Principles for Private and Public Internalisation of Externalities. A Synoptic View

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Abstract. *Externalities represent a market failure situation and they appear when one person´s activities influence other person´s welfare in a way that is outside the market mechanism. In contrast to the effects transmitted by market prices, externalities negatively affect the economic efficiency. They arise in everyday life and are noticed only if the effects are obvious. Ronald Coase´s approach started from the premises that externalities can be internalized. His model provides private sector means to defend against market failure. Coase´s solution to internalize externalities based on negotiation between the involved parties, given the property rights, has influenced the free market approach of market failures and today many economists consider that governments should work with the market and not against it using taxes and regulations. In the mainstream literature it is said that if for small local externalities the private sector can find solutions to solve problems, big scale externalities, such as global warming, need government intervention. As far as the last ones are concerned, we can talk about: a) the Pigouvian tax, which is a tax levied on polluting activities; b) the Pigouvian subsidy, given to those who suffer from negative externalities; c) the subsidy paid to individuals or firms to conduct activities with positive externalities; d) legal regulations, such as limits for emitting polluters and restrictions regarding the time of day or year when negative externalities can be legally produced.*

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1. The nature and characteristics of externalities

Externalities appear every time a person´s action influences another person, in a negative or positive way, without the first person to bear a cost or to receive a benefit from the undertaken action (Moșteanu, Iacob, 2007, p. 13). So, the fact that some persons´ actions influence other´s welfare does not generally generate market failure, as long as the effects are transmitted through price.

Negative externalities cause market goods overproduction, while positive externalities lead to an underproduction of goods, in both cases being induced different types of damages.

If a person has a factory that dumps its garbage in a river without an owner and another one makes her living fishing in that river, then the first person´s activities negatively influence the second person in a way that is not caught in a price change, therefore the damage done is not included in market decisions. For the first person, the clean water is an input. But the clean water is also a scarce resource that could enter in alternative use, like fishing. The efficiency principle (Rosen, 2008, p. 72) states that for the water the first person should pay a price that reflects its value as a scarce resource which can be used for other activities. But there isn't any price paid and the water is inefficiently used.

Externalities are the result of the incapacity to set property rights, therefore there are some opinions holding that the most proper solution to externality problem is the one in which the public authority grants the universal allowance to delimit through homesteading of previously unowned "public" resources to good faith first users (the universalization of privatization principle) (Rothbard, 1982, pp. 55-99).

If a river has no owner, there is no market for it and everybody would use it without payment.

But if this resource would have an owner, the price would reflect its value in alternative use, so it would be efficiently used. If the person that fishes in the river would own it, the one who has the factory should pay her a tax for polluting, that expresses the damage done, taking into account these changes in her production decisions, and therefore not wasting the water. But if the one who has the factory were the owner, he should ask a tax for the privilege to fish in the river, tax that depends on the pollution level. Hence, the factory´s owner would have an incentive not to excessively pollute the river, because it will trigger a smaller tax.

Externalities have the following characteristics (Rosen, 2008, pp. 72, 73):

▪ *Externalities can be generated by both consumers and producers.* Not all externalities are generated by companies. If a person smokes in a crowded space, she will diminish the welfare of the people breathing the polluted air. Smoking has also other negative effects, both physical and financial, such as labour productivity decrease, the risk of generating fire, but, in some degree, we can talk about a few positive effects that smokers have on non-smokers.

There is an interesting approach of externalities (Gruber, 2005, pp. 160-161) represented by the (cynical) positive externalities for tax payers, generated by smokers´ premature death. Smokers pay taxes for social security programs, but don't live long enough to benefit from them, leaving more money in the government budget that can be used for the non-smokers.

▪ *Externalities are reciprocal.* If we return to the previous example, the one with the river and the two persons managing their activities based on it, the individual dumping garbage in the river is instinctively considered the polluter. But the other person can also be considered as polluting the river with fishermen, increasing the social cost of the factory´s owner. From the social point of view, as alternative to fishing, using the river for dumping garbage is not necessarily more damaging, everything depending on the costs of alternatives for each of the two activities.

▪ *Externalities can be positive.* Vaccinating against smallpox is an example of positive externality. In the process of vaccinating there are some costs, such as the vaccine price, discomfort and small risk of inducing a disease. In case of a biological terrorist attack, the vaccinated persons would benefit, meaning that their probability to get sick would be very low. On the other hand, from a person´s vaccination, other members of the community will benefit, meaning there is a small chance they will get the disease from that person. Yet neither the vaccinated person nor people around it take into account such external effects which measure the costs and benefits of this kind of activity, in the absence of government intervention.

▪ *Public goods can be referred as a particular type of externality.* When a person generates a positive externality, with effects for everyone in the economy, the externality is a pure public good. Most of the time, the distinction between public goods and externalities isn't very clear. For example, if a person installs in his garden a device for electrocuting flies, it is considered that a pure public good has been created if it had killed the flies from his whole community. In case only a fraction of the neighbours has been affected, then an externality has been generated.

Taxonomically speaking, the most popular way of classifying externalities is between negative (external costs) and positive (internal costs) ones.

On another account, using as the main elements producers and consumers, there can be identified four possible combinations of externalities (Moșteanu, 2005, p. 21): *from consumer to consumer, from producer to producer, from consumer to producer and from producer to consumer.* Externalities from consumer to consumer are known a pure consumption externalities, those from producer to producer as pure production externalities, those from consumer to producer mixed consumption externalities and the externalities from producer to consumer are known as mixed production externalities.

Another way of classifying externalities is based on the scale criterion. In this respect, there are externalities of small dimension and produced at local level. In this category, there is, for example, the impact loud music on a roommate, smoking, alcohol consumption, drug consumption. There are also worldwide externalities, the most relevant example being global warming.

In the table below there are synthetically displayed some types of externalities.

Table 1

Example of different types of externalities

Types of externality	External costs	External benefits
Pure production externalities (*generated and received in production*)	Acid rain pollution discharged by a power station which harms a nearby commercially run forest	A farmer benefiting from drainage undertaken by a neighbouring farmer
Mixed production externalities (*generated in production but received in consumption*)	Dust polluting discharged by a brickwork, breathed by asthmatic children living nearby	Commercially owned bees pollinating fruit trees in neighbouring gardens
Pure consumption externalities (*generated and received in consumption*)	Noisy music at a party disturbing neighbouring households	Households benefiting from the beauty of neighbouring gardens
Mixed consumption externalities (*generated in consumption but received in production*)	Congestion caused by private motorists increasing firms´ transport and delivery costs	Commercial bees keepers benefiting from private gardens of nearby houses

Source: Powell, Ray, *Advanced Economics,* Raithby, Lawrence&Co.Ltd, Leicester, p. 152.

2. Internalising externalities

Internalising externalities requires actions where *private negotiations* or *government intervention* lead to a price that reflects the total external costs and benefits of a person's decision.

2.1. Private solutions to internalising externalities

a) In order to solve the problem with externalities, Ronald Coase (1960) suggested *direct compensations to those affected*, in this respect releasing a theorem that carries his name, consisting of two parts.

The first part of Coase theorem states that when property rights are adequately defined, negotiations between the party creating externality and the party affected by it determine reaching social equilibrium. Because parties' negotiations end with internalising externalities, it is revealed that externalities don't automatically generate a market failure. The government intervenes only to rigorously set property rights, the rest of the problems being the private sector's responsibility.

The second part of the theorem states that the efficient solution doesn't depend on which party receives the property rights, as long as these are given to one party.

Coase used as example (Powell, p. 157) locomotives which used wood as fuel and generated fires on farmers' fields. If farmers had "property rights to prevent crops' destruction", they could sell those rights to railways companies, as long as the price

paid was higher than the damage done. But if the railway companies had the "property right to emit sparks" farmers could pay the companies to reduce them, the companies accepting this deal only if the payment was higher than the foregone earnings.

The Coase theorem makes two assumptions: the costs of negotiation (transaction costs) between parties are low and the resources' owners can identify the source for the damage done to their property and can legally prevent these damages. The theorem is relevant for situations where only a few parties are involved, externalities are of a small scale, produced locally and their sources are well defined.

However, in some situations negotiation is impossible or it could be done, at least in theory, with higher costs, as is the case of air polluting, where millions of people are affected. Moreover, even if property rights for air could be set, it should be difficult for the owners to identify those responsible for polluting the air and to what extend each person is responsible for her share (Rothbard, 1982).

b) Another way to internalise externalities is *merger of the involved firms*. In this situation each would take into account the damage he could produce to the other party and so, based on activities' coordination the profit of the new entity will be greater than the sum of individual profits, when each would independently take decisions.

c) Individuals can't merge, but sometimes *social conventions* can be considered an attempt to determine people to take responsibility for their own externalities. For example (Rosen, 2008, p. 81), children are taught that throwing garbage on the ground is an irresponsible and not nice gesture, inflicting costs for other persons. Certain moral values make people coordinate each other and therefore internalise externalities their behaviour might create.

2.2. Government's solution to internalising externalities

a) A solution for internalising externalities, given by the economist A.C. Pigou, is to levy o tax on the polluter to compensate for the fact that some inputs have prices too low. The Pigouvian tax represents a tax levied on each unit the production that generates externalities, until the price paid by the consumer equals the social marginal cost of the production.

Corrective taxes compensate for the fact that there isn't a market for externalities.

It has to be noted that the purpose of the corrective tax is to reduce the actions generating externalities to an optimal level and not to directly compensate those affected. This because if it was common knowledge that people affected by externalities were to receive a certain sum of money, then more people would be tempted to expose themselves to externalities, in comparison with the situation where no compensation was given (*moral hazard*).

A problem with this approach is that no incentives are given to search for ways to reduce pollution, others besides reducing production. Since taxation is levied on each unit of production, the company is not

motivated to install a pollution reduction technology to reduce emission of pollutants on each production unit, because this wouldn't diminish its total tax burden. To solve this problem, there can be levied a Pigouvian tax on each polluting emission unit, called emission fee. For each emission unit reduced, the company bears a cost, but, due to the emission tax, the total amount of money owed to the government diminishes with every unit of pollution reduced. Reducing pollution is done as long as tax economy for each unit exceeds the cost of reducing pollution with another unit.

b) An efficient level of production can be obtained paying the polluter to reduce his activity.

The subsidy is paid to the polluter for each unit of production he foregoes.

Furthermore, subsidies can be money paid by government to individuals or firms to take up activities with positive external effect. Subsidies for producers move the supply curve to the right, increasing both the quantity of the good and the positive externality generated by its production. Subsidies for consumers, paid directly to consumers in order to spend them on a certain good, move the demand curve to the right. For example (Powell, p. 161), to encourage public transport, the government gives subsidies for railway or municipal transport or can provide subsidised tickets for passengers.

c) Regulations, as a means to reduce externalities, can take the form of limits for pollutants emission or restrictions regarding the time of day or year when negative externalities can be legally produced. Total elimination of the negative externalities is impossible to achieve because it would mean elimination of some goods vital for survival.

d) The traditional regulations can be improved by adding a flexibility element, such as *negotiable emission rights*, that allow reaching a certain level of production and have as feature their transferability between parties. Companies or countries capable of reducing pollution more than the law permits can sell the remaining emission rights to those companies or countries which, for various reasons, can't or don't want to reduce pollution below the maximum limit. According to the Kyoto Treaty[1], Romania, which was also the first country to sign the protocol, can sell other states the right to emit greenhouse gases within the limit of the legal quota of 250 mil tones of gases carbon dioxide equivalent less how much pollutes today.

Choosing a type of instrument for internalising externalities can be done according to the objective set by the government, which can be reducing pollution and lower the costs with reducing pollution. As a relevant example, Poland and Sweden have used taxes for polluting combined with regulation regarding waste water treatment, whose discharge in the Baltic Sea have generated considerable damage. Moreover, London uses a congestion charge, levied on motorists who want to go through the centre of London, for the purpose to avoid road traffic, considering that for reducing environment pollution fuel taxes are more appropriate.

Quantity approach of externalities (Gruber, 2005, pp. 140-141) (regulations) sets to reduce pollution as much as possible, regardless of the costs, being the best method to obtain a maximum benefit when the pollution effects are big both for the environment and for people's health.

In the case of the price approach (taxes and subsidies), costs with reducing pollution will never exceed taxes, letting the pollutions production to a level that is not optimal with respect to the pollution level. If marginal costs prove to be greater than expected, they will apply a smaller reduction.

If an environment protection is desired, then it is best to choose the quantity approach and leave the price approach for when the emphasis is on cost rather than fighting pollution effects.

If theoretically the government corrective role for solving externalities defines itself by setting certain intervention measure, such as taxes, subsidies, regulation, to lead to a private cost close to the social cost, in practice this internalising operation is not so simple due to difficulties in measuring external costs.

3. Conclusions

Externalities appear when a person´s activity influences another person, actions not included in the price mechanism. In general, externalities have their roots in the absence of property rights.

Negative externalities cause market goods overproduction, while positive externalities lead to an underproduction of goods, in both cases being induced different types of damages.

If the government appoints property rights, its intervention being limited only to this job, Coase believes that the involved parties can negotiate to obtain an efficient output. This solution for internalising externalities asks for inconsiderable negotiating costs, small scale externalities and exact identification of externalities' source.

In case market fails to solve the externalities' problem, government intervention can be justified. The government has two types of instruments to intervene: the approach based on price (taxes, subsidies) and the approached based on quantity (regulations), which it can manage depending of its objectives.

Note

(1) Forces the sighnig countries to reduce greenhouse gases by at least 5% below the 1990 emissions, between 2008-2010. EU engaged itself in a 8% reduction.

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