goods in such a way that the community is ableto derive the greatest attainable satisfication. This is possible when allocation of public expenditure in different lines of state activity is so determined in the budget that the community is able to reach the highest possible indifference surface as between public goods, private goods and leisure.

3.3 Public expenditure on non-marketed goods :

When goods are not provided by the market or negligibly by the market, the government has to incur expenditure. Applying conventional economice tools results in problem like market failure due to the characteristics of public goods (non-rivatry and non-excludability). Then it is to be

demanded as people do not reveal their preferences. There are two ways the government can spend to stimulate the output of some good that is not provided by the private market—

(i) pay private firms and

(ii) to produce directly.

Allocative Effect :

Whichever the way, the allocative effect is to increase the output of the desired good. In both cases, the resources that would have been used to produce other goods in the private sector are used instead to produce goods in the public sector. In the following figure, ZZ is the production
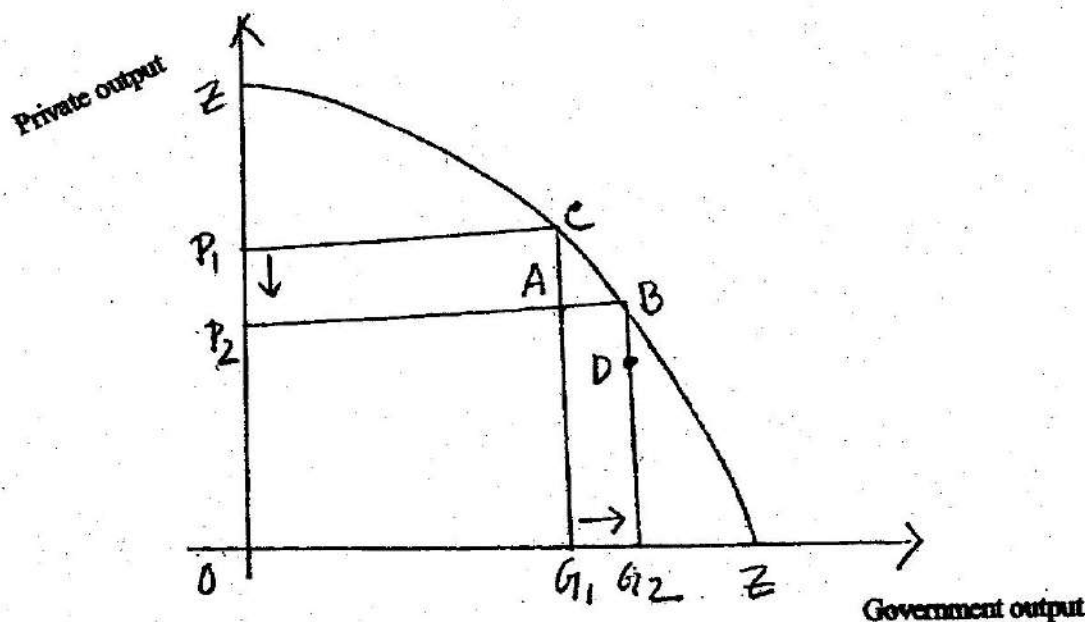

Fig. 3.4

possibility curve which shows the trade off between private sector output and government sector output. Initially, at point C, the economy is producing OG_1 in the public sector and OP_1 in the private sector. If the government increases its production to OG_2 or by G_1G_2, the private sector output falls to OP_2 or by P_1P_2. The less reflects the fact that the resources used in the government project must be drawn from the private sector, where they would have been used to produce other goods and services. Government expenditures that stimulate the output of some non-marketed good have an opportunity cost that takes the form of a reduction in goods and services in the private sector.

Distributive Effect

When the government stimulates the production of non-marketed goods, the distribution of benefits to different individuals or groups is difficult to determine. This is because there are no market prices to register values that people either individually or collectively place on this type of good. Again, different people may benefit to many different degree.

Production Inefficiency :

$P_1 P_2$ is the minimum possible opportunity cost associated with the increase in government output by $G_1 G_2$ as shown in figure 3.4. Only if the government output is produced in the least costly way, $P_1 P_2$ will reflect actual cost. There are many ways to combine resources to produce the additional $G_1 G_2$ units of product and some of them will involve larger cost than $P_1 P_2$. At point D, when OG_2 of the government output is produced, it involves $(P_1 P_2 + DB)$ amount of opportunity cost i.e. DB more than the previous.

The opportunity cost of government expenditure programme is reflected in the form of taxation, different taxes will distribute this burden differently among the public.

3.4 Fixed quantity subsidy for marketed goods :

Subsidies for education, food, child care, housing, job training, health care facilities involve that the government makes a certain quantity of a good available to a consumer at no cost or at a cost below the market price. This is called the fixed quantity subsidy which emphasises that the a quantity subsidised is beyond the control of the recipient. The government determines what quantity of the good is made available at the zero or subsidised price. It is also called in kind subdidy. Fixed quantity subsidies can have various effects on the consumption and well being of receipents, depending on the size of the subsidy, the good being subsidized and who pays for the subsidy.

Taking into consider food and other goods, let income of the consumer is ₹ 1,000/-. If the price of the food is ₹ 10/- per unit of food, total food will be 100 units. Pre-subsidy equilibrium is at point e which requires the consumption of 40 units of food and 600 units of other goods. Suppose, 30 units of food is provided by the government in the form of subsidy. After subsidy is provided, if the person decides to spend all his money on food, then he can consume 130 units of food and the budget live becomes MM'N'. Again, if he decides to spend all his money on other goods, ₹ 1000 of goods will be purchased.
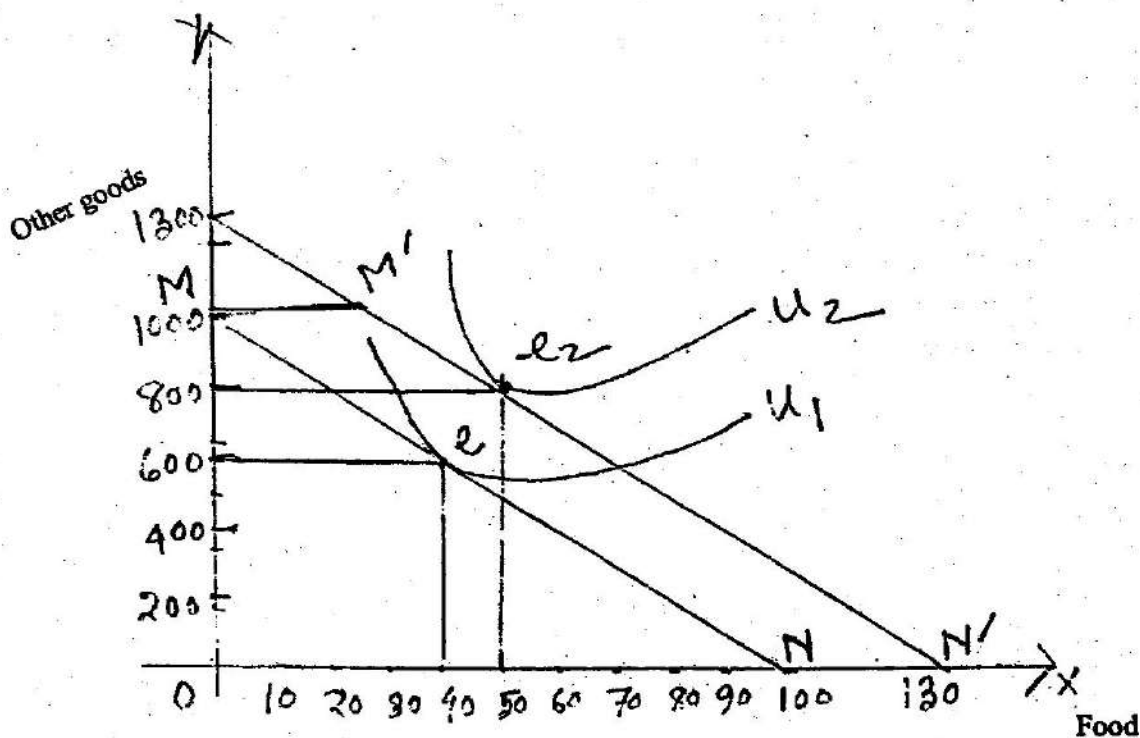
Fig. 3.5

The post subsidy equilibrium will be at e_2 where the person consumes 50 units of food and ₹ 800 of other goos. Now, increase in the consumption of food by 10 units and of other goods by ₹ 200, there is a reduction in the private purchase of food amounting to 20 units (50 – 30), since 30 units is provided in the formof kind subsidy. But if the government provides a cash transper of ₹ 300 so that the new budget live will be M"N'. The effect of the FQS on consumption opportunities is the same as a each transfer except that the dotted portion of the budget line M'M" is not available to the consumer.

Subsidy financed from the tax on beneficiaries :

Let the initial budget line be M"N'. So the person consumes 130 units of food by ₹ 1300. Pre-taxation equilibrium is at point e_2 where 50 units of food and ₹ 800 of other good is consumed.

If a tax is imposed on the beneficiaries amounts to ₹ 300 (30 units of food X ₹ 10), then the budget line will shift downward by ₹ 300 to MN. If the government provides 30 units of food in terms of subsidy, post-tax-subsidy budget line becomes MM'N'. So, again the person is equilibrium at point e_2 consuming the same amount before taxation. Only effect is that the upper portion of the budget line (MM') is not available.

Many government tax-subsidy programme through fixed quantity subsidy has little impact, only change is in the reduction in private purchases.

Over Consumption :

A fixed quantity subsidy will increase consumption by more than a cash transfer if the quantity provided by the government is greater than the consumer would purchase if he or she had cash rather than the in kind subsidy.

If the consumer's preference is for 40 units of food, then it canbe satisfied in the following way—

(i) 30 units of food subsidy + buy 10 units.

(ii) ₹ 300 subsidy + buy 10 units.

(iii) ₹ 600 is given to the consumer, ₹ 400 for 40 units of food + ₹ 200 for other goods.
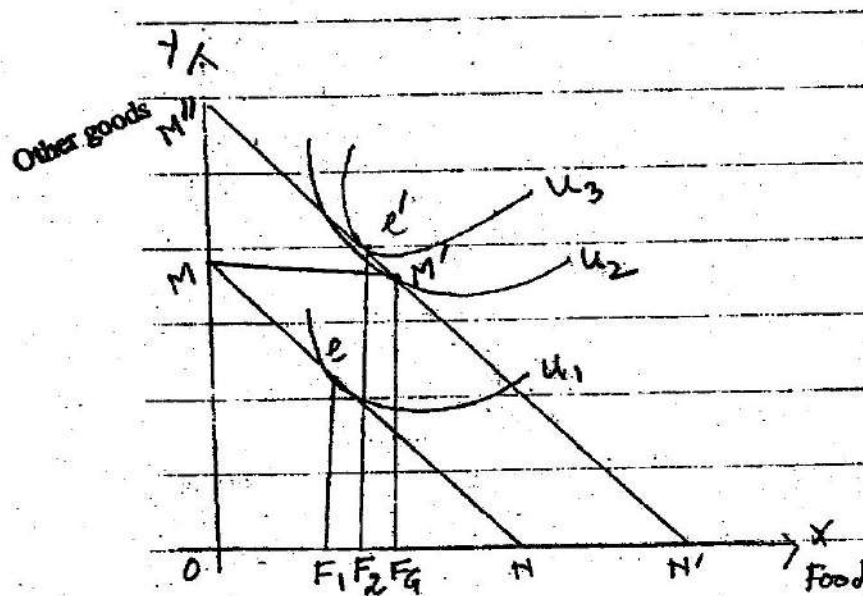

Fig. 3.6

MN is the pre-subsidy budget line with a consumer consuming F_1 units of food. If the government provides F_G units of food at no cost, the budget line will shift to MM'N'. Given the consumer's indifference curves, new equilibrium is at point M'. If the consumer is given cash equal to the cost of the changing the consumption point from e' to M', increasing the consumption of food but making him worse off.

Under Consumption :

In some cases fixed quantity subsidy will induce consumption than a cash transfer. This outcome can occur when it is very costly or impossible for the consumer to supplement the quantity of the

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good provided by the subsidy (M M″), budget line would be M″N′ and will consume less food F_2 at e′. So, fixed quantity subsidy has increased consumption of food more than a cash transfer. But

fig. 3.7
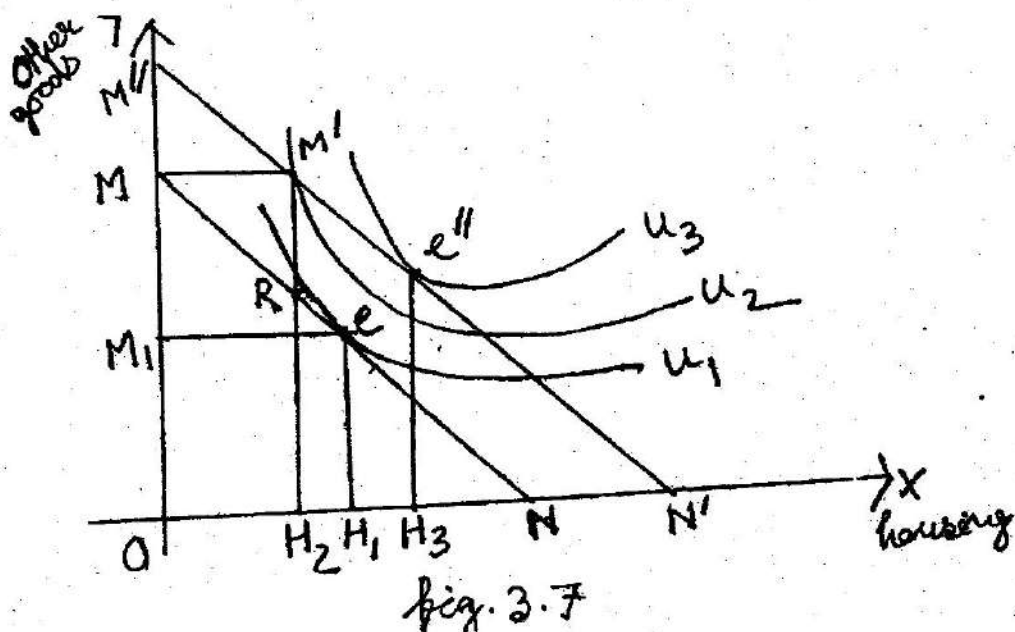
the consumer will be better off if he is given cash transfer rather than fixed quantity subsidy as he is on heigher indifference curve u_3 with cash transfer while on lower indifference curve u_2 with fixed quantity subsidy. Thus, the increase in consumption in comparison to cash transfer, $F_2 F_G$ is over consumption of the subsidised good.

When the fixed cost subsidy is financed by tax :

In this case, M″N′ is the initial before tax and subsidy budget line, equilibrium is at e′ with indifference curve u_3. MN is the after tax budget line. Post tax-subsidy budget line is MM′N′, equilibrium is at M′ with indifference curve u_2. The subsidy and tax together have the effect of government. It is very expensive to buy from the market over what is provided by the government in the form of subsidy. The pre-subsidy budget line is MN and equilibrium is at point e. In the absence of any subsidy, H_1 housing is consumed. If the government affers the family a housing units of H_2 at no cost, the new budget line will be MM₁RN. The budget line is MM′RN instead of MM′N because in case of MM′N, the consumer could consume more of the subsidised good to the right of M′ by paying only the cost of additional units but to consume more housing than H_2, the consumer must for go the subsidised housing unit and bear the entire cost of housing units along the RN portion.

With MM′RN budget line, the family would consume subsidised housing and consume at M′, even though it involves less housing than they consumed without subsidy. Although the family sacrifices H_1H_2 units of housing, they gain M_1M units of other goods and they are better off at M′ than at E.

If instead of subsidised housing, equal size cash subsidy that the family can spend as they wish is given, the new budget line will be M″N′ with equilibrium is at e′ where MM″ is the cost of subsidy. The family would also be better off at point e′ on indifference curve u_3 with H_2H_3 units of more housing. So, H_2H_3 is a measure of the under consumption produced by the housing subsidy.

3.5 Excise Subsidy :

In case of excise subsidy, the government pays part of the per unit price of a good but allows the quantity of the good to be determined by consumer purchases. The quantity and hence, the cost to the government depend on the level of consumer purchases and so are not fixed by the nature of the policy.

There are two types of excise subsidies— advalorem excise subsidies and per unit excise subsidies. With an advalorem excise subsidy the government pays a certain percentage of the per unit cost of some good or a specific percentage of the consumer's total expenditures on the good. In contrast, with a per unit excise subsidy the government pays a certain amount for each unit of the good consumed.

Allocative effects : Market perpective :

Let the food industry is to be subsidised and that the industry is a constant cost competitive industry. The initial price and quantity are ₹ 10 and Q_1. If an excise subsidy of ₹ 4 per unit of food
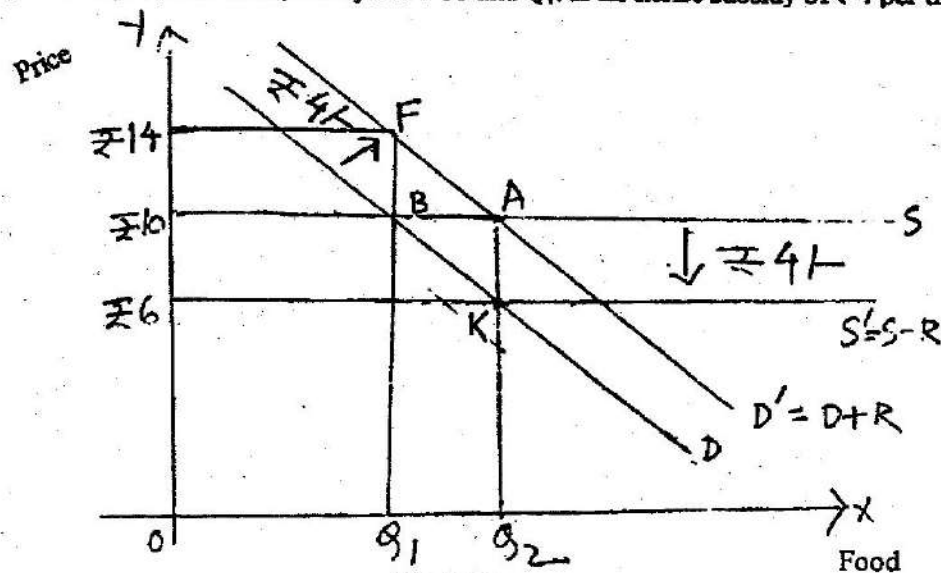

Fig. 3.8

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is paid to the firms, this has the effect of reducing their net per unit production costs by ₹ 4 and supply curve will shift down word to S'. As a result of lower net cost of production, the firms expand output and that leads a lower price for consumers. The new equilibrium is established at the intersection of S' and D. At a lower price ₹ 6 per unit of food, consumption increases to Q_2. The total amount of subsidy is equal to the area PAKP'. The cost of production does not come down by the provision of subsidy but price lowers because a part of it is borne by the government.

Suppose that consumers receive ₹ 4 from the government for each unit they purchase, the firms are not subsidised. The subsidy increases the per unit price that consumers are willing to pay to the firms. At Q_1, consumers are willing to pay a maximum of BQ_1 or ₹ 10 per unit but as the government will give them ₹ 4 per unit, their demand price increases to ₹ 14 per unit and demand curve shifts to D'. With D' and unchanged supply curve S, equilibrium occurs at point A, with output Q_2. Here, producers are receiving ₹ 10 per unit and consumers are paying a net price of ₹ 6 per unit or KQ_2 as ₹ 4 per unit or AK portion reflects government subsidy.

Increase in output from Q_1 to Q_2 represents over consumption by the consumers. The benefit of the additional Q_1Q_2 units is less than the cost of producing additional output. The reason behind this is that consumers purchase the additional output is that someone else is bearing part of the cost.

$$\text{Benefit} - \text{cost} = BKQ_2Q_1 - BAQ_2Q_1$$
$$= - BAK$$

So, the net cost of producing the additional output Q_1Q_2 is the area BAK. It is also because that the resources used in producing Q_1Q_2 units can be used more productively in some other means.
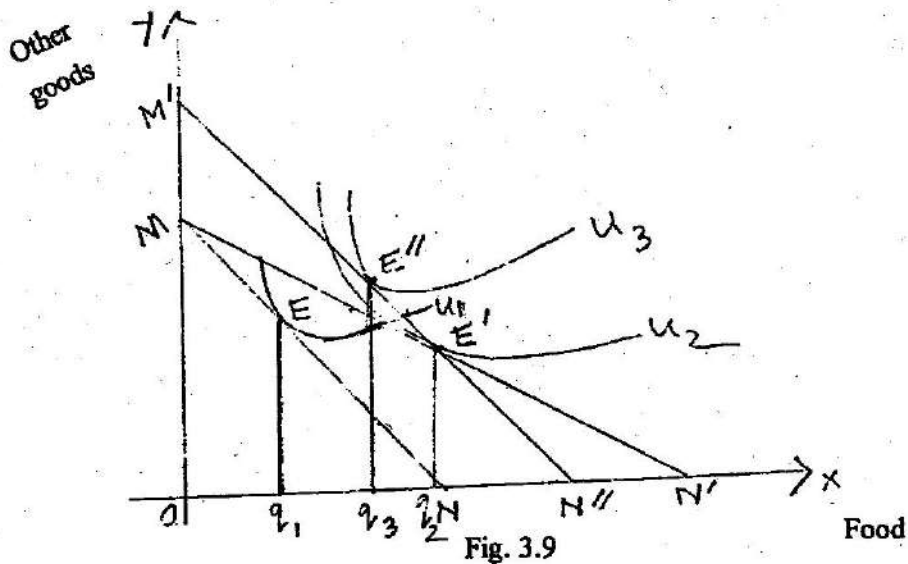
Allocative effects : Individual Perspective :

Fig. 3.9

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The pre-subsidy budget line is MN and the consumer is in equilibrium at point E. The excise subsidy lowers the price of food, so the budget line becomes flatter as shown by MN'. Faced with the lower price, the individual's new equilibrium is at E' involving a larger consumption of food, q_2. Consumption of q_2 without subsidy results in other goods consumed is $T q_2$. Again, consumption of q_2 with subsidy leads to consumption of other goods as $E'q_2$ units. So, the cost of subsidy = $E'q_2 - Tq_2 = E'T$.

This $E'T$ part is borne by the government. If the government decides to subsidise in form of cash transfer the budget line appears as $M'N''$, where the cash transfer (MM') is equal to the cost of subsidy $(E'T)$. Then the consumer would prefer point E'' purchasing less food but more of other goods. With cash transfer, the consumer would be better off as compared to excise subsidy as he will be on higher indifference curve u_3. Hence, q_3q_2 amount reflects over consumption.

When the consumer pays tax for financing subsidy :

The initial budget line is $M'N''$, the post tax budget line is MN and the post tax-subsidy budget line is MN'. The net result is to increase food consumption from q_3 to q_2 and to make the consumer tax payer worse off.

Over consumption of food and welfare cost is the outcome in both cases. In case of excise subsidy, the consumers would be better off consuming less food with a cash transfer. On the other hand, when the consumers pay the taxes themselves, the welfare cost reflects the fact that consumers would be better off consuming less food without any tax or subsidy.

Distributive effects of excise subsidy :

Incidence refers to the distributional effect of a tax, subsidy or other policy. Sometimes, the incidence of the excise subsidy falls on consumers because the price paid by consumer decreased

Fig. 3.10

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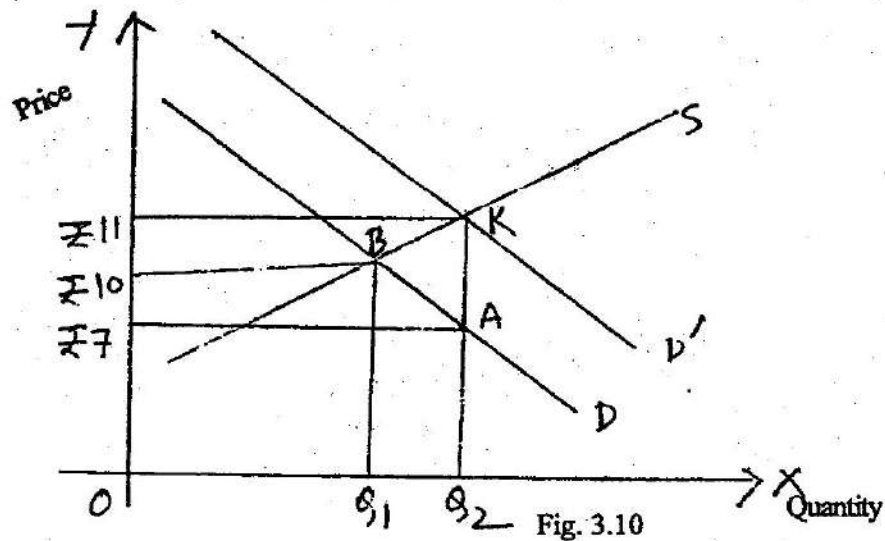
by the full amount of the per unit subsidy. Thus, consumers benefitted and sellers did not. Again sometimes, the benefits do not accrue entirely to consumers.

The figure shows the effects of an excise subsidy for a good produced by an increasing cost competitive industry. The supply curve is assumed to be upward sloping implying that per unit production costs rise as the total industry output expands. The subsidy is ₹ 4 per unit and is shown by the upward shift in the demand from D to D'. The final equilibrium occurs at K where D' and S intersect. The net price to consumers is ₹ 7, only ₹ 3 below the unsubsidised price. Part of the subsidy is received by sellers who new are paid ₹ 11 per unit, ₹ 1 more than before. The incedence, or benefit of the subsidy falls on both buyers and sellers.

The extent of benefit to the buyers and sellers depends on the relative elasticities of demand and supply curves. If the subsidy is gone to the seller, it is a case of super normal profits i.e. new entry into the industry affecting the supply curve. Net cost is BAK and amount to be over consumed is $Q_1 Q_2$.

3.6 Evaluation of public expenditure analysis :

Usually public expenditure is incurred in the form of projects. The amount of finance available is very scarce. So, we have to select the projects to be financed. Public projects are selected by the project appraisal of social cost-benefit analysis. On the other hand, private projects are selected by the project appraisal of private cost-benefit analysis.

The methodology involved in social cost – benefit analysis is–

Social profitability = Social benefit – Social cost.

Private profitability = Revenue – expenditure.

The social profitability is different from the private profitability as there are some spill over effects involved in social projects due to externality.

Measuring social prefitability :

Social profitability consists of– social benefit and social cost. Again, there are two components of social benefit and social cost.

1. Direct benefit and cost which is the real value of outputs and real cost of inputs.

2. Indirect benefit and cost which includes employment effects, distribution effects, allocative effects.

Discounting returns over time from public projects :

Present value of benefit over n years of time

$$PB = \frac{B_1}{1+r} + \frac{B_2}{(1+r)^2} + \frac{B_3}{(1+r)^3} + \ldots + \frac{B_n}{(1+r)^n}$$

Again, present value of cost over time is

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$$PC = I_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \ldots + \frac{C_n}{(1+r)^n}$$

where I_0 represents the initial cost and $C_1, C_2, C_3, \ldots C_n$ are the recurring costs.

So, net present value

$$= PB - PC$$

$$= -I_0 + \frac{(B-C)_1}{(1+r)} + \frac{(B-C)_2}{(1+r)^2} + \ldots + \frac{(B-C)_i}{(1+r)^i}$$

$$= -I_0 + \sum_{i=1}^{n} \frac{(B-C)_i}{(1+r)^i}$$

Hence, the net present value is the difference between the discounted sum of returns and the initial cost of the projects. The project will be viable only if NPV > 0 or NPV is positive.

Here, the commercial prefitability is

$$\frac{(R-C)_1}{(1+r)} + \frac{(R-C)_2}{(1+r)^2} + \frac{(R-C)_3}{(1+r)^3} + \ldots$$

where r is the market rate of interest.

Again, one can adopt internal rate of return instead of market rate of interest for the evaluation of public projects.

The internal rate of return is that rate of interest where net present value is equal to zero i.e. NPV = 0 and projects are viable when internal rate of return is greater than the market rate of interest.

3.7 Self-assessment questions :

1. Critically discuss Lindahl's model of voluntary exchange.

2. Explain Samuelson's Benefit theory.

3. Discuss allocative and distributive effects of public expenditure on non-marketed goods. How does production inefficiency arise in such types of goods.

4. Show the over consumption and under consumption cases of fixed quantity subsidy for marketed good.

5. Discuss the evaluation of public expenditure analysis.

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Unit 4
Public Revenue

Structure :

4.0 Introduction :

For public authorities, there are several sources of receipt of funds– revenue receipts and non-revenue receipts. Revenue receipts of public authorities include both tax revenue and non-tax revenue. Tax revenue refers to the funds raised by the government from taxes of all kinds. This unit deals with the various concepts relating to taxation. The principles guiding the determination of the amount of taxation for various sections of people are also discussed. It also discusses the shifting and incidence theory, specifically the neo-classical theory and price–output effect of shifting under different market and cost conditions and also about tax capitalisation and the concept of VAT.

4.1 Objectives :

After going through this unit, the reader will be able to—

1. gain the various concepts relating to taxation– tax ratio, buoyancy, elasticity etc.
2. have an idea about the principles of taxation– benefit principle, ability-to-pay and maximum welfare principle.
3. know about the tax incidence and shifting and price-output effect of shifting under different market and cost conditions.
4. get an idea about capitalisation of tax and value-added tax (VAT).

4.2 Concepts :

Tax Ratio :

The ratio of tax revenues to Gross National Product (GNP) is called the tax ratio. It is the percentage of GNP which comes to the public exchequer as tax revenue. The concept of tax ratio gives the idea about economic strength of the country, taxable capacity of the nation, level of living of the people and the extent of growth structure in tax-potentiality related sectors of the economy.

Buoyancy of Taxation :

The tax yield or tax revenue may increase due to different reasons. It may increase with an upward revision of tax rate or with an extension of the tax coverage or with the growth of the tax base. The concept of buoyancy of taxation is related to the growth of tax-base. Tax-base is that legally defined object on which tax is imposed. For instance in case of income tax, income is the base of tax with reference to which tax is paid. Similarly, for gift-tax and expenditure tax, amount of gift and amount of expenditure are the legally defined bases respectively. If the increase in the tax yield is due to the growth of the tax base rather than due to increase in the tax coverage or increase in the tax rates, the tax is buoyant. Income tax is said to be buoyant if the tax yield increases when the tax base i.e. income increases.

Buoyancy of taxation is given by

$$\frac{\text{relative increase in tax revenue}}{\text{relative increase in tax base}}$$

Symbolically, if is represented by

$$\frac{\frac{\Delta T}{T} \times 100}{\frac{\Delta T_B}{T_B} \times 100}$$

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Ilasticity of Taxation :

The yield of a tax may also go up on account of expansion of its coverage or a revision of its tax rates. Such a charactristis of a tax is called its elasticity. In other words, elasticity of a tax refers to its responsiveness to steps taken up by authorities in increasing its yield through an extension of its coverage or revision of its rates. So, elasticity of taxation is the ratio of proportionate change in the yield to proportionate change in the coverage or rate of taxation. For the total economy of a country, income elasticity of taxation will be the ratio of proportionate change in tax yield to proportionate change in national income, i.e.

$$E_T = \frac{\frac{\Delta T}{T}}{\frac{\Delta Y}{Y}}$$

where E_t = elasticity of taxation,

ΔT = incremental change in tax

T   = tax yield

ΔY = incremental change in national income

Y   = national income

This is known as income–elasticity of tax revenue. If $\frac{\frac{\Delta T}{T}}{\frac{\Delta Y}{Y}} = 1$ income elasticity of tax is unity,

if $\frac{\frac{\Delta T}{T}}{\frac{\Delta Y}{Y}} > 1$ taxation is income elastic and if $\frac{\frac{\Delta T}{T}}{\frac{\Delta Y}{Y}} < 1$ taxation is income inelastic.

Rate Schedules of Taxation :

There are mainly three rates schedules of taxation– (i) Progressive taxation, (ii) Regressive taxation and (iii) Proportional taxation.

(i) Progressive taxation :

Progressive taxation is that system of taxation under which tax liability increases more than in proportion to increase in tax base i.e. income. Under this system of taxation, tax payers of different income groups have to pay different tax rates, i.e. larger the income earned by a person, higher will be the tax rates for that person. A tax is progressive if the ratio of tax liability to tax base increases with the increase in tax base. For instance, a person having income of Rs. 10,000 pays 12 per cent of his income as tax while another person with income of Rs. 15,000 is required to pay 15 per cent of his income as tax increase in tax rate PP_1 is larger than provisions increase in tax rate i.e. QQ_r.

Similarly, LL_1 is larger than MM_1 which is again larger than PP_1. Each unit increase in tax base leads to larger and larger rates of tax and hence, marginal tax rate curve lies above the average or progressive tax rate curve.

(ii) Regressive taxation :

Regressive taxation is the reverse of progressive taxation. Regressive taxation is that system of taxation under which the ratio of tax liability to tax base falls when the tax base increases. Like progressive taxation, tax payers of different income groups have to pay different rates of taxation but here larger the tax base i.e. income, lesser will be the tax rate. For example, if a person with income of Rs. 10,000 pays 12 percent of his income as tax, then this system of taxation requires that a person with income of Rs. 15,000 has to pay lesser than 12 percent and so on.

In case of progressive taxation, since the ratio of tax liability to tax base increases with increase in the tax base, the marginal tax rate will be more than the average tax rate as shown in the following diagram—
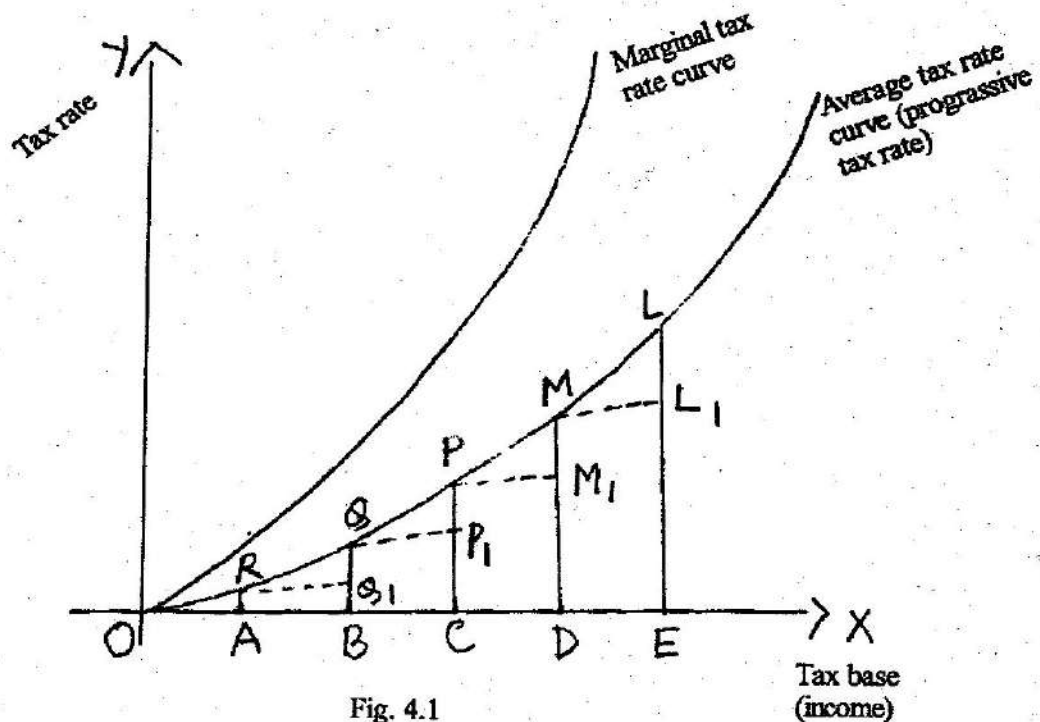

Fig. 4.1

The programme tax rate curve is upward rising and concave to OY axis. As the tax base (income) increases from OA to OB, progressive tax rate increases from AR to BQ which is larger by Q_1Q. Similarly, when income increases to OC, tax rate increases to CP so that the of his income as tax rate. In case of regressive taxation, marginal tax rate is less than the average tax rate.

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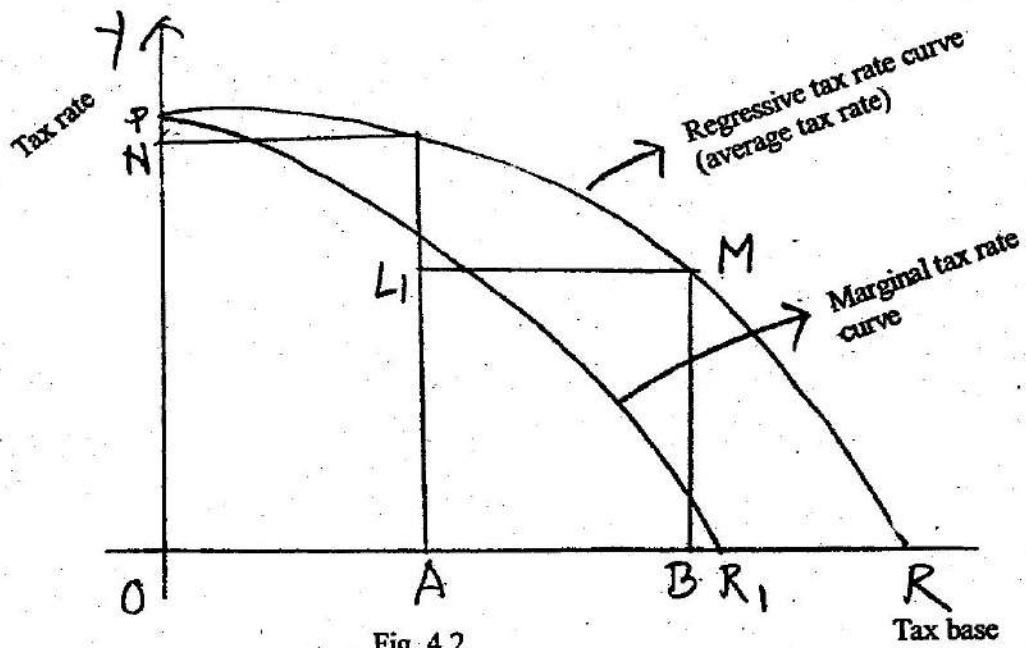
Fig. 4.2

When the tax base increases from OA to OB, the average tax rate (the regressive tax rate) is reduced from AL to BM. PR is the average tax rate and PR$_1$ is the marginal tax rate curve which lies below the average or regressive tax rate curve.

(iii) Proportional taxation :

Proportional taxation is that system of taxation under which each tax payer pays the same rate of tax whatever is his income. It means that the ratio of tax liability to tax base remains the same whatever the change in tax base. For instance, if the proportional tax rate is 10 percent, the individuals having incomes with ₹ 10,000, ₹ 20,000 and ₹ 30,000 will have to pay ₹ 1,000, ₹ 2,000 and ₹ 3,000 as their tax liability respectively. Since in case of proportional taxation, the ratio of tax liability to tax base remains constant, the average tax rate and marginal tax rate will be the same.

Fig. 4.3

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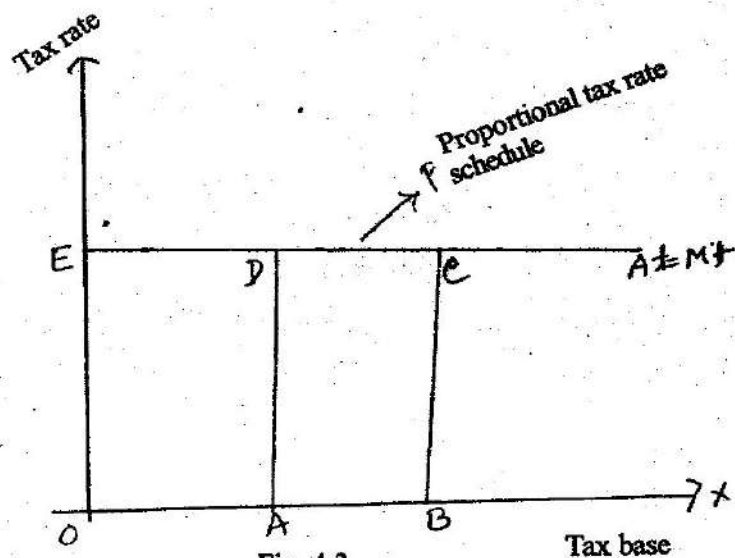In fig. 4.3, tax base is measured along OX axis and tax rate along OY axis. The proportional tax rate schedule is given by the horizontal straight line EC. The tax rate is fixed which is equal to OE. Even when the tax base increases from OA to OB, the tax rate remains the same at AD or BC since OE = AD = BC. Therefore, the proportional tax rate schedule is a horizontal straight line which is also the marginal tax rate schedule.

Tax Credit :

Tax credit is some specified amount to be subtracted directly from the amount of tax paid. Tax liability is directly reduced by the extent of tax credit. For example, in case of child-care credit, which is available to same employed tax payers who pay some one to care for their children while they work, their tax credit is equal to the allowable child care expenses. If for tax payers with adjusted gross income (AGI) above ₹ 28,000, the credit rate is 20 percent, it means that the amount of the credit is equal to 20 percent of allowable child-care expenses.

Exemption :

The Adjusted Gross Income (AGI) is found out by adding together all the items constituting income from taxable resources–including wages and salaries, interest, dividends and realized capital gains and then subtracting certain allowable business expenses incurred in earning income. Most of the tax payers think AGI as their total income but it is buyer than the comprehensive measure of income since it does not include the above exclusions. Some other adjustments are also made in determining taxable income, i.e. personal exemptions from AGI Tax payers are allowed a personal exemption for the tax payers, spouse and each dependent. The size of family is a consideration for exemption of tax. Since large family will bring down the standard of living of the members, a minimum exemption limit is allowed. The excess of aggregate production over the amount necessary to give a subsistence level of living to the people of the country. The total amount of production in the country is represented by national income. The whole national income can not be taken away by taxation. At least a minimum amount necessary for subsistence living has to be left for consumption of people. So, taxable capacity refers to the society's income above this minimum amount. Stamp also defines the concept of taxable capacity in another ways as the minimum possible contribution that the citizens can make towards the expenses of public authorities without having a really unhappy and down-trodden existence and without dislocating the economic organisation too much.

According to L.H. Kimmel, taxable capacity is the capacity to raise revenue without extreme interference with production activity and operation of the economy.

Prof. Shirras defines taxable capacity as the total surplus of production over the minimum

consumption required to produce that level of production, the standard of living remaining unchanged.

Taxable capacity is the tax paying capacity at various micro or macro levels. Taxable capacity may be related to an individual tax payer or a group of tax payers, an industry or a state or the economy as a whole. There are various factors determining the taxable capacity volume of national income, distribution of national income, size of population and per capita income, standard of living, saving, investment and economic growth.

Deduction :

In order to determine taxable income, one other adjustment is made : the tax payers either may itemize certain expenditures and deduct them from AGI or may subtract from AGI a fixed sum known as the standard deduction. Which alternative the tax payer chooses normally depends on which option provides the larger tax saving. In combination with exemptions, deductions are useful in remaining millions of low-income families from the tax rools. The most important allowable itemized deductions are interest paid on home mortgages and certain other loans, state and local income and property taxes, charitable contributions, some medical expenses etc.

Excess burden of tax and taxable capacity :

Increasing magnitude of state activities and of public expenditure means increase in the dimension of tax net and large collection of public receipts from other sources. Payment of tax involves a sacrifice on the part of tax payer. So, under the tax net larger will be the burden of tax on the society. If the tax burden is larger than what the society can bear, the country's economic set up will be adversely affected. Every nation or society has a limit in its capacity to bear tax which is known as 'taxable capacity'. It indicates the tax paying capacity of the whole nation. At the individual level, taxable capacity is the tax paying capacity of the individual tax payers.

Check your progress :

1. Distinguish between buoyancy of taxation and elasticity of taxation.

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2. What is proportional taxation ?

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3. In case of progressive taxation, the ratio of tax liability to tax base :

   (a) increase (b) decrease when tax base increases.

4. Distinguish between tax credit and exemption of tax.

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4.3 Principles of taxation :

4.3.1 The Benefit Principle :

The propounder of benefit principle was Adam Smith and the principle was reformulated by Erik Lindahl in his 'Voluntary Exchange Theory'. This principle views the tax as a price paid by the tax payers to the government for the benefits they received in the form of goods and services supplied by the government. There is 'quid pro que' relationship between the tax payers and the government so that a tax is paid against the benefit received from the government. Moreover, it is the price paid for the benefit received. The benefit principle of taxation states that if the benefit is larger, the liability of giving tax is also larger to the tax payers. Just like a price paid for a commodity by an individual represents the marginal utility of the commodity to him, the amount of tax paid by the person represents the measure of benefit received from social goods and services.

Cost of services and value of service :

The benefit principle of taxation is interpreted in two ways : 'Cost of service principle' and 'Value of service principle'. According to the cost of service principle, the contribution of tax payer should be equal to the cost of supplying public services that benefit him. This principle can be applied to certain areas of public services like posts and telegraphs, electricity, transport etc. In case of value of service principle, the incidence of tax should be in accordance with the worth of public services to the tax payer. This principle is applied to public services including police, defence, justice, public parks etc.

Earlier Views :

According to earlier views, tax was a price paid for protection. Maintenance of protection was to be financed and taxation was the way to it. According to the earlier writers, the greater protection means larger amount of tax. Since the wealthier people need more protection than a poorer one, the amount of tax should be larger for the former than the latter. This approach was basically followed by the contract theorists.

Again, the classical economists insisted upon the greatest happiness principle (Bentham). During the nine-tenth century, the principle was viewed as 'insurance-premium interpretation' so that taxes

are viewed as the premium paid for protection and should be limited to the people who desire protection. Mc. Culloh and Thiers were the main advocates of this view. Again, towards the end of nineteenth century, optimum level of public expenditure and corresponding distribution of tax burden were determined by this principle. It follows the rule of the market that is the equality between price and marginal utility.

Modern views :

Erik Lindahl, in his voluntary exchange approach reformulated the Benefit principle in 1919. According to him, just like people pay voluntarily for any commodity purchased from private market, tax is also a voluntary contribution by them which covers the cost of supplying the public services. This theory simultaneously determines the amount of public services to be supplied by the government and the distribution of tax burden among various tax payers to meet the cost of supplying these public services.

To illustrate Lindahl's model, let's suppose that there are two individuals 'A' and 'B' and a social good in the society. Since each of A and B consumes the total amount of social good supplied but racemes different amounts of satisfaction from it, their benefit shares may be considered as joint products. So, the cost of supplying social good is a joint cost. If A contributes X percent of the total joint cost, B will have to contribute (1 – x) percent of the total joint cost. The joint qutribution of both A and B covers total cost of supplying the social good. Therefore, A's offer to contribute certain percentage of total cost may be considered as the supply schedule of social goods for individual B and vice-versa.

Diagrammatic Representation :

The quantity of social goods is represented on the horizontal axis and the percentage of total freely available to B. At output level OG, A is willing to contribute GS per cent of total cost. So the good is available to B on bearing of RS per cent of cost. But B is willing to contribute RT per cent of total cost. It implies that the total contribution of both A and B will exceed the cost of supplying social good by ST per cent. This is an indication for larger preference of social goods. The optimum level of social goods is given by OE at which A's contribution EQ per cent and B's contribution PQ per cent of cost jointly equal to the total cost of supplying those amount of social good. Again, if output level is OK which is greater than OE, A is willing to contribute KL per cent but B is willing to contribute only NM per cent so that ML per cent of the total cost will remain uncovered.

Therefore, neither more than nor less than OE will be produced and cost contributed by A on the left vertical axis and percentage of total cost contributed by B on right vertical axis. The total unit cost of supplying social goods is OV. The curve aa is the demand schedule of individual A and
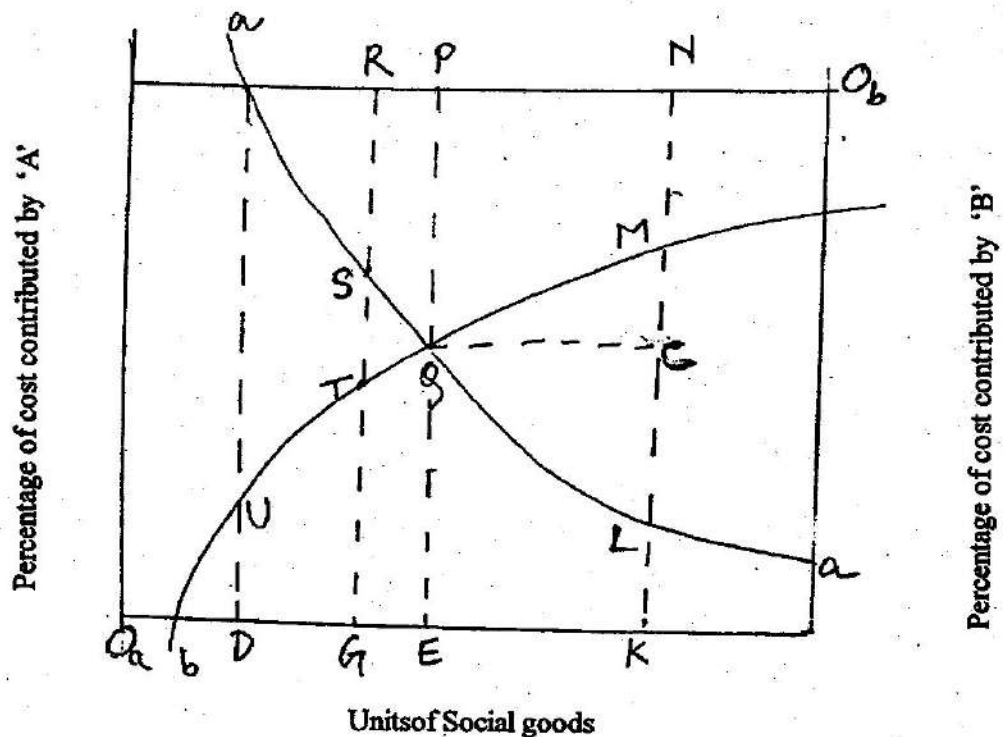
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Fig. 4.4

bb is the demand schedule of individual B. The demand schedule of A is considered as the supply schedule of B and vice-versa. For output level OD, A is willing to contribute 100 percent of total cost so that the good is OE is the optimum level of output of social good.

Critical Evaluation :

The benefit principle of taxation has certain limitations :

1. A subjective thing like benefit cannot be directly measured. The amount of benefit depends upon many psychological factors which can not be given a quantitative treatment.

2. Since tax is universally recognised as a compulsory contribution without any reference to benefit received from the government, it should not be used as a relationship between the tax payer and government in terms of commercial transaction of exchange or in terms of quid-pro-quo.

3. The theory wrongly assumes that the amount of benefit to an individual can be assessed independently of the amount of benefit to other individuals. Some times, the benefit from a public service depends upon the benefit shares of other individuals.

4. The benefit principle takes into account only the direct benefits of public services and ignores the indirect or external benefits. Hence, it under-estimates the amount of benefit received and the tax obligation.

5. Although voluntary exchange approach by Erik Lindahl is the most refined statement of the principle, it also suffers from various limitations. The theory is over-simplified by assuming two individuals and one type of public good. The assumption that an individual will reveal has true demand schedule for public good is highly unrealistic. In case of public good, understatement of preference is more common.

Despite the above shortcomings, economic justification of tax is the most important merit of benefit principle. When tax is imposed on an individual against the benefit received through the supply of public services, it secures economic justice.

4.3.2 The ability-to-pay principle :

Bordin presented a case for proportional taxation during 16th century emphasising that tax share should be distributed according to faculty or ability to pay. The theory is restated and modified by same other economists like Rousseau, J.B. Say, Wagner, Roosvelt, Pigou and Dalton.

There are three forms of ability-to-pay approach–
(i) Equity view of taxation.
(ii) Welfare view of taxation and
(iii) Welfare view of tax-expenditure programme.

The equity view of taxation requires that the distribution of tax should be according to the principle of equity or equality of sacrifice as called by J.S. Mill. The welfare view of taxation shifts emphasis from equity to welfare and would require that the distribution of tax burden should be such that it leads to least aggregate sacrifice to secure maximum possible aggregate welfare. The third view takes into account both the tax and expenditure sides of budget determination. It tries to achieve maximum aggregate welfare through the distribution of both tax shares and public outlays.

Equal Sacrifice and Ability-to-pay :

Payment of tax involves sacrifice on the part of the tax payer. Since this sacrifice is the real burden of taxation, it should be equal for each tax payer. According to Cohen-Stuart and Edgeworth, there are three concepts of equal sacrifice– (i) equal absolute sacrifice, (ii) equal proportional sacrifice and (iii) equal marginal sacrifice.

(i) Equal absolute sacrifice (EAS) :

Equal absolute sacrifice requires that the absolute amount of real burden due to payment of tax should be equal for every tax payer. The real burden or sacrifice involved in tax payment is the loss of utility due to money surrendered in tax. So, the loss of income utility due to payment of tax should be equal for every tax payer. Suppose, the community is consists of two individuals, A and B. Then the equal absolute sacrifice principle requires that

$$\{U(Y) - U(Y - T)\}_A = \{U(Y) - U(Y - T)\}_B$$
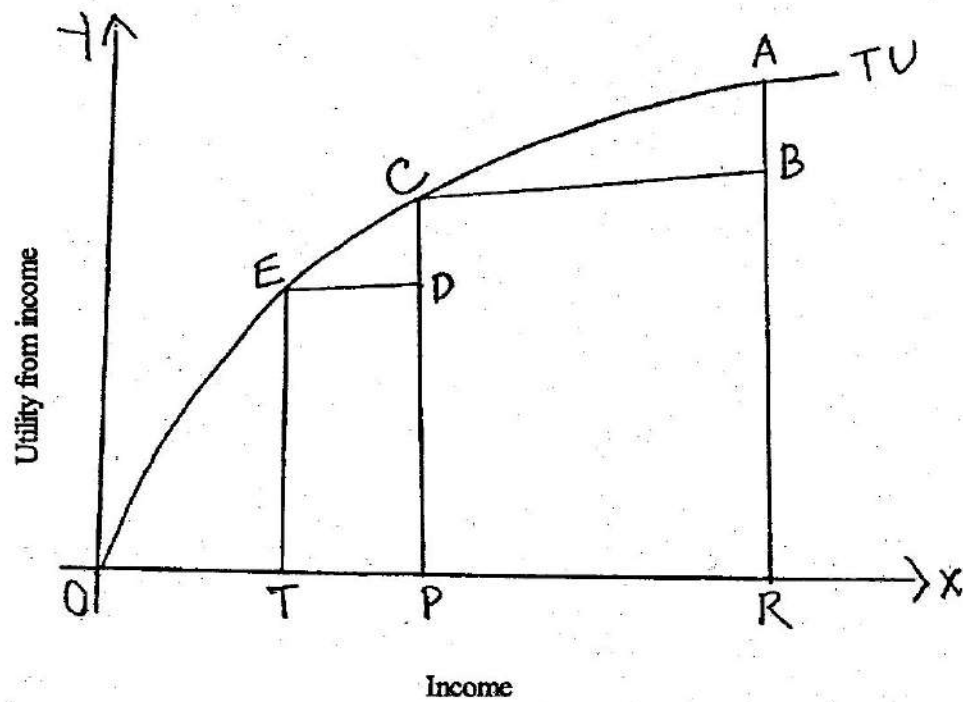
Income

Fig. 4.5

In the diagram, the incomes of the individuals A and B are represented on the horizontal axis and income utility on the vertical axis. The income of the richer person, A is OR and that of poorer person, B is OP. TU is the total utility curve and the total amount of tax is RT. The utility of income before payment of tax is RA for person A and it will be PC for person B. Again, the utility of income after payment of tax is PC and TE for persons A and B respectively. So, EAS principle requires A to pay RP amount and B to pay PT amount of tax. The absolute amount of sacrifice i.e. the loss in income utility is AB for A and CD for B. But AB = CD and the absolute amount of sacrifice due to payment of tax is equal for both tax payers.

(ii) Equal Proportional Sacrifice (EPS) :

In case of equal proportional sacrifice, the total loss of utility due to payment of tax as percentage of the utility of increase before tax must be equal for every tax payer. It means that the ratio of loss of utility due to tax payment to utility of income before tax should be equal for all tax payers. For two individuals A and B, EPS rule requires that

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$$\left\{\frac{U(Y)-U(Y-T)}{U(Y)}\right\}_A = \left\{\frac{U(Y)-U(Y-T)}{U(Y)}\right\}_B$$
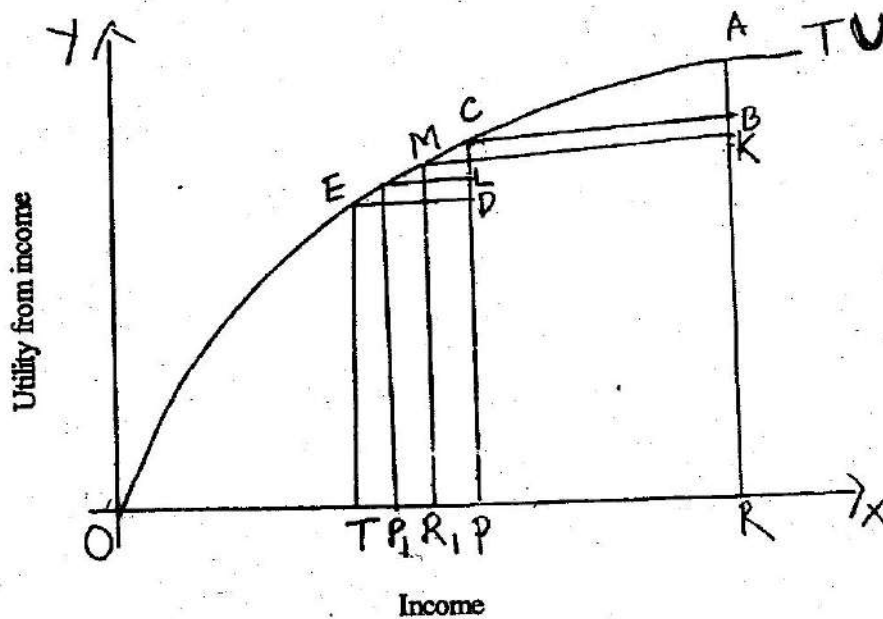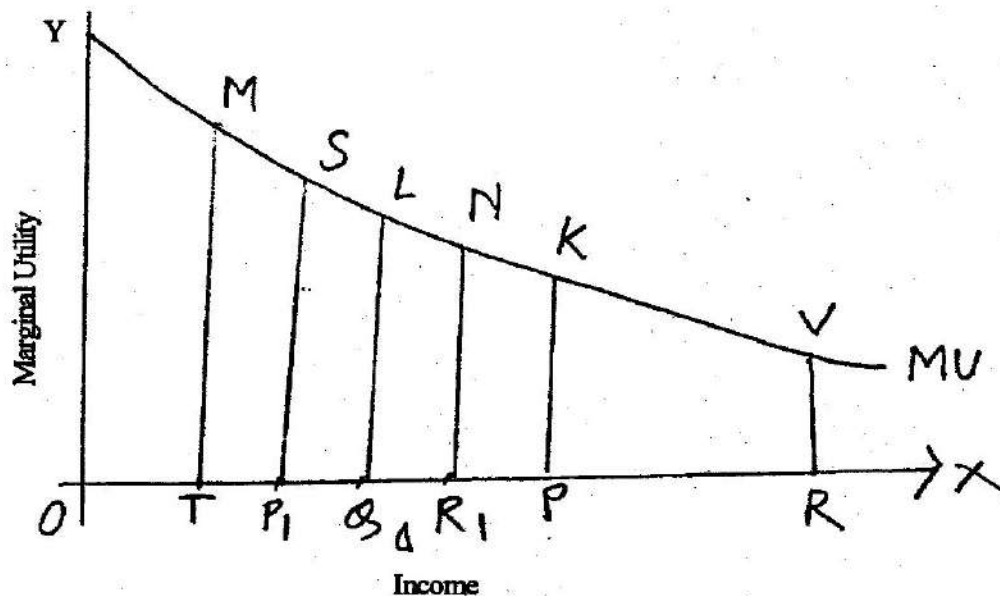

Income

Fig. 4.6

The EPS rule requires individual A to pay RR_1 and B to pay PP_1 amount of tax so that the ratios $\frac{AK}{AR}$ and $\frac{CL}{CP}$ are equal and $RR_1 + PP_1 = RT$ which is the total amount of tax to be collected. In case of EPS rule, the richer person pays larger amount of tax while the poorer person pays smaller amount of tax as compared to equal absolute sacrifice rule.

(iii) Equal Marginal Sacrifice (EMS) :

Equal marginal sacrifice rule requires that the marginal sacrifice due to payment of tax should be equal for each tax payer. It states that it is because the marginal utility of larger increase is lesser than that of smaller incomes the richer people having larger incomes should pay higher taxes than their poorer counter part with smaller income so that the loss in marginal utility after tax payment is equal for both. For two individuals A and B, EMS rule requires that

$$\{MU(Y-T)\}_A = \{MU(Y-T)\}_B$$

or, $\left\{\dfrac{dU(Y-T)}{d(Y-T)}\right\}_A = \left\{\dfrac{dU(Y-T)}{d(Y-T)}\right\}_B$

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Fig. 4.7

In the diagram, income is represented on the horizontal axis and marginal utility on the vertical axis. MU is the marginal utility schedule of individuals A and B whose incovers are OR and OP respectively. If the total amount of tax is RP, the entire tax burden will fall on A because RP is the excess of A's income over B's income. If higher than RP, say RT amount of tax to be raised, A and B should have to pay RQ and PQ amounts (PQ = TQ) of tax so that they will be left with OQ amount of income and QL marginal utility after payment of tax. The equal marginal sacrifice principle is also called the least aggregate sacrifice principle.

Ability to pay and Tax Rate Schedules :

The determining factor whether a particular equal sacrifice rule follows regressive, progressive or proportional tax rate schedule is the shape of total utility curve that is the rate at which marginal utility of increase decreases along with increase in income.

If the community is assumed to be consist of two individuals, A and B, let's take the case of equal absolute sacrifice rule first. Moreover, we take the total utility curve to be linear which means that marginal income utility is constant.

If RT amount of tax to be raised, A will have to pay RP and B will have to pay PT so that absolute sacrifice of utility of A i.e. AB and of B i.e. CD are equal and RT amount of tax is collected (RP + PT = RT). Of the two triangles, ECD and CAB, AB = CD, $\angle$CDE = $\angle$ABC, $\angle$DEC = $\angle$BCA and $\angle$ECD = $\angle$CAB. So, these two triangles are equal and CB = ED i.e. RP = PT. It implies that both A and B will pay the same amount of tax although their income levels are not same. Therefore, the tax is regressive.

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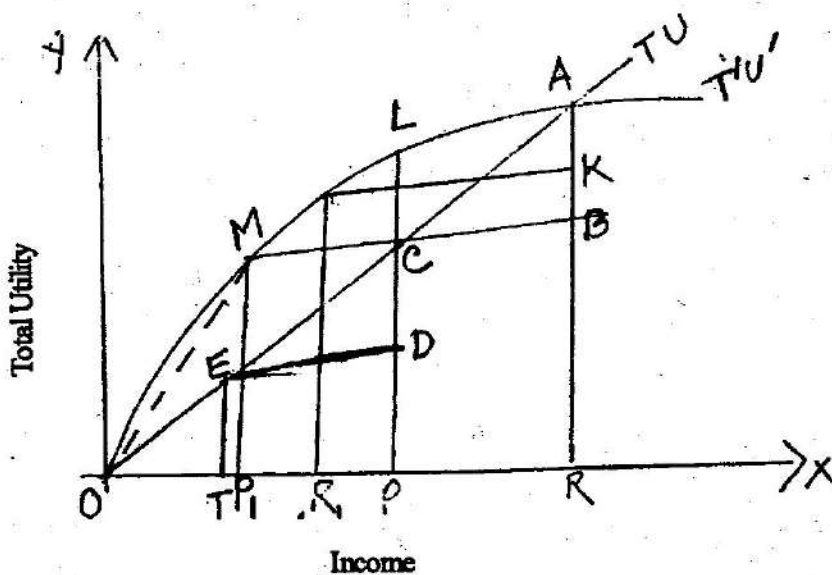
Income

Fig. 4.8

If the assumption of constant marginal income utility is removed and we assume that the marginal utility of income decreases with increase in income, the total utility will shift to T'U'. Under this concave shape of total utility curve, the richer person A will have to pay larger amount of tax RR_1 than the poorer person B which pays PP_1 amount of tax with the absolute sacrifice of utility due to tax payment will be equal (AK = LC) for both. So, as the assumption of constant marginal income utility is removed and TU curve is no more linear, the richer person pays larger tax than that of the poorer person leading to progressive taxation. It follows that greater concavity of TU curve or the steeper rate of fall are marginal income utility implies higher tax liability of the richer person and smaller tax liability of the poorer person. So, we find all the three tax rate schedules to be associated with equal absolute sacrifice rule as regressivity turns to proportionality and then to progressivity as with the degree of concavity of TU curve. We can conclude that equal absolute sacrifice rule follows–

(i) Proportional taxation if the rate of fall in marginal income utility is equal to the rate of increase in income.

(ii) Progressive taxation if the rate of fall in marginal income utility is steeper than the rate of rise in income and

(iii) regressive taxation if the rate of fall in marginal income utility is lesser than the rate of rise in income.

In case of proportional sacrifice rule, the slopes of total utility and average utility curves determine what tax rate schedules are to be followed by it. The slopes of average utility of income

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are given by the lines drawn between the point of origin and different points on total utility curve. It is clear in the above diagram that the slope of average utility declines from OM to OA as income increases from OP_1 to OR with total utility curve T'U'. So, EPS rule follows–

(i) Proportional tax rate schedule if the rate of fall in marginal income utility is equal to the rate of fall an average income utility.

(ii) progressive taxation if the rate of fall in marginal income utility is higher than the rate of fall in average income utility and

(iii) regressive taxation if the former rate of fall is lesser than the latter rate of fall.

Therefore, in case of equal absolute sacrifice and equal proportional sacrifice rule, the declinering marginal income utility is a necessary condition but not the sufficient condition. For sufficient condition to be satisfied, it should be compared with other relevant rate to decide what tax rate schedule to be followed by it.

However, in case of equal marginal sacrifice rule, the declining marginal income utility is the factor determining the tax rate schedule to be followed by it. Declining marginal income utility requires the richer person to pay higher tax while the poorer person to pay smaller tax and calls for a progressive taxation. But, if marginal income utility is constant then under equal marginal sacrifice rule, the higher people will be free from tax liability on the other hand, the poorer people are taxed only.

If the marginal income utility is constant and the marginal utility curve is a horizontal straight line like MU, equal marginal sacrifice rule will follow all the three tax rate schedules because whatever amount of tax is collected from A and B, their post-tax marginal income utility will be the same.
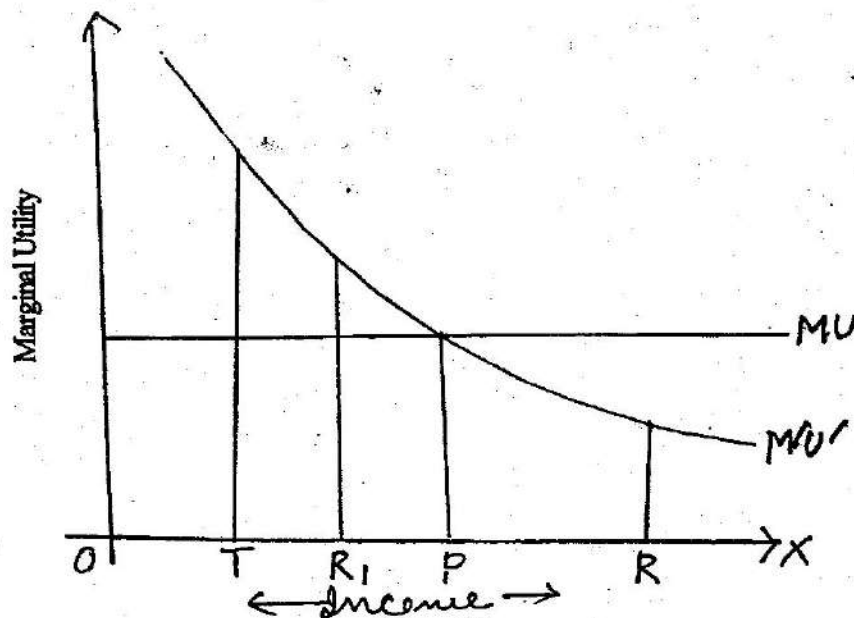

Fig. 4.9

In the diagram, income is represented on the horizontal axis and marginal income utility on the vertical axis. If marginal utility of income is falling with $M'U'$ curve and RP amount of tax to be raised, A will have to pay RP amount of tax while B need not pay anything so that post-tax incomes remain equal for both (OP). But, if TR tax to be raised, A will have to pay RR_1 while B pays $PR_1 = TR_1$ so that their post-tax incomes are equal (OR_1) implying progressive tax rate schedule.

Demerits of Ability-to-Pay Principle :

Ability-to-pay theory of taxation possesses the merit that the citizens are taxed in accordance with their ability-to-pay and hence satisfies the criterion of good taxation. Again, it also satisfies the ideals of horizontal and vertical equity. Despite its various merits, it has also certain drawbacks which are as follows :

(1) The equal sacrifice principle is based on the assumption that utility from income is cardinally measurable, which is unrealistic.

(2) The theory has three interpretations, of equal sacrifice, equal absolute sacrifice, equal proportional sacrifice and equal marginal sacrifice, each of which has a different measure of equal sacrifice of utility due to taxation but which of the three equity rules to be followed can not be decided.

(3) Equal sacrifice principle is based on the unrealistic assumption that marginal utility of income decrease with every increase in income.

(4) Since people are different physically, mentally or emotionally, it is not accurate to take a common utility curve for every one.

4.3.3 Maximum Welfare Principle of Budget Determination :

The maximum welfare principle of budget determination requires application of two rules—

(i) the principle of equimarginal returns whereby individuals maximise satisfaction by spending income on different goods in such a way that marginal utility from each type of expenditure is equal and

(ii) the principle of equality between marginal social sacrifice and marginal social benefit.

The maximum welfare principle of budget determination is illustrated in the above figure. The size of budget i.e. the amount of tax resources or public expenditure is measured on horizontal axis and marginal social benefit from public expenditure and marginal social sacrifice from taxation is measured on vertical axis. Marginal social benefit from successive units of public expenditure is shown by EE_1. This is a falling curve indicating that the additional utility from public expenditure goes on falling as larger amounts of money are spent. The curve TT_1 measures the marginal social sacrifice from taxation. As in the case of public expenditure, marginal utility from private expenditure also declines with successive increments of outlay. As tax payments should be viewed as private outlays,

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Fig. 4.10

marginal social sacrifice curve (TT₁) also will decline below the horizontal axis. When the amount of public expenditure is OC, marginal social benefit equals CA and marginal social sacrifice equals CD so that the net benefit equals to CB. The line NN_1 is obtained by deducting TT_1 from EE_1 and measures the marginal net benefits derived from additional units of budgetary outlays. So, at OL size of budget, marginal social benefit is equal to marginal social sacrifice (KL = LM) so that the marginal net benefit amounts to zero since there is no vertical distance between Ox and NN_1. Therefore, OL optimum size of the budget is determined so that at that point net social benefit is maximum.

Maximum welfare principle of budget determination specifies optimum budget at a point where marginal social benefit equals marginal social sacrifice and therefore, the net social benefit is maximum.

Criticism :

The maximum welfare principle of budget determination suffers from the limitation that there is no scientific way of measuring either marginal social benefit or marginal social sacrifice as represented by EE_1 and TT_1. Again, the assumption of interpersonal utility comparison in framing these graph schedules remains a fundamental weakness in the principle.

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Check Your Progress :

1. Distinguish between the cost of service and the value of service principle.

....

....

2. Define equal absolute sacrifice.

....

....

3. Which sacrifice principle is called the 'least aggregate sacrifice' principle?

....

....

4.4 The Neo-classical theory of tax incidence and shifting :

Tax incidence and shifting depends on various factors such as, elasticity of demand and supply of the product taxed, the cost conditions and market conditions of the taxed commodity.

### Shifting under situations of demand elasticity :

With given elasticity of supply, shifting of tax through price changes will be different under different situations of demand elasticity.

Fig. 4.11   Fig. 4.12
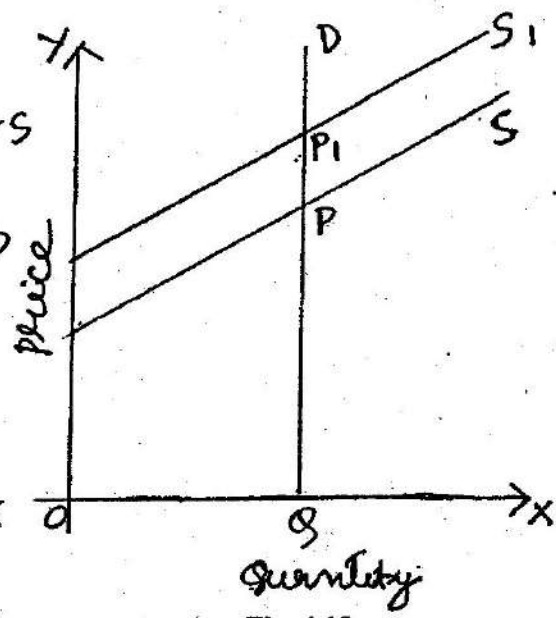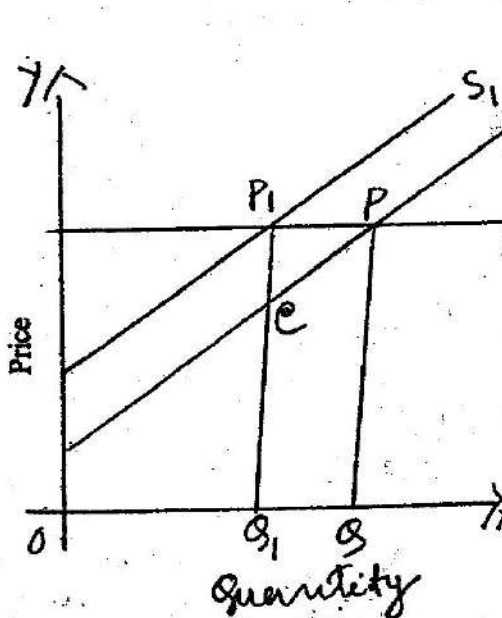
The seller of the product will fail to shift the tax if the price of the product can't be at all increased i.e. when the demand for the product is perfectly elastic. Again, he will be able to shift the whole amount of tax to the buyer when the product is perfectly inelastic.

In above figures, the quantity of the commodity taxed is measured along horizontal axis and price is measured along vertical axis. D and s are the demand and supply curves respectively. Before imposition of tax, the equilibrium quantity of demand is OQ at price PQ. With imposition of tax, the supply curve will shift to S_1. In the first figure, the demand curve being perfectly elastic, when supply curve shifts to S_1 with imposition of tax, the post-tax equilibrium price P_1Q_1 is the same as before pre-tax price but output reduces from OQ to OQ_1. The buyer pays P_1Q_1 but the seller will get only Q_1C since CP_1 amount has to be paid as tax to the government. Again in the second figure, the demand curve being perfectly inelastic, with imposition of tax output does not reduces at all while price increases. The post-tax equilibrium price is P_1Q which rises by the full amount of tax PP_1. The tax is completely shifted to the buyer and so the incidence is fully on the buyer.

Between these two extremes i.e. perfectly elastic and perfectly inelastic demand, the incidence is shared between the seller and the buyer. D is more elastic demand curve than D_1. The pre-tax and post-tax supply curves are S and S_1 in the figure. When demand is more elastic as shown by

Quantity
Fig. 4.13

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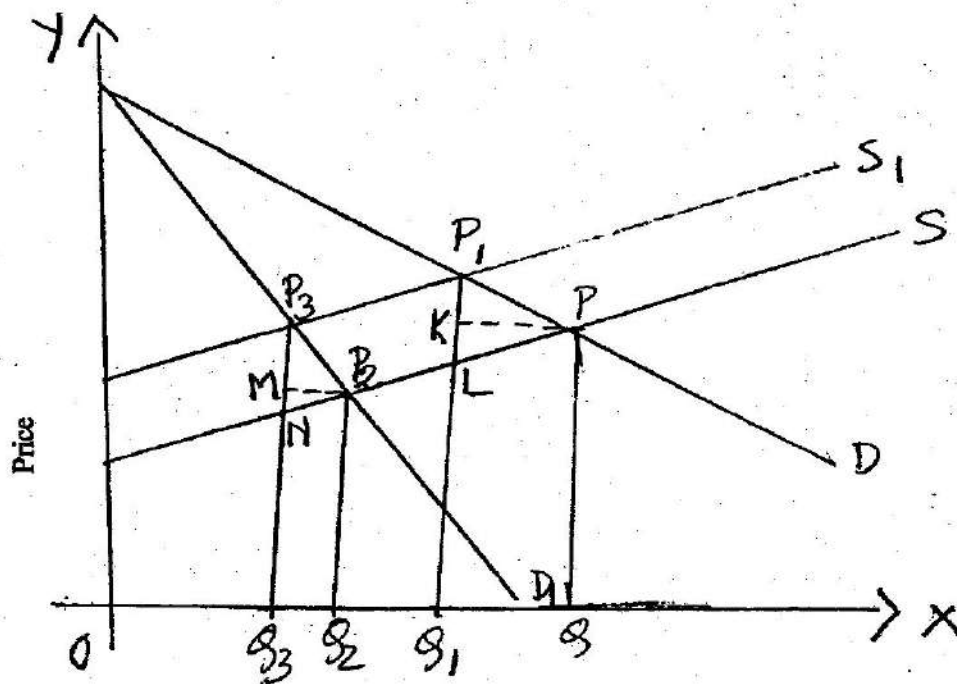
demand curve D, the price is increased by P_1K when P_1L amount of tax per unit is imposed. Only P_1K portion of tax is shifted to the buyer but remaining KL portion will be borne by the seller. That is, larger the elasticity of demand curve, larger will be the incidence on the seller and smaller on the buyer.

In case of less elastic demand shown by D_1, price increases by a much larger amount P_3M. Out of the total amount of tax imposed P_3N, the remaining portion MN should be borne by the seller. So, larger part of the incidence is on buyer and smaller part on seller when demand is less elastic.

Shifting under situations of supply elasticity :

Given a demand elasticity, the supply of a commodity may be perfectly elastic or inelastic or may have different degrees of elasticities between these two extreme cases. In figure, with given demand curve, the pre-tax and the post-tax supply curves are S and S_1 respectively. The imposition of tax P_1M per unit of the commodity reduces the supply from OQ to OQ_1 and raises the price from QP to Q_1P_1. That is price is increased by the full amount of tax and tax is fully shifted to the consumer.
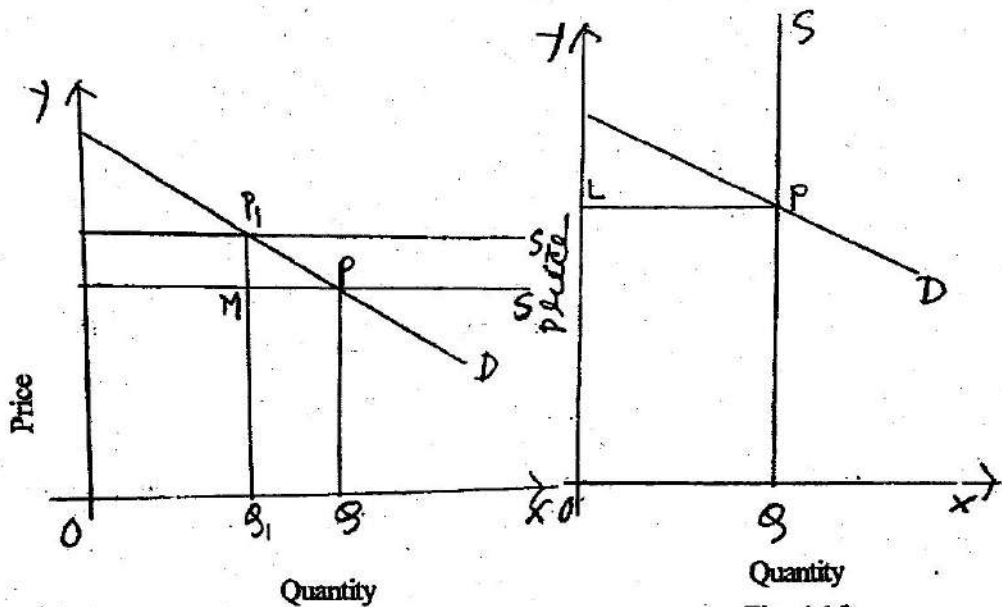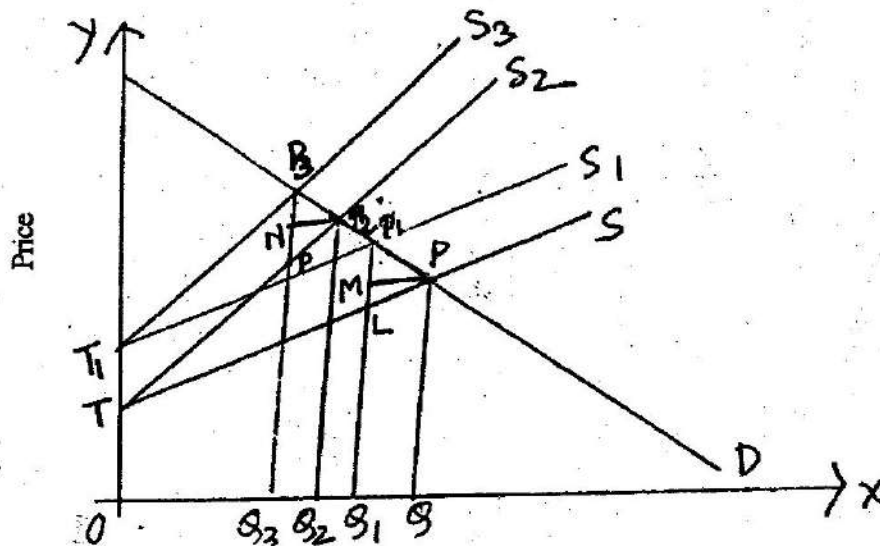

Quantity
Fig. 4.14

Quantity
Fig. 4.15

But when the supply is perfectly inelastic as shown in the figure, the imposition of tax can affect neither price nor the quantity. The price will remain QP and quantity OQ as before pre-tax situation and the tax will have to be absorbed by the seller. That is, the incidence of tax will be borne by the buyer when supply is perfectly elastic and the seller bears the incidence fully when supply is perfectly inelastic.

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Between these two extreme cases, the incidence will be shared between the buyer and the seller. More elastic supply curve is TS and less elastic supply curve is TS_2. With supply curve TX, when tax TT_1 per unit of the commodity is imposed, the new supply schedule will be T_1S_1 so that price rises to P_1M. So, larger part of the tax is borne by the buyer and the lesser part by the seller.
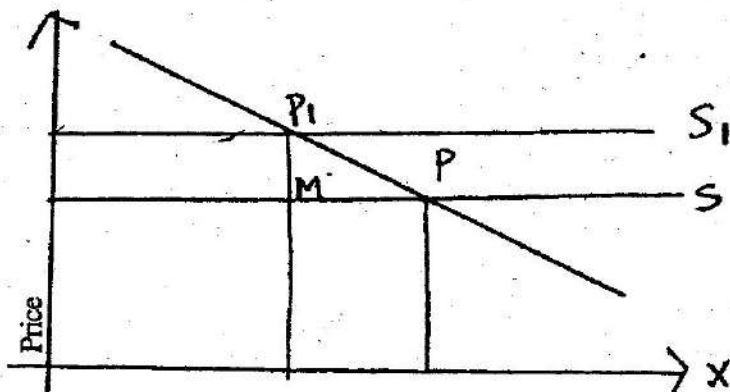

Quantity
Fig. 4.16

Again, when the supply curve is TS_2 which is less elastic, with imposition of tax TT_1 per unit of the commodity, the supply curve will shift to T_1S_3. Price rises to P_3N which is less than P_1M. So, P_3N amount is shifted to buyer and NP amount is shifted to seller. So, larger the elasticity of supply, larger will be the tax incidence on the buyer and smaller on the seller and vice-versa.

4.5 Price-output effect of tax shifting under different cost conditions :

A commodity is produced under constant cost or increasing cost or decreasing cost. If the commodity is produced under constant cost, the incidence will have to be borne fully by the buyer. The

Quantity   Fig. 4.17

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supply curve will then be a horizontal straight line as shown by S in the above figure. The tax per unit of commodity which is P_1M raises the supply curve to S_1 and reduces the supply from OQ to OQ_1. The price is increased by P_1M so that the tax is fully shifted to the buyer.

If the commodity is produced under increasing cost conditions, the tax will be partially shifted to the buyer. The tax TT_1 per unit of the commodity raises the price by P_1M while the rest, MN
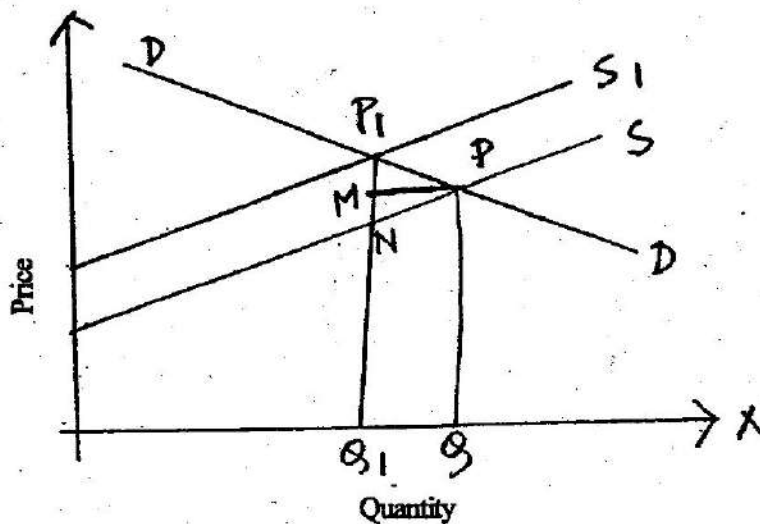

Fig. 4.18

is borne by the seller. Therefore, incidence of tax is shared between the buyer and the seller depending upon the elasticity of demand and supply curves.

When a commodity is produced under decreasing cost conditions, with imposition of TT_1 per unit of tax, the supply curve shifts from S to S_1. It decreases the output from OQ to OQ_1 and raises
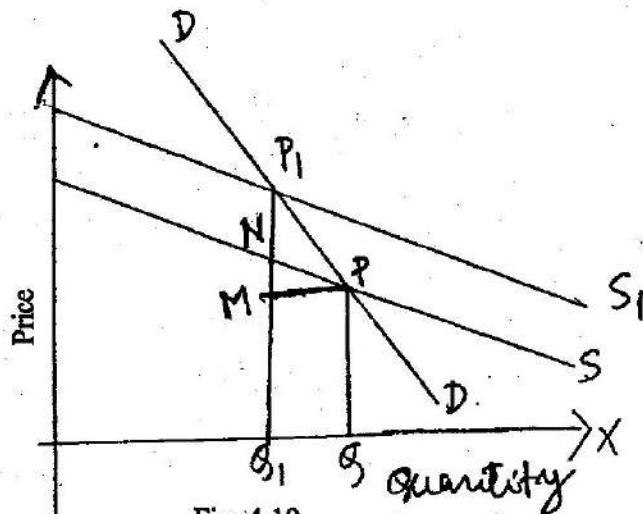

Fig. 4.19

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the price by P_1M. It means that the price rises by more than the tax indicating that the buyer not only bears the whole amount of tax but also pays a still higher price which is higher than the amount of tax by NM.

4.6 Price-output effect of tax shifting under different market situations :

Under perfect competition an individual seller cannot influence the price in the short period. So, the tax can not be shifted to the buyer and incidence of tax will be on the seller. But in the long run, supply will be more elastic. Hence, it will be possible for the firm to shift the tax partially to the buyers.

NKC is the total cost curve, OMR is the total revenue curve, ON is fixed cost and PN is the lump-sum tax which raiss the total cost curve to PLC_1. The optimum output will remain OQ because even after paying lump sum tax KL, the profit remains at ML which is the largest possible profit margin to the monopolist. But in case of other than a lump sum tax, some shifting will take place under monopoly through increase in the price depending upon the elasticity of demand and supply curves.

In case of oligopoly, when the price is set by one firm acting as the price leader, the tax on commodity is likely to be directly shifted to the consumer. Again if oligopoly price becomes rigid as explained by kinky demand curve which is very inelastic for fall in prices but highly elastic for rise in prices as shown in the following diagram at point K.

A monopolist can raise or lower the price through the control of supply considering the profit margin. Likewise, whenever a tax is imposed on the monopolist's product, he can decide whether the shifting of tax is better or absorption is better. If the tax is a lump sum tax on the profit of the monopolist, there will be no contraction in output or change in the price and incidence of tax will be fully borne by the monopolist seller.
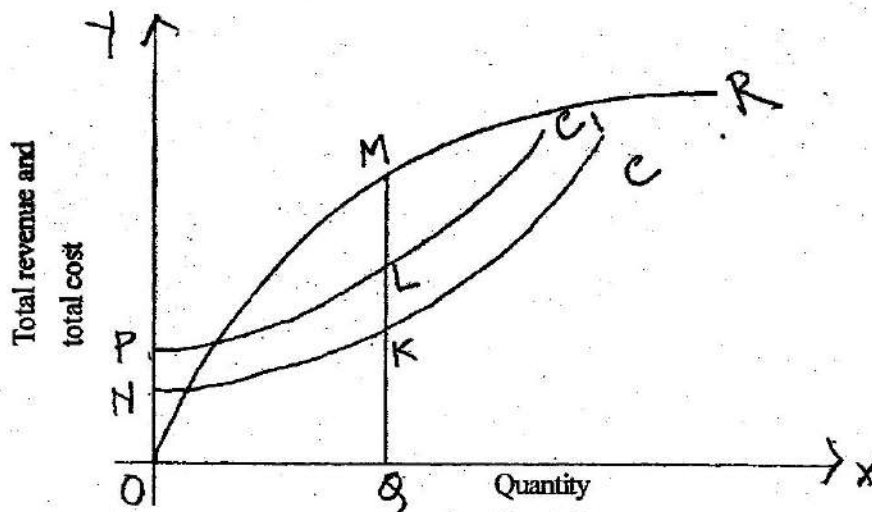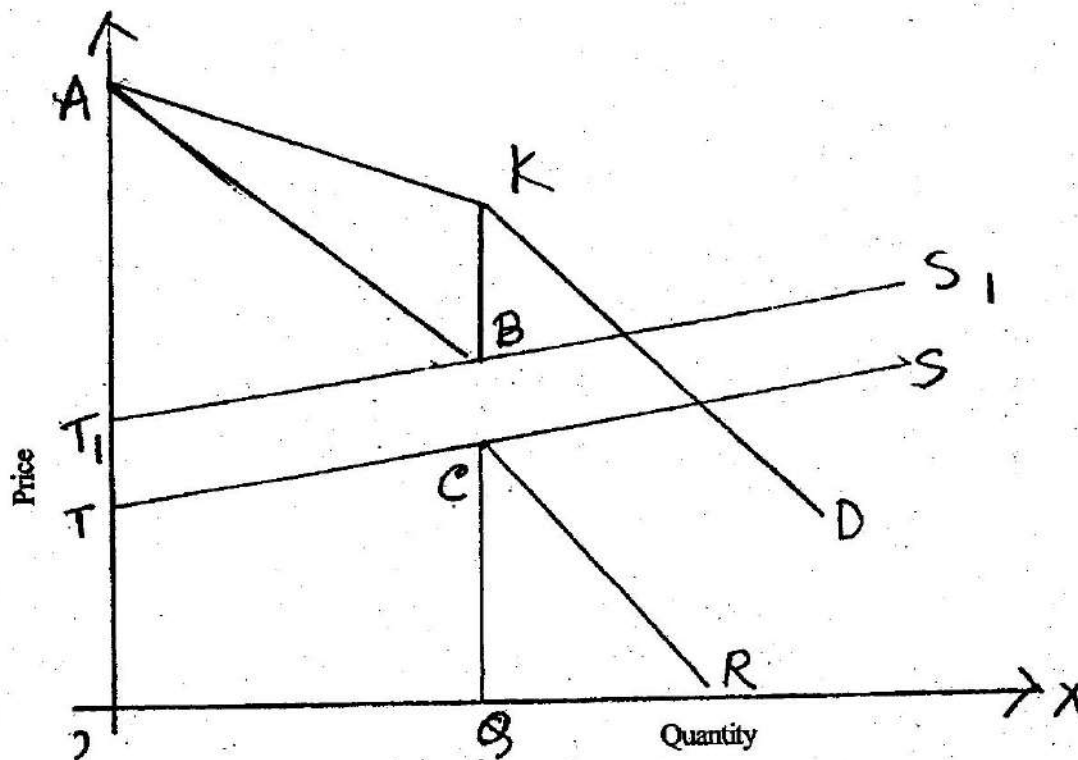

Fig. 4.20

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Fig. 4.21

If a firm raises the price beyond K, other firms will not follow. But if it towers the price below K, other firms will follow the action. So, KD portion of demand curve is inelastic. Because of the rink, there is a discontinuous portion BC in the marginal revenue curve ABCR. Between the points B and C, marginal cost will not result in a change in price. So, a tax per unit TT_1 will raise the marginal cost curve from S to S_1 which also passes through the discontinuous portion. So, there will be not possible to raise the price and incidence will be fully borne by the seller.

4.7 Musgrave's Budget Incidence Theory :

According to modern concept of incidence, there is no difference between incidence and other effects of a change in the budgetary system comprising both tax and public expenditure. The modern concepts has made an attempt to study by incidence the overall effect on the distribution of income as a result of change in tax and public expenditure. According to Musgrave, 'incidence refers to distributional changes resulting from adjustments in both tax and expenditure policy. He made a distinction between specific expenditure incidence and differential expenditure incidence.
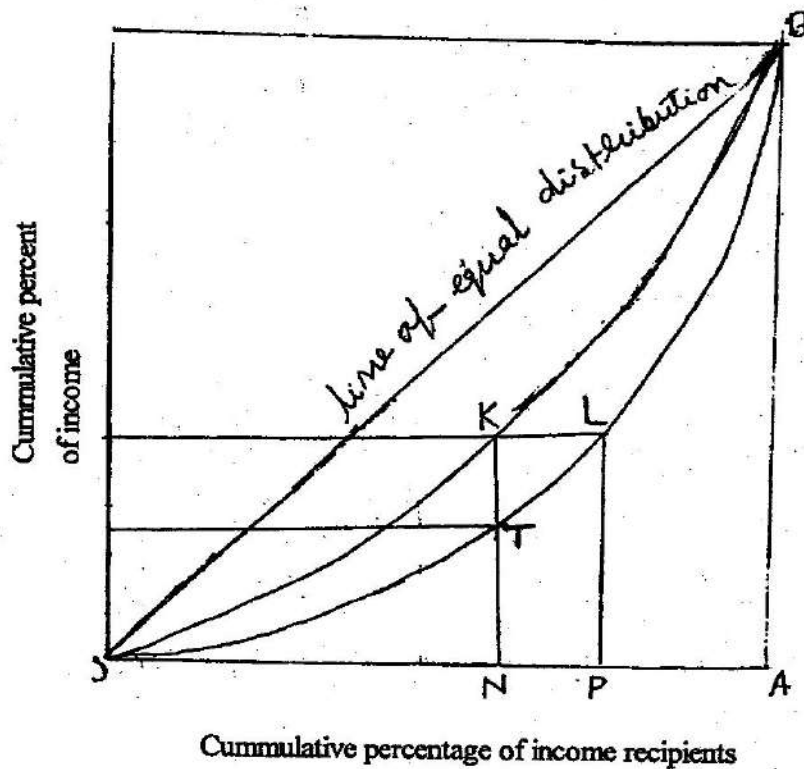
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Cummulative percentage of income recipients

Fig. 4.22

In Musgrave's budget incidence theory, the budget incidence may be measured as the ratio of post-budget coefficient of equality to pre-budget coefficient of equality which is shown with the help of Lorenz curve in above figure. Percentage of income and percentage of income earners are measured along vertical and horizontal axes respectively. OB is the line of equal distribution. Let the curve OLB express the initial distribution of income so that OP percent of income earners receive OM percent of income and ON percent of income earners receive OR percent of income. When there is a change in the budget policy whether it is in taxation or in public expenditure, the income distribution is shown by the curve OKB. The co-efficient of equality before the change in budget policy is given by $\frac{OLBA}{OBA}$. Again, the coefficient of equality after the change is given by $\frac{OKBA}{OBA}$. The ratio of these two coefficients measures the incidence or distributional change. So,

Budget Incidence $= \dfrac{OKBA/OBA}{OLBA/OBA}$

$= \dfrac{OKBA}{OLBA}$

If this ratio equals unity, budget incidence is proportional, if this is more than unity, the budget incidence is progressive and it is requessive when the ratio is less than unity.

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4.8 Capitalisation of tax :

Capitalisation of tax is related to the income from durable property. The income from a durable good is subjected to an annual tax successively for all the years of its life time. During the time of purchase of durable property, the aggregate amount of property taxes is shifted backward to the seller since the buyer have to pay in future for the life time of the good. The market value or sale value of property is reduced by the full amount of aggregate future tax. This one-time backward shifting of the tax is known as the capitalisation of tax. It is also called amortisation of tax.

As the ownership of durable property comes to the buyer, he will have to pay the tax an income from it for the future life span of the property. Since this whole amount of tax is deducted from the sale value during the time of sale, the impact of tax is on the buyer but incidence has to be borne by the seller. For capitalisation of tax, the following conditions must be satisfied :

1. The property should be durable. Because in case of non-durable property, the selling value falls and supply falls. This increases the price and so the burden of tax will be on the buyer. Therefore, property tax on a non-durable good can not be capitalised.

2. The property tax must be a differential one in the sense that there will remain other alternative sources of investment untaxed or taxed at lower rates.

4.9 Value-Added Tax (VAT) :

Value-added tax (VAT) is a tax levied on the value added to the product by seller. VAT is not a tax on the total selling value of the product. So, a seller is liable to pay the tax only on the net value of the product which is found out by deducting from the gross value of input materials purchased from others.

Example :

A retail seller purchases a product from the whole seller at ₹ 100 and spends ₹ 10 for transportation or other expenses. He sells the product to consumers at ₹ 130. So, the value added to the product by him is ₹ 20 (₹ 130 – ₹ 110). The value-added tax is 30 percent. Then the tax liability will be ₹ 6.00 with tax base ₹ 20.

At any stage of transaction, whether in the process of production or in the process of distribution, the tax liability is based on the value added to the product by him.

VAT was adopted through historical evaluation by France in 1954 to replace turnover taxes. Since 1967 other countries of the European Economic Community (EEC) also started opting for VAT. In India, it was introduced on the recommendation of the Jha Committee (1978).

The basic diference between VAT and a sales tax is that the tax liability under VAT is split up into stages. Theoretically, the tax liability in the case of VAT and in the case of sales tax at the retail

level should turn out to be the same. This is because the total retail price is nothing but the value added to the product in all the stages of production and distribution.

4.10 Summary :

A tax is a voluntary contribution which is levied on wealth or income, production or consumption, sales or purchases, transactions. Tax ratio relates the tax liability to GNP, buoyancy of taxation is related to the growth of tax base while elasticity of taxation is related to the expansion of coverage or to increase in tax rates. There are three rate schedules of taxation– progressive, proportional and regressive depending upon whether tax liability increases more than, equal or less than proportionately in relation to increase in tax base. The benefit principle states that tax liability should be determined in accordance with the benefits received while ability to-pay principle states that tax liability should be related to person's ability to pay so as to ensure minimum sacrifice. The neo-classical theory of tax incidence and shifting shows that the incidence of tax depends on the elasticity of demand and supply and also on various market and cost conditions. We also come across the various concepts like taxable capacity, capitalisation of tax and VAT. Moreover, the maximum-welfare principle of budget determination and Musgrave's budget incidence theory are discussed.

4.11 Self-assessment questions :

1. Write short notes on– taxable capacity.
2. Discuss the different rate schedules of taxation.
3. Critically analyse the benefit principle of taxation.
4. Discuss ability-to-pay principle of taxation.
5. Explain neo-classical theory of tax incidence and shifting and show price-output effect under different market and cost conditions.
6. What do you mean by capitalisation of tax?
7. Write your short notes on– Value-added tax.

4.12 Additional Readings :

1. Browning E.K. & Browning J.M., "Public Finance and the price System", Pearson.
2. Musgrave & Musgrave, "Public Finance in Theory and Practice."
3. Choudhury R.K., "Public Finance and Fiscal Policy."

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