UNIT 4 COASIAN BARGAINING*

Structure

4.0 OBJECTIVES

After reading this unit, you will be able to:

- identify the features of a well-defined property rights system;
- explain how 'missing markets' and the absence of well-defined 'property rights' impedes solution to correcting 'negative externalities' in environment;
- define 'Coasian bargaining' and illustrate by a hypothetical example how negative externalities in consumption can be tackled by assigning rights;
- discuss the 'Coasian solution' to tackle negative production externalities;
- show how in situations of 'positive production externality' efficient solution can be obtained by internalising the externality;
- state Coase Theorem specifying its limitations;
- illustrate how Coasian Bargaining is applied in practice; and
- indicate the role of 'liability laws' as an alternative to situations where Coasian solutions cannot be applied.

4.1 INTRODUCTION

In the previous two units, we identified the ideal conditions for market efficiency. Violations of those conditions (assumptions) result in market

* Ms. Parul Gupta, Assistant Professor, ISBF, New Delhi.

failure. Broadly, in the context of environmental goods and services, the presence of externalities and public goods are the sources of market failure (resulting in an inefficient allocation of resources). In this unit, we will examine the different ways to correct the market failures. Two approaches viz. Coasian bargaining and liability laws will be discussed. We first begin by understanding how 'missing markets' and the absence of well-defined 'property rights' impedes the correction of negative externalities.

4.2 MISSING MARKETS AND PROPERTY RIGHTS

External effects occur when the actions of one agent affect another agent in an unintended manner. The beneficiary of the unintended positive externality does not reward the agent bestowing the effect. Likewise, the agent suffering the consequences of negative externality does not receive any compensation from the agent imposing the damage. In other words, there is no incentive or penalty (i.e. feedback) on actors generating external effects. In a market system, these effects can be rewarded (for positive externalities) and penalised (for negative externalities) using price signals which would thereby amount to 'internalising' the externalities. As a result, the action involving a negative externality can be discouraged and the action involving a positive externality can be encouraged. In other words, a market failure arising out of external effects can be corrected if suitable rights are assigned to economic agents which they could then use to bargain or negotiate a change in the actions of others. The basic idea is therefore to institute a system that rewards the generation of beneficial effects and penalises the generation of harmful effects in such a way that they are no longer external.

The potential for correcting externalities (mostly, negative ones) lies in the creation of well-defined property rights so as to remedy the problem of 'missing markets'. Consider a situation where a firm operates an incinerator that produces fumes (negative externality) affecting residents living nearby. Since there is no 'market' to trade fumes, the firm does not face any price for it and overproduces the externality. Further, if the persons suffering from the fumes do not own a right to clean air (i.e. they cannot insist by law for abetment methods or compensation for damages), the polluting firm could ignore the externality it generates. Establishing cohesive entitlements makes goods excludable thereby allowing a market system to operate. The practical problems with externalities arise because of incomplete, missing or unenforceable property rights for the commodity generating the externality resulting in the external benefits and costs of a person's actions not being owned by anyone.

A well-defined property rights system establishes *comprehensive*, *exclusive*, *transferable* and *secure* entitlements. In the example on toxic fumes above, establishing property rights on clean air will allow an agent to buy or sell the 'right to inhale clean air' to someone else (or the agent causing the air to pollute) thereby creating the market structure required to correct the externality. Without tradable property rights, the allocation of a good in the economy could be higher (or lower) than the efficient level in case of a

negative (or positive) externality. Well-defined property rights, and an effective mechanism to facilitate negotiation between agents, allows people to trade their rights. Assuming other conditions for perfect competition hold, such a trade will result in a competitive equilibrium which, by the First Welfare Theorem, is Pareto efficient.

The problem however arises because laws cannot either be enforced or the information to establish such contracts is often not available or verifiable or measurable. For instance, how does one measure on a real-time basis how much smoke does a person A inhale due to a person B's smoking of cigarettes? Likewise, in cases of transboundary pollution (such as carbon dioxide emissions), there may be a lack of a legal system to enforce the contract. It is also not practical to use the legal system to reward people for the beneficial effects they confer on others (e.g. someone lighting incense in their home, the fragrance from which spreads outside as well). As a result, some of the social costs or benefits of the decision-maker's actions will not be included in the decision-making process.

4.3 INTERNALISING EXTERNALITIES: COASIAN BARGAINING

In this section, we will consider an important result, called Coasian bargaining. It demonstrates how, under certain conditions, tradable property rights can allow the economy to reach an efficient outcome. Recall that in Unit 3 (Sub-section 3.4.1) we have seen that the efficient level of a consumption externality is achieved at the point of intersection between the marginal benefit and marginal external costs (MEC) curves (Fig. 4.1). Although it appears a straightforward solution, the problem arises because agent B (the passive smoker i.e. the victim of smoke generated by agent A's consumption of cigarettes) does not have any legal right to claim compensation from agent A for polluting the environment with cigarette smoke. As a result, agent A continues to smoke until his marginal benefit reaches zero (C_0) and the efficient allocation (C*) is not reached.

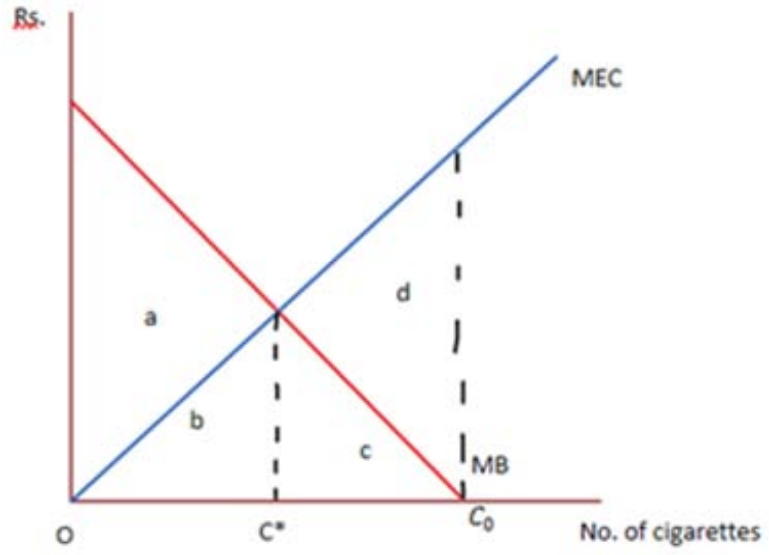

Fig. 4.1: Negative Consumption Externality

4.3.1 Consumption Externality

To remedy the above situation, property rights need to be established which either give a legal right (i) to agent A to smoke or (ii) to agent B to inhale clean air unpolluted by cigarette smoke. Such a legal arrangement will support bargaining and allow the agents to mutually arrive at the efficient outcome. Let us take a numerical example to illustrate this (Table 4.1). A is the smoker whose total benefit (Column 3), starting with a high of 18 (hypothetically assumed), and further assumed to decline by 2 with the consumption of each successive cigarette. B is the passive smoker, whose total external cost (Column 2) starting with zero for zero cigarettes increases progressively with every additional cigarette smoked by A. Due to this progressive increase, figures in column 2 (starting with 'zero') touches 110 by the time A smokes 10 cigarettes. The figures in Column 3 (due to diminishing returns to A increase less steeply with every additional cigarette smoked) with the cumulative benefit touching 90 by the time the 10^{th} cigarette is smoked. Alternatively, we can state this algebraically as follows.

Table 4.1: Bargaining in Case of a Negative Consumption Externality

No. of Cigarettes (x)	**Total External Cost to B (Non Smoker)**	**Total Benefit to A (Smoker)**	**Marginal External Cost (MEC) to B ($2x$)**	**Marginal Benefit to A ($20-2x$)**	**Total Societal Benefit ($3-2$)**	**Marginal Societal Benefit $[6_x - 6_{(x-1)}]$**
1	*2*	*3*	*4*	*5*	*6*	*7*
0	0	0	0	-	0	0
1	2	18	2	18	16	16
2	4	34	4	16	28	12
3	12	48	6	14	36	8
4	20	60	8	12	40	4
5	30	70	10	10	40	0
6	42	78	12	8	36	-4
7	56	84	14	6	28	-8
8	72	88	16	4	16	-12
9	90	90	18	2	0	-16
10	110	90	20	0	-20	-20

Note: (i) Column 2 figures are arrived at as: 0, 0 + 2, 2 + 4, 6 + 6, 12 + 8, 20 + 10, 30 + 12, 42 + 14, 56 + 16, 72 + 18, 90 + 20; (ii) Column 3 figures are arrived at as: 0 + 18, 18 + 16, 34 + 14, 48 + 12, 60 + 10, 70 + 8, 78 + 6, 84 + 4, 88 + 2, 90 + 0; (iii) Marginal Benefit is the difference between the benefit accruing from successive amounts of consumption and marginal cost is the difference between the costs incurred from successive amount of consumption; (iv) Marginal societal benefit in Column 7 is calculated from Column 6 in the same manner as stated in (iii).

Marginal benefit being the difference between the benefit accruing from successive amounts of consumption, let the marginal benefit to A from smoking x cigarettes be $20 - 2x$ (where 20 is assumed as the highest benefit he derives while smoking the first cigarette; which decreases to 18 by the time he finishes completing smoking the first cigarette). Likewise, let the marginal external cost from each cigarette for agent B be $2x$. Columns 4 and 5 respectively shows the marginal external cost to B and marginal benefit to A for each cigarette smoked. All cost and benefit figures (i.e. leaving aside the figures in Column 1) are in monetary terms (rupees). The total societal benefit is thus maximised at 5 cigarettes (which corresponds to C* in Fig. 4.1). At this point the marginal societal benefit equals zero or equivalently, marginal benefit (for A) equals marginal cost for B (i.e. both are 10). In the absence of any legally binding 'no smoking' rule, agent A will smoke 10 cigarettes (i.e. till his marginal benefit is zero). Societal benefit at this point is –20 and marginal cost to B from smoking 10 cigarettes is also highest. Clearly, societal benefit can be increased if the agents move from 10 cigarettes to 5 cigarettes. Let us assume that A has the right to smoke as much as he wants and agent B is willing to trade from his external cost to bargain with A for reducing the number of cigarettes consumed by A so that B's marginal external cost of suffering from smoke is reduced. In the first instance, agent B can offer to pay anything between 0 and 20 rupees to agent A to reduce the consumption by one cigarette. Let us say that B offers 5 rupees to A. Agent A will be interested in agreeing to the deal because he can increase his benefit from 0 rupees to 5 rupees by smoking one less cigarette i.e. he is 'giving up' the marginal benefit of smoking the 10^{th} cigarette (which is zero: see Column 5 of Table 4,1) and gain rupees 5 (the negotiated price) in return. As a result, he now smokes 9 cigarettes. Agent B does not mind paying rupees 5 since he can save rupees 20 in the external cost as his net gain is still Rs. 15. This is, therefore, a 'mutually beneficial exchange'. Next, agent B could offer to pay anything between Rs. 2 and Rs. 15 to agent A (i.e. from out of his marginal external cost) to reduce the consumption of another cigarette by A. Such deals can continue until we reach the fifth cigarette, where agent B can pay a maximum price of Rs. 10 to agent A to bring down the consumption to five cigarettes. Note that Agent B cannot offer any deal that is acceptable to agent A to reduce the consumption from 5 to 4 (or less) cigarettes i.e. no further mutually beneficial deals can take place beyond 5 cigarettes which in fact is the efficient allocation.

In the above case, the rights were granted to the 'polluter' i.e. the smoker (agent A). As a result, agent A was the one receiving the compensation for reducing his cigarette consumption. If the rights are allotted to the 'victim' (agent B) instead, then the polluter will pay compensation to the victim. If there is a 'no smoking' sign placed in the room, agent A will not be able to smoke at all. Note that this is not the efficient outcome as there is a scope to improve this outcome through bargaining. In this case, agent A could approach agent B and offer to pay an amount between 2 and 18 rupees, say 3 rupees, to be allowed to smoke one cigarette. As a result, agent A gets a net benefit of Rs. 15 (i.e. 18–3) and agent B gets a net benefit of Re. 1 (i.e. 3–2). Similarly, agent A can compensate agent B for the next cigarette by offering

any price between Rs. 4 and Rs. 16. Such mutually profitable exchanges can go on until the 5th cigarette. Agent A will no longer be able to 'bribe' agent B to smoke the 6th cigarette (since to allow the 6th cigarette, agent B will not accept any price less than Rs. 12, while agent A will not pay any price more than Rs. 8). Thus, in equilibrium, agent A will consume 5 cigarettes and bargaining has, once again, resulted in the efficient allocation.

If we take the diagrammatic representation to the problem, as depicted in Fig. 4.1, in both the cases considered above, the exact sequence of payments will depend upon the relative bargaining power of each agent. As long as $MB > MEC$ (as is the case towards the left of the efficient outcome in Fig. 4.1), agent A will pay agent B an amount between MEC and MB to be allowed to smoke another cigarette. If $MEC > MB$, then agent B will pay agent A to reduce smoking. Both the streams of transactions will ultimately lead to the efficient outcome C*. This notion of private bargaining resulting in the correction of externality problems was proposed by Ronald Coase (a Nobel Laureate) and hence is named as Coasian bargaining. Coase's argument was that the externality situation arises out of incomplete property rights and by vesting the property right in the polluter *or* the victim, an efficient outcome can be reached. The result of the work of Coase, popularly known as the Coase theorem, is stated as: *under certain conditions,* the same efficient outcome is arrived at, regardless of whether the affected party or the generator of the externality is allocated the rights. In the example considered here, the same number of cigarettes are smoked in equilibrium irrespective of whether A holds the rights or B does. However, the assignment of property rights implicitly increases the wealth of the agent, and therefore from the equity point of view, the outcome is not the same. In sum, the assignment of property rights does not affect efficiency but does affect equity.

4.3.2 Production Externality

In this section we will consider an example each of a negative and positive production externality to assess how both these types of external effects can be corrected (or internalised) using Coasian bargaining.

4.3.2.1 Negative Production Externality

Consider a paper mill located upstream on a river. Assume that the mill derives a marginal benefit (MB) of p* for each unit of output it produces (Fig. 4.2). Further, let the mill incur an increasing marginal cost for each unit of output produced. Assume also that the paper production process involves the release of some effluents which is discharged into the nearby river. These discharge affects the production of a fishery located downstream [indicated by an upward sloping marginal damage (MD) curve in Fig. 4.2]. The paper mill's private marginal cost (PMC) is lower than the social marginal cost (SMC) which is the sum of private marginal cost and marginal damages (known as *external costs*). The gap between the social marginal and private marginal costs is the source of the negative externality.

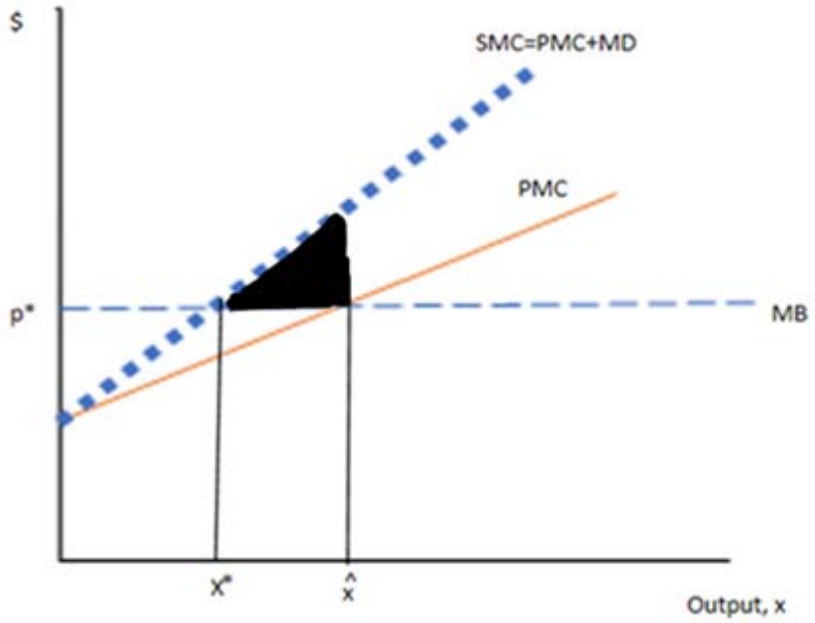

Fig. 4.2: Negative Production Externality

The societal costs include the costs borne by both economic agents viz. the mill and the fishery. Since the marginal damages are a cost incurred by the fishery due to the production of paper, the social marginal cost curve represents the sum of private marginal cost and damage cost. In the absence of property rights, the mill will choose to produce $\hat{x}$ units of output (intersection of private marginal costs and marginal benefit), which is greater than the socially optimal level x^* (intersection of social marginal cost and marginal benefit). As a result of the excess production, the social costs (deadweight loss) are equal to the shaded triangular area. The regulator's role would be to devise a way to eliminate this deadweight loss. This can be done by allotting the 'right to pollute' to the paper mill *or* by allotting the 'right to clean water' to the fishery.

If the paper mill is allocated the right to pollute, it will choose the profit maximising level of output ($\hat{x}$). Since the fishery would incur a marginal damage cost of $MD(\hat{x})$ from this level of output, it would be willing to pay a bribe [up to the maximum of the MD ($\hat{x}$)] to the mill, to reduce its output so that the fishery can save on its marginal damages. Accepting such an offer would however mean that the mill foregoes the marginal benefit (price) of that unit of output but saves on the marginal cost of that unit. Thus, in equilibrium, the compensation from the fishery to the mill would be $MD = MB - PMC$. In other words, the compensation of amount equivalent to MD to the fishery would be enough to cover the net loss to the mill of producing one less unit. As a result, the mill's optimisation rule will now be to choose an output level for which $MB = PMC + MD$. Recall that the right-hand side of this condition is nothing but the SMC. Thus, the mill is using the socially optimal condition $SMC = MB$ and hence will choose to produce x^* units of output which is precisely the socially efficient level. Thus, the bargaining process has allowed the polluter to internalise the externality thereby correcting it.

The rationale here is that by offering a compensation for each unit *not produced*, the mill's opportunity cost of producing the next unit increases exactly by the amount MD. By producing an additional unit, the mill earns p* at the margin but also loses out MD. Thus, in effect, the firm's cost curve shifts up by the height MD at each unit to SMC (= PMC + MD). This additional cost induces the firm to choose the 'correct' amount of output, eliminating the deadweight loss.

4.3.2.2 Positive Production Externality

Here, let us say that a beekeeper and a farmer with an apple orchard are neighbours. Since bees help to pollinate apple trees, the orchard owner receives an uncompensated benefit from the nearby apiary where we assume each beehive pollinates one acre of orchard. If the orchard owner had to use artificial pollination to grow the trees, it would cost him, say, Rs. 10 per acre. On the other hand, the beekeeper's total costs are given by, say, $C(h) = h^2 + 10 * h + 10$, where h is the number of beehives. Let each hive's output be 2 kg of honey, valued at Rs. 10 per kg in the market so that each hive's value of output is Rs. 20. If operating independently i.e. without taking into account the positive externality bestowed, the beekeeper will use his profit-maximising rule to decide upon the number of hives to be maintained. Thus, at the private optimal, we have:

$$MB = p = MC$$
$$\Rightarrow 20 = 10 + 2h$$
$$\Rightarrow h^* = 5$$

Since each beehive is allowing the orchard keeper to save Rs. 10 (which he would have otherwise spent on artificial pollination), the *external benefit* of a beehive is $10h$. Thus, the total benefit ($\Pi(h)$) is given by:

$$\Pi(h) = \overbrace{20h}^{beekeeper's\ benefit} + \underbrace{10h}_{orchard\ keeper's\ benefit} - \overbrace{(h^2 + 10h + 10)}^{beekeeper's\ cost}$$

Differentiating the above expression (with respect to h) and setting the derivative equal to zero, we get:

$$30 - 2h - 10 = 0$$
$$\Rightarrow 20 = 2h$$
$$\Rightarrow h' = 10$$

Therefore, to achieve the social optimal, the orchard keeper can offer to compensate the beekeeper at the rate of Rs. 10 per beehive. Due to this compensation, the beekeeper's optimisation condition changes to:

$$30 = 2h + 10 \Rightarrow h_{new} = 10 = h'$$

This example thus illustrates how Coasian bargaining can lead to the optimal solution even in the presence of positive externalities. In fact, the same efficient solution can be obtained if the firms merge i.e. operate jointly.

Doing this will result in the 'internalisation' of the externality, which is the key to correcting it.

Check Your Progress 1 [answer within the space given in about 50-100 words]

1) State the characteristics of a well-defined property rights system.

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2) What are some of the limitations faced in correcting externalities?

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4.4 LIMITATIONS OF COASIAN BARGAINING

Coasian bargaining works only when certain conditions are met. These, therefore, may be stated as assumptions (or limitations) for the successful working of Coasian bargaining. These may be stated as follows.

i) **Transaction or Bargaining Costs are Zero (or Negligible):** We need the assumption that there are no barriers to bargaining. In real life, it is difficult to imagine that a person smoking a cigarette would be approached by another person in the vicinity and asked to reduce his smoking in return for an appropriate payment! The presence of bargaining costs, or, more generally, transaction costs (including effort and psychic costs), complicates Coasian bargaining in practice.

ii) **No Wealth or Income Effects:** In our examples above, we had assumed that assigning property rights to any agent does not change the efficient outcome. This conclusion is dependent upon the assumption of no wealth/income effects. This is theoretically captured by assuming quasilinear preferences for the agents. In other words, with quasilinear preferences, the outcome of the externality is independent of the initial assignment of property rights i.e. every efficient solution will have the same amount of the externality and it does not matter who is allotted the rights (although it will still matter for equity).

iii) **Involvement of Multiple Agents:** In each of the cases described above (in 4.3.1, 4.3.2.1 and 4.3.2.2), there was one generator of externality and one affected party (sufferer). Bargaining between two agents is fairly straightforward but complexities arise when there are more than two agents involved i.e. no deal or bargain acceptable to all agents involved may arise. Due to this reason, Coasian bargaining may be infeasible in real life scenarios.

iv) **Problem of Identification and Assignment of Rights:** To allow for bargaining to take place, property rights need to be allotted for which it is crucial to identify the polluter(s) and/or victim(s). Since the translation of emissions into ambient concentrations is complicated by spatial, temporal and seasonal factors, identification of the affected parties would be difficult. For instance, toxic waste, radioactive substances and greenhouse gases stay in the environment for a long time, affecting potential victims after tens of years. In cases of common resources, or of diffused sources of pollution, victims may themselves be unaware of their status making bargaining difficult and inefficient.

In spite of the above limitations of the Coasian bargaining framework, as stated by the Coase's result (or theorem), so long as the property rights are well-defined, and it is easy and costless to trade in those rights, it does not matter how the rights are initially distributed (i.e. to the polluter or victim) and trading will ensure that the efficient allocation is reached. In other words, in an alternative way we can ***also*** state the Coase theorem as: *under the two conditions of no transaction costs and well-defined property rights, an allocative solution will be invariant and optimal irrespective of how the initial rights are distributed*.

4.4.1 Applications

Coase Theorem has formed the foundation of several regulatory policies like the cap-and-trade (marketable permits) system for carbon emissions and the Acid Rain programme for sulphur dioxide emissions. A marketable permit allows polluters to trade the 'right' to pollute and is one of the methods the regulator can use as economic incentive to achieve cost-effective pollution reduction. Trading induces a price on a permit to pollute thus making firms view pollution as an expensive activity. Polluters would want to pollute less in order to save on the costs of permits thereby 'internalising' the externality. Further, a firm can sell the permits for each unit of pollution it does not emit thereby earning revenue. In the case of two polluters, the bargaining (trading) of permits would lead to equalisation of the marginal abatement (reduction/cleaning) cost across the two firms resulting in cost-effective abatement. In practice, polluters (firms) are assigned a quota for their emissions of a pollutant. If a firm reduces its emissions by more than the allotted quota, it can sell the same as 'right to pollute' in the market. This generates a price for the polluting right. Each firm can then compare the market price of an emission permit to the cost of abating emissions and decide whether it can save costs by reducing emissions or could purchase an adequate amount of pollution permits from other firms. A firm with high

abatement costs would prefer to purchase the permits rather than incur a high cost to reduce the emissions while a firm with low abatement costs could prefer to abate and sell its permits and earn revenue. In equilibrium, the price (marginal benefit) of the pollution right equals the marginal cost of abatement thereby achieving efficiency.

The Coasian bargaining approach was used in the United States in 1990 to curb the sulphur emissions (associated with acid rain). A system of marketable emission permits for sulphur dioxide was set up which was successful in reducing emissions by 43 percent within 17 years. More recently, the European Union Emissions Trading Scheme (EU ETS) adopted the cap and trade scheme to cover 11,000 polluting installations across the EU.

4.4.2 Liability Laws

While Coasian bargaining methods can achieve efficiency in a decentralised context (i.e. where there is minimal intervention by the regulator or other authority), the presence of transaction costs and multiple agents limit the practical application of this approach. An alternative in such a scenario is to use liability laws. Liability laws however require intervention from courts (or an enforcement machinery) unlike in Coasian bargaining where the parties involved figure out a solution for themselves.

Liability laws make polluters liable for the damages they cause. However, the real purpose is to signal the potential polluters to change their decisions in order that the need for compensation does not arise. In cases where the damages still occur because the polluter did not take sufficient precaution, the party claiming damage can approach the court which can assess the value of the damages and stipulate suitable compensation in accordance with the law. To save on the potential compensation costs, the polluting firm can see an incentive to take adequate precaution and minimise the activity which may cause pollution. In other words, liability laws dissuade the firms from undertaking a polluting activity by virtue of the threat of holding them accountable for damages. This leads to a socially desirable precaution to be exercised by the economic agents.

Check Your Progress 2 [answer within the space given in about 50-100 words]

1) How are social marginal costs different from private marginal costs in the presence of negative production externality?

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2) State the conditions necessary for the Coase theorem to hold.

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3) Give two examples of marketable permits implemented globally.

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4.5 LET US SUM UP

In the presence of well-defined property rights, there will be scope for agents involved to negotiate for negative externalities to be internalised. In their absence, there would be missing markets which would not enable the holding of a bargaining. The bargaining, termed as Coasian bargaining, will however operate under certain conditions. These assumptions or limitations include the absence of transaction costs and wealth effects. In practice, presence of multiple agents complicates the application of this principle. Despite this, the approach has been successfully applied as 'cap and trade' permits. Liability laws are an option where Coasian bargaining cannot be applied.

4.6 KEY WORDS

Coasian Bargaining : Refers to a negotiation process that takes place privately between parties to eliminate an externality provided property rights are defined.

Cap-and-trade System : A policy through which a limited number of permits to pollute are issued and can be bought and sold in the market. It combines a quantity based limit on emissions and a price based approach that places a cost on environmentally damaging decisions.

Liability Laws : Liability laws make polluters liable for the damages they cause. The party claiming damage can approach the court which can assess the value of the damages and stipulate suitable compensation in accordance with the law.

4.7 SOME USEFUL BOOKS AND REFERENCES

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2) Kolstad C (2006). *Environmental Economics,* New Delhi, Oxford University Press.

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4) Stevens M, Bowles S, and Sethi R (2017). *Markets, Efficiency and Public Policy*, Unit 12, in The CORE Team, The Economy. Available at: http://www.core-econ.org. [Accessed on January 13, 2018].

5) Varian, H. R. (2010). *Intermediate Microeconomics: A Modern Approach,* New York, W.W. Norton & Co.

4.8 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) A well-defined property rights system has four features. The property rights should be *comprehensive*, *exclusive*, *transferable* and *secure* entitlements.

2) Incomplete, non-verifiable or asymmetric information and the lack of a legal enforcement mechanism are the main limitations faced in correcting externalities.

Check Your Progress 2

1) Social marginal costs are a sum of private marginal costs and marginal damage (external) costs. In the case of a negative externality, the social marginal costs are higher than private marginal costs.

2) For Coase Theorem to be applicable, there should be no wealth income and transaction costs and property rights should be well-defined.

3) EU-ETS and Acid Rain Programme.