

MARKET FAILURE ANALYSIS: PUBLIC GOODS AND EXTERNALITIES

INTRODUCTION

Dear Friends. In this session we shall understand the basics of economic theory by which we can, with logical reasoning explain the environmental problems, issues and policies. Adam Smith uses a well-known metaphor, the “invisible hand” of the market place that leads the self-interested economic agents to maximize utility, profit and revenue and hence maximize social benefits, what is popularly called “efficient allocation of resources”. In general economic literature it is referred, that market is “benevolent social planner”. The logic behind this is that if the market works well, all economic agents are benefited equally and nobody’s benefit or interest is threatened.

However there are two very important economic principles, namely: (1) Markets are usually a good way to organize economic activity and (2) Government can sometimes improve the market outcomes.

In the light of these two principles, we can understand, “Market failure Analysis: Public goods and externalities”.

In case of first principle, we focus on the fact that market works well, clears by signaling and evolution of spontaneous order’, but does not work well in all situations and in all times, no doubt, it does many things well, but they do not do everything well. **With regard to second principle, we focus on the fact that in situations and times when market fails it becomes unavoidable to go for government intervention.**

Basically market fails, means efficient allocation is not achieved and everyone is not equally benefited by market, because there is an existence of monopoly power, externality and public good. Sometimes even irrationality of economic agents, social and cultural residues are also causing market failure. When such elements exist, then neither ‘invisible hand’, nor ‘signaling’ nor ‘spontaneous order’ set the system right. Hence government’s intervention becomes inevitable.

Externalities

Externalities are those gains and losses sustained by others as a result of actions initiated by producer and consumers or both, and for which no compensation is paid. Externalities are sometimes called 'unintended effect'. Alfred Marshall used the phrases 'external economies' and external diseconomies' for the same.

When externality exists, buyers and sellers neglect the external effect of their actions when deciding how much to demand or supply, the market equilibrium is not efficient when they are externalities. It means the equilibrium fails to maximize the total benefit to society as a whole. In case of negative externalities neither the producer nor the consumer takes in to consideration, the full cost of pollution. In order to prevent this, the government has to interfere.

For our interest of effects on environment, negative externalities are important. In the sense that they affect the environment within which human beings seek to satisfy their economic and biological needs. Since externalities are caused by both producers and consumers, hence it's vitally essential to distinguish between consumption externality and production externality.

Consumption Externalities

The consumption externality may be explained in the context of a two-person economy by using the utility function

$$U_A = f(a_1, a_2, \dots, a_n; b)$$

Where

U_A denotes the total utility of individual A;

a_1 to a_n denote the activities from 1 to n

which are directly under the control of individual A;

b denotes the activity of individual B.

The equation asserts that A's utility is not only dependent on A's own activities,

but also on the activity of individual B.

For example, an individual's enjoyment of peace depends not only on what the individual does, but also on the neighbor's activities.

It must be noted that interdependence alone is not sufficient to constitute an externality. It must also be shown that there has been a failure to pay for or to receive payment on account of any gains or losses. Thus, a consumption externality exists where there is interdependence, coupled with an absence of any form of compensation or price paid by the gainers.

Production Externality

A production externality can be similarly explained by following function

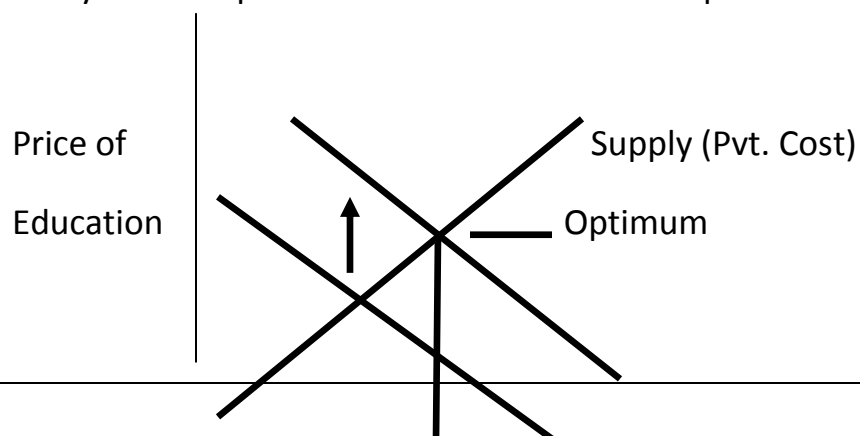
$$P_c = f(c_1, c_2, \dots, c_n; d)$$

P_c denotes the firm's profit depends on the n activities of firm c i.e. c_1 to c_n and on the activity of a second firm.

Thus a production externality exists where there is some interdependence among the activities of firms coupled with an absence of any form of price or compensation paid on account of the loss or gain.

Positive Externalities

Positive externalities yield benefits for example, education. The consumer of education becomes more productive worker and gets higher wages. Moreover, educated population leads to more informed voters and gives better government for everyone, more educated population tends to lower crime rates. Besides this, more educated population may encourage the development and dissemination of technological advances leading to higher productivity and higher wages for everyone. The positive externalities can be explained with help of diagram.





In the figure, the demand curve does not reflect the value to society of the good. Because the social value is greater than private value, the social value curve lies above the demand curve. The optimal quantity is found where the social value curve and supply curve (which shows costs) intersect. Hence the socially optimal quantity is greater than the quantity determined by the private market.

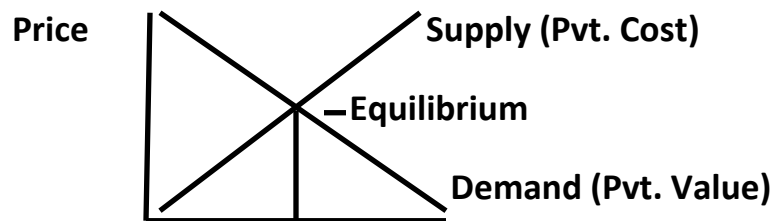
The government can correct the market failure by inducing market participants to internalize the externality. To move the market equilibrium closer to the social optimum, a positive externality requires a subsidy. The government follows the right course: Education is heavily subsidized through public schools and government scholarships.

Examples of Positive Externalities

- (1) Restored historic buildings convey a positive externality because people who walk or ride by them can enjoy the beauty and the sense of history that these building provide.
- (2) Research into new technologies provides a positive externality because it creates knowledge that other people can use.
- (3) Developing public utilities of different types and health care measures by government impact positive externality.

Welfare Economics

Externalities have welfare consequences; hence it is essential to understand that how in the absence of externalities with ideal functioning of market give allocative efficiency and everyone in the society is benefited. This can be understood with the help of following diagram, where in the demand curve of particular commodity shows the value to the consumer (the price that he pays) and the supply of a commodity shows the cost to the producer.



The Q market is inequilibrium quantity produced and consumed are equal. It is efficient in the sense that it maximizes the sum of producer and consumer surplus. That is the market allocation of resources maximizes the total value to the consumer and the total costs to the producers. In the absence of externalities therefore, the market equilibrium is efficient.

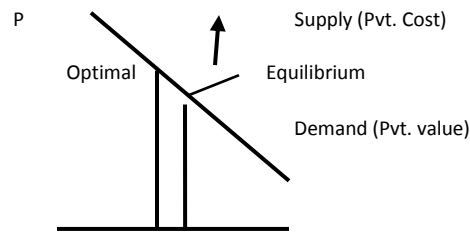
Negative Externalities

Negative externalities are the main source of environmental degradation. A chemical industry emit pollution for each unit of its product produced, a certain amount of smoke enters the atmosphere. It adversely affects the health of the people those who breathe the air so it is a negative externality. We want to understand that how does this externality affect the efficiency of the market outcome.

When such externality exists, the cost to society of producing chemical product is larger than the cost to the producer of chemical product. For each unit of chemical product produced, the social cost includes the private costs of the chemical product; the social cost includes the private costs of the chemical product producers plus the cost of those bystanders affected adversely by the pollution. The diagram shows the social cost of producing chemical product. The social cost is above the supply curve, because it takes into account the external costs imposed on society by the industry. The difference between these two curves reflects the cost of the pollution emitted.

In this condition the question that arises is what quantity of chemical product should be produced? The benevolent social planner (market) the planner would like to choose the output level where cost to the producer is equal to value to the consumer, so that the maximum (optimal) level of output is maintained. In the

presence of negative externality the cost of the producer would exceed the value to the consumers. Price External cost Social (Pvt. and External cost)



Note that the equilibrium quantity Q_{market} is larger than the socially optimal, Q_{optimum} . This inefficiency occurs because the market equilibrium reflects only the private costs of production. Here the social cost exceeds the marginal value to the consumer. Hence at the Q_{market} , the demand curve lies below the social cost curve.

The use of such a tax is called internalizing the externality because it gives buyers and sellers in the market, an incentive to take into account the external effects of their action.

Example of negative externalities

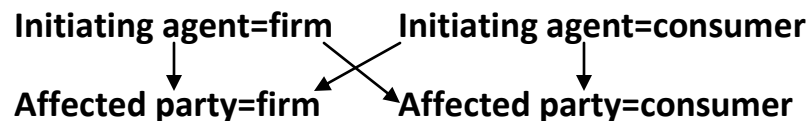
- (1) The smog discharged by automobiles pollutes the air and causing health problem for the society.
- (2) The chemical industry discharges chemical water that flow in the river, killing fishes and resulting in the loss of livelihood of a fisherman.
- (3) Barking dogs in the street create negative externality; even your private barking dog disturbs your neighbor and locality and leads to noise pollution.

In brief, externalities, positive or negative can run from production to production and from production to consumption. In addition, they can run from consumption to production and from consumption to consumption.

An important problem is how to determine whether a given externality generating activity is one of net external costs (negative externality) or net external benefits (positive externality). Broadly speaking, if the externality leads to a net increase in the total of consumer and producer surplus, it can be said to

be positive externality and in that case, state action might be called for to encourage it. Conversely, if the externality leads to a net reduction in the total of consumer and producer surplus, state action may be called for to arrest it or even to ban it completely.

The figure shown here can make it clear how firms and consumers may generate and be affected by externalities.



Causes of externalities

1. Interaction between the economic system and the environment

Economic agents extract and exploit resources from the nature. The resources are then returned to the environment as wastes. Externalities arise because the environment has only a limited assimilative capacity as a waste disposal sink.

2. Lack of developed markets

Market for some environmental resources, however, is non-existent-e.g. there is no market for fresh air. In other instances, markets do not take account of the full social cost to future generations: for instance markets for non-renewable resources like oil, coal and copper. Glaring deficiencies exist in the markets for waste disposal.

3. Property rights

Property right is the legal title that confers ownership of an asset. Such property rights enable the owner to practice exclusion over the asset. If property rights are not there, and if they are not well defined then externalities will persist.

4. Interdependence of production and consumption

The interdependence of production and consumption activities generates potential externalities. When there are connections and relations then unintended effects are seen.

Public Policies toward externalities or Dealing with externalities

Throughout our discussion on externalities, we have seen that, they lead to inefficient allocation of resources. However, this inefficiency can be remedied. In practice, both public policy makers and private individuals respond to externalities in various ways. All the remedies share the goal of moving the allocation of resources closer to the social optimum.

The government can respond to externalities in two ways: (1) Command and control policies that regulate behavior directly, (2) Market based policies provide incentives so that private decision makers will choose to solve the problem on their own.

[1] Command and Control policies regulation

This measure directly controls the externalities. The consumption and production of certain goods results into degradation of environment and causing adverse and injurious effects on society. The factories that are contaminating water are forbidden. Drug consumption and production are prohibited by the government. In this case, the external cost to society far exceeds the benefits to the polluter. The government therefore, institutes a command and control policy that prohibits this act altogether.

Usually government constitutes Environmental Protection Agency (EPA). This agency act to regulate environment degradation. It put total restriction on industry which creates pollution or fixes the minimum level of pollution that an industry may emit. It can also restrict the use and application of certain technology which pollute the environment.

[2] Market based policy to deal with externalities

Market based policies which deal with demand and supply changes can be made socially efficient by government intervention. A well known approach is Pigou's tax subsidy, according to which a corrective tax and subsidy can overcome the imposed on generators of negative externalities and subsidy be given to generators of positive externalities. An ideal corrective tax would equal the external cost caused by negative externalities and an ideal corrective subsidy would equal the external benefits incurred by positive externalities. The result of

this market based approach to surrender externalities would lead to socially optimum resource allocation and enhance economic efficiency.

Tradeable pollution permits

Under the regularity authority if two firms, one is interested in increasing pollution and another is interested in reducing pollution in order to manage the pollution to socially efficient level, then such deal between the two firms is given green signal by pollution controlling authority. Such a deal is good policy from the view point of economic efficiency. The logic of this approach is a voluntary transfer of the right to pollute from one firm to another.

A market to trade these permits will ultimately develop and that market will be governed by the forces of supply and demand. The market will ensure that this new market allocates the right to pollute efficiently. The firms which can reduce pollution at a low cost will sell whatever permits they get, and firms that can reduce pollution only at a high cost will buy whatever permits they need. As long as there is a free market for the pollution rights, the final allocation will be efficient regardless of the initial allocation.

Bargaining Solution: Coase Theorem

According to the Coase theorem, if property rights are well defined then governmental intervention to tackle problems caused by externalities may not be required. Instead, voluntary bargaining between the affected parties may lead to efficient outcome. To put it differently, according to the Coase theorem, if private parties can bargain over the allocation of resources at no cost, then the private market always solves the problem of externalities and allocates resource efficiently.

Revealing close inspection on this theorem it can be inferred that it is based on following assumption;

- (1) Property rights are well defined
- (2) There is either no transaction cost or the transaction cost is negligible
- (3) The initial distribution of rights does not matter.

If these assumptions hold good then Coase theorem holds good. In nutshell, market prevails. There is no need of government intervention; market can solve the problem of externalities.

Let us try to understand Coase theorem with example. Suppose Manu owns a dog and the barking of this dog disturbs his neighbor Kanu. Manu gets a benefit from owning the dog, but it confers a negative externality on Kanu. Should Manu be forced to send the dog to the pound or should Kanu have to bear the noise caused by barking of the dog?

Under this condition we first consider what outcome is socially efficient. A social planner, considering the two alternatives would compare the benefit that Manu gets from the dog to cost that Kanu bears from the barking. If the benefit exceeds the cost, it is efficient for Manu to keep the dog and for Kanu to live with the barking. But if the cost exceeds the benefit then Manu should get rid of the dog.

According to Coase theorem, the private market will reach the efficient outcome of its own. How? Kanu can simply offer to pay Manu to get rid of the dog. Manu will accept the deal if the amount of money Kanu offers is greater than the benefit of keeping the dog. In reverse case Manu can offer to pay Kanu to allow him to keep the dog. If the benefit of the dog to Kanu exceeds the cost of the barking to Manu, then Kanu and Manu will strike a bargain in which Kanu keeps the dog.

The bargaining solution is generally only appropriate where small numbers of people are involved, otherwise the transaction and administration costs may be so high that they outweigh the benefits of bargaining.

In brief, the Coase theorem says that private economic factors can potentially solve the problem of externalities among themselves. Whatever be the initial distribution of rights, the interested parties can reach a bargain in which everyone is better off and the outcome is efficient.

Legislation to impose minimum standards

This method of dealing with externalities belongs to the wider field of legal rules and regulations. For instance, factory owners could be legally obliged to raise the height of their Chimneys or to install noise abatement equipment. Motor car manufactures may be compelled to fit exhaust systems that reduce emissions from vehicles and to develop fuel efficient engines.

Conclusion

Friends, herein we have discussed and analysed the pertinent problem of environmental degradation i.e. externalities-the concepts types and the solutions for the negative externalities along with different approaches i.e. government's intervention by means of taxes and subsidies, by laws and regulations and market solution to get optimal output or to rationalized externalities. We have also discussed the bargaining (Negotiation) approach and trade licenses to combat the problem of externalities. However so long as unintended effects in the system and society persists, the externalities will live with, the remedy is to be cautious and regulate them, minimize them in order to retain social welfare.

The discussion on public private goods and other goods has been represented conceptually and visually by diagrams. The whole discussion on the two issues related to environment has relevance for its social welfare implications.

Thank you Friends..