

ECONOMIC CONCEPTUALIZATION OF NEGATIVE ENVIRONMENTAL EXTERNALITIES

Cornelia Gabriela Piciu,
Iuliana Militaru *

Abstract

In response to various pressures of society, economic agents polluting behaviors began to report externally on its environmental policy and performance. The importance of such an external report depends on the degree of change required in management culture and systems, in how new environmental protection measures influence management decisions.

"Internalization of externalities" implies a reassessment of how to identify and measure the relevant costs of processes and products (such as a "total cost assessment") and to design mechanisms for stimulating innovation. Following these changes, management decisions and behavior could be reoriented, aimed at the establishment of sustainable development, for example by applying a viable industrial ecology.

Key words: negative externalities, external costs, internalization of externalities

JEL classification: Q31, Q32, Q52

1. Introducing

By definition, markets do not include the effects of externalities or external costs. It is therefore important to identify the external effects of production systems and then to quantify their internalization of external costs. Internalization of external costs is made by a public authority and / or exchange through appropriate policy measures such as taxes and duties corrective changes, reduces the initial level of pollution production [10]. Before such measures are taken, policy makers should be informed about the existence and extent of external costs of different production systems. Need for calculating external costs is based on the following reasons:

- External costs immeasurable environmental conflict worsens. Decision-making process should be supported by an assessment of external costs be undergoing environmental mitigation or compensation in the final stage;
- Rules affecting competition, favoring technological development harmful ways;
- Affect the allocation of public resources, using resources from more efficient users (usually health system to reduce costs those in education and research - development);

* Cornelia Gabriela Piciu is PhD of Economics at Financial and Monetary Research Center "Victor Slăvescu", Bucharest, gabriela_piciu@yahoo.com, Iuliana Militaru is Associate Professor of Economics at Romanian-American University, Bucharest, iulianapredescu@yahoo.com,

- Reducing efficiency and social productivity of labor, one of the main factors in the development of a state [6].

2. The importance of environmental costs

The importance of environmental costs lies in the fact that these external costs are large social system and they are not just a symptom of serious environmental problems, but also problems of economic and social justice.

External costs can vary widely between countries, regions or cities, are considered barriers to healthy development of economy. Correcting elements that generate external costs is one of the conditions for sustainable development.

Knowledge of external costs, claims, damages, economic and social operators induced by the specific activities and their calculation is important for:

- calculation of externalities is essential to obtain an accurate analysis of cost-benefit analysis (CBA);
- the existence of large externalities known people, such as those related to environmental impact, is an obstacle to market price, in an attempt to reach a state of equilibrium between supply and demand;
- public policy should act to reduce external costs by applying environmental regulation and economic fairness in taxation policy based on the principle that the "polluter pays" principle;
- It is far better to estimate external costs than to ignore their existence [14].

Economic evaluation of environmental damage and estimation of external costs are of particular importance for the design and evaluation of environmental policy instruments (economic evaluation of environmental damage is of paramount importance to substantiate tariffs and subsidies based on environmental issues). Thus, criticism of environmental policy or tax increases purely motivated by environmental taxes can be offset by a scientific foundation "safety threshold" of damage costs related to enabling a comparative assessment of the environmental

Economic evaluation aims at assigning monetary values to environmental use. In economic terms, using produce cost environment where there is conflict between uses, and / or quality of goods is affected considerably beyond tolerable. This means that the environmental good in question is a rare commodity in the economic sense. However, in addition to the direct costs of use, there are also indirect costs to be considered, such as those affecting the environment negatively impact human health, either directly or through various impact pathways. If the environmental impact is taken into account, this leads to external effects - negative effects that expressed in monetary terms are referred to as external costs [3].

This is a feature of external costs: these costs are borne by the parties responsible, but by individuals (or society as a whole), which have no direct or indirect relationship with the relevant actors on the market.

Measure propensity to pay, to incur a loss is the common goal of assessment methodologies, which distinguishes them, however, is how to calculate the willingness to pay.

Estimation of external costs is a procedure for their evaluation, both qualitatively and quantitatively being done in the following steps:

- The analysis: assessment and description of the objectives in the context of its deployment;
- Design of business impact factors and impact of the main methods;
- A quantitative estimate impact methods;
- A final economic assessment of the effects produced by the application of monetary value [2].

3. Transfer of externalities

Given the large number of external cost categories, the number of components of environmental costs and the types of impact assessed in each category often arises whether a trader polluter can afford a full study or evaluation should rely at least partly on existing case studies in the literature. However, if we rely on existing studies, the question is what studies should be considered benchmarks and the selection criteria should be applied if the average values of damages would be excluded from the case studies, the methods and assumptions that led to the results. Also, special attention should be paid to the choice of the main criteria of correction to be applied in transfer cost - benefits and key parameters affecting transfer of damages context.

In an ideal situation, when all the information needed to assess the external costs of an activity are available, external costs are measured by the sum of the variances economic utility exposed to the effects of all factors final methods planned impact generated by the activity. This shall be done following steps:

- Framework of analysis;
- Selection and modeling of different ways to impact the environmental context and time in which it operates;
- Economic assessment of utility losses arising due to the impact on the environment.

In theory, this procedure involves a complex modeling in an uncertain framework, and economic evaluation phase, the company must carry out numerous studies on willingness to pay, one for each category of impact study. In this case, we are talking about very high evaluation costs, which could be reduced by using values already recorded in the case studies in the literature. In some cases, even impact reconstruction chemical and physical methods can be simplified through an appropriate benefit transfer [4].

To avoid failures of assessment, transfer costs in the literature (an operation is inevitable to some extent) is based on the following steps:

- Knowledge of a number of case studies or reviews (authors, sponsors, assumptions, methodologies, results, etc.);
- Selecting the best values of damage or functions;
- Applying appropriate transfer criteria for social and economic context under evaluation, environmental sound criteria and economic criteria. This is the main

reason why environmental economist should always be part of the evaluation team of external costs [11].

4. Self-protection measures for environmental negative externalities

Economic actors polluting behaviors have a different attitude towards risk. This approach depends on several factors, including the nature of the risk, the probability of losing entity, the potential seriousness of loss and its economic consequences. Assuming that the operator demonstrates rationality and perfect information, economic actors are able to calculate the actual value of a given risk by discounting the magnitude of losses [9].

Polluting behavior of economic agents often reduce the severity of undesirable events. Once the risk is properly identified and assessed on the internalization of externalities decisions still need to be taken immediately. In this perspective, economic actors can have the following attitudes:

- Economic agents 'risk aversion' - businesses assume risks: are willing to pay more than the actual risk, in order to transfer its damaging consequences of someone else's work;

- Economic agents' preference for risk ", prefer to keep the risk of loss,

- Operators have an attitude "risk neutral" where are indifferent about the choice between:

- (A) Determining risk and

- (B) Transfer the risk to someone else through advance payment of an amount equal to its true value [12].

Businesses can self-protect by passing negative externalities from other agents. An economic self-protection may also reduce or filter the severity of occurrence from which other business could suffer.

I believe that X_i is physical measures of self, the agent and to adopt measures that X_j is agent j .

From formula, I express the expected damage function of agent i as follows:

$$D_i(X_i, X_j) = [1 - \pi_i(X_i, X_j)] L_i(X_i, X_j) \quad (1)$$

$[1 - \pi_i(\bullet)]$ is the probability that agent i will suffer an economic loss $L_i(\bullet)$.

Expected loss function highlights two key components of a potential undesirable event: the probability that the event will occur $1 - \pi_i(\bullet)$, and its severity, $L_i(\bullet)$, where the event actually happens. The difference between probability and severity is unnecessary. It was) demonstrated empirically (Shogren, 1991), that individuals recover more of an unwanted event less likely than reducing the severity of its occurrence [16].

The self agent will reduce the expected damages as follows:

$$\frac{\partial D_i}{\partial X_i} < 0 \text{ is } \frac{\partial \pi_i}{\partial X_i} > 0 \text{ and } \frac{\partial L_i}{\partial X_i} < 0$$

Since a trader can resort to self-protection for unwanted environmental externality, we aim to study the efficiency of non-cooperative behavior and economic cooperation [1].

We consider two undertakings, i and j , facing possible economic losses as a result of exposure to negative externalities. In this case we have the following possible scenarios:

1. two economic agents, i and j , does not cooperate, but each take measures of self-protection;
2. the two economic agents, i and j , can cooperate if it is jointly adopt self-protection measures;

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Given that self-protection measures exist economic costs polluters i and j can be written:

$$C_i(X_i, X_j) = P_i(X_i) + D_i(X_i, X_j)$$

$$C_j(X_i, X_j) = P_j(X_j) + D_j(X_i, X_j)$$

Expected environmental costs (minimized) for polluting economic agents i and j are:

$$\min_{X_i} C_i(X_i, X_j) = P_i(X_i) + D_i(X_i, X_j)$$

$$\min_{X_j} C_j(X_i, X_j) = P_j(X_j) + D_j(X_i, X_j)$$

Where: $C_i(X_i, X_j)$ = i the economic costs and externalities are included

$C_j(X_i, X_j)$ = j trader costs which include externalities

We form a system so that we have:

$$\frac{\partial C_i}{\partial X_i} = \frac{\partial P_i}{\partial X_i} + \frac{\partial D_i}{\partial X_i} = 0$$

$$\frac{\partial C_j}{\partial X_j} = \frac{\partial P_j}{\partial X_j} + \frac{\partial D_j}{\partial X_j} = 0$$

If there is no cooperation between economic solutions of these equations are of the form (x_i, x_j) ,

$C_i(X_i, X_j)$ can be greater than $C_j(X_i, X_j)$ ($C_i(X_i, X_j) > C_j(X_i, X_j)$) or $C_i(X_i, X_j)$ be less than that $C_j(X_i, X_j)$ ($C_i(X_i, X_j) < C_j(X_i, X_j)$)

It is noted that a lack of cooperation behavior unilaterally may lead to inadequate allocation of resources; and focused actions can increase economic efficiency. What is important to remember when uncooperative behavior is that with a self-transferable and filterable externalities can create, in turn, another externality. It is considered that most environmental policies can only transfer, not solve existing externalities [17].

In the absence of government limits imposed on the activities uncooperative, irresponsibility shown by some businesses make better environment and its preservation seem very expensive [5].

Conventional theory that ignores transferability, leads to the conclusion that the efficient resolution of externalities requires reduction. Transferable negative externalities theory shows that a trader who does not cooperate with the rest polluting businesses will cause great environmental damage. The strategic control of externalities, which encourages cooperation between economic agents polluting behavior, should be resumed consideration. When externalities transfers are possible, technically speaking, are merely strategies to increase the degree of inefficiency, emerged from uncooperative behavior [15].

2. two economic agents i and j jointly cooperate and adopt self-protection measures

Given that self-protection measures exist cooperative solution provides that common environmental costs to be minimized as follows:

$$\text{Min } C = C_i (X_i, X_j) + C_j (X_i, X_j) = P_i (X_i) + P_j (X_i, X_j) + D_i (X_i, X_j) + D_j (X_i, X_j)$$

$$\frac{\partial C}{\partial X_i} = \frac{\partial P_i}{\partial X_i} + \frac{\partial D_i}{\partial X_i} + \frac{\partial D_j}{\partial X_i} = 0$$

$$\frac{\partial C}{\partial X_j} = \frac{\partial P_j}{\partial X_j} + \frac{\partial D_j}{\partial X_j} + \frac{\partial D_i}{\partial X_j} = 0$$

for negative externalities $C (X_i, X_j)$ and $C (X_i, X_j)$. The estimated costs include the cost of protection $P (X)$ and damage function $D (X, q)$. Thus, it can be shown that where there is self-protection, an externality can be transferred from one company to another, then don't cooperate behavior will lead to overprotection. If self-protection or reduce externality, a trader refusal to cooperate will lead to exposure.

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5. Conclusions

The results suggest that coordination of protection activities among economic agents polluting behaviors earnings will increase global environmental policy. The internal European Single Market in 1992, coordination of protection between economic agents polluting behaviors, minimizes environmental costs reducing public credibility of those who claimed that these measures are very costly environmental policy.

It has become essential for businesses with polluting behavior to assume greater responsibility for environmental issues and to adapt current practices, seeking to produce increasingly less environmental damage. Harnessing this responsibility is therefore a key element in any strategy to achieve the objective sustainability [7]. Evaluating the feasibility of such a strategy requires not only scientific problems, and attention to political, economic, social and organizational, are necessary. A key factor in this process is to change the way companies make decisions that will impact on the environment.

References

1. Bird, J., 1987, *The Transferability and Depletability of Externalities*, Journal of Environmental Economics and Management, pp. 54-57;
2. De Vries, H.J.M., Petersen A.C., 2009, *Conceptualizing sustainable development: An assessment methodology connecting values, knowledge, worldviews and scenarios*, Ecological Economics, pp. 1006–1019;
3. del Mercato, E. L., 2006. *Existența echilibrului concurențial cu externalități: Un punct de vedere diferit*. Revista de economie matematică, pp. 525-543;
4. Giddens, A., *The Consequences of the Modernity*, Cambridge, Polity Press, 19;
5. Hansjurgens, Bernd, Antes, Ralf, 2008, *Economics and Management of Climate Change, Risks, Mitigation and Adaptation*, Springer Science and Business Media, LLC;
6. Heidhues, P., Riedel, F., 2007, *Sunt importante preferințele sociale pe piețele concurențiale?*, Working paper 392, Institutul de Economie Matematică, Universitatea Bielefeld;
7. Huitema, Dave, 2011, *The Evaluation of Climate Policy: Theory and Emerging Practice in Europe*, Springer;
8. Johansen , Inger Lise, 2010, *Foundations of Risk Assessment*, Editori Kammer;
9. Smithson, Michael, 2008, *Uncertainty and Risk- Multidisciplinary Perspectives*”, *EarthScan , Publishing For a Sustainable Future*, London, London Sterling, VA;
10. Kneese, A., Ayres, R., and d’Arge. R., 1970, *Economics and the Environment: A Materials Balance Approach*, Washington, D.C.: Resources for the Future;
11. Marchand. J. and Russell, K., 1973, *Externalities, Liability, Separability, and Resource Allocation*, American Economic Review, pp. 611-620.

12. Mark P. Sharfman & C. S. Fernando, 2008, *Environmental risk management and the cost of capital*, Strategic Management Journal Volume 29, pages 569–592.
13. Maxwell, Dorothy (Project Director) - “Addressing the Rebound Effect - Final Report”, European Commission , DG ENV, 2011;
14. Piciu, G., coordonator, (2012), „Riscurile ecologice și costurile politicilor de mediu din perspective dezvoltării durabile”, proiect de cercetare CCFM;
15. Randall, Alan (2011) - “Risk and Precaution”, Cambridge University Press, Cambridge, New York, 2011;
16. Shogren, J. and Crocker, T. (1991), ‘Risk, Self-Protection, and Ex Ante Valuation’, *Journal of Environmental Economics and Management* 20: 1-15.
17. Shogren, J. (1990), ‘The Impact of Self-Protection and Self-Insurance on Individual Response to Risk’. *Journal of Risk and Uncertainty* 3: 191-204.