



CAPACITY TO FINANCE ENVIRONMENTAL INVESTMENTS OF A POLLUTER

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Rezumat

Evaluarea riscurilor finanțării proiectelor de investiții de mediu, având ca fundamente identificarea, interdependența, analiza și prospectarea efectelor acestora, se impune deoarece eludarea, abordarea individuală sau dimensionarea eronată a acestora ar putea avea consecințe nefavorabile și neprevăzute în ceea ce privește eficiența strategiilor și politicilor în domeniul protecției mediului.

Această cercetare are scopul de a identifica, pe baza unei analize științifice, metodologice și empirice, raportată la conceptele, principiile și argumentele impuse de teoria economică, riscurile asociate finanțării proiectelor de investiții de mediu, precum și alternativele, din perspectiva dezvoltării durabile, de:

- (1) evitare și de internalizare a costurilor de finanțare;
- (2) evitare și de internalizare a externalităților de mediu.

Abstract

Risk evaluation of financing environmental investment projects presumes the identification, interdependency, analysis and prospecting of their effects. This is necessary because the elusion, individual approach or improper sizing of these investment projects may have unfavourable and unpredicted consequences on the efficiency of the strategies and policies of environmental protection.

This purpose of this research is to identify, through scientific, methodological and empirical analysis of the economic concepts,

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principles and arguments, the risks associated to the sustainable financing of environmental investment projects in terms of:

- (1) Avoiding and internalising the financing costs;
- (2) Avoiding and internalising the environmental externalities.

JEL classification: Q56

Keywords: financing risks, financing through projects, investments for environmental protection

Introduction

Apparently, there is no direct or strong relation, between the dynamics of the demand and the production recipe of a product – e.g. a good (not service) – manufactured through a polluting production process. The direct relation is only apparently missing, upon a superficial analysis, because it is closely related to the financing of a project of investment, for instance the expansion of the production capacity of the polluting factory – which aims to decrease the amount of pollutants released (into the air, water or soil).

To start with, the analysis must be set within its natural settings pollution became a problem only after, and because, its *amplitude* and the amplitude of its *effects* draw the attention due to the entailed difficulties. The, almost mathematical, relation between these two terms, the classification of a reality as negative element and its amplitude, where the first is function of the second, clearly highlights the economic and social substrate of the need for risk assessment related to the financing of the investments for environmental protection.

It is a fact that what is produced, and for *whom* – through economic activities whose deleterious environmental effects cause worrying – is the “raw material” for the ecology, the object of activity of the ecologists and the matter of concern for this paper. However, this real background of the ecology cannot be described in terms of a contradiction because it is a binomial – even an unsustainable one on the long-term; the two dynamics that describe it are integrated within a single reality, the real economy, they are not individually autonomous.

The financing capacity of a polluter depends on the demand for its products

Environmental protection should be achieved with the maximal efficiency by the society to its direct and concrete benefit; in these terms

pollution is a harmful objective existence in a subjective plan, in other words, in the social plan. For a polluter, the financing of an investment project concomitantly with the financing of its efforts for environmental protection is more so difficult, in any economy, as the society aims to limit its financial potential because – and against – its production capacity.

In purely social terms, the polluter manufactures a production which is too large to fit the long-term requirement of the population, at least the population in the neighbourhood of the polluter; the production relying on an intrinsically polluting process pollutes more with the increase of production scale.

However, in purely economic terms, and drafting a *status quo* of the market (in a specific state from a real economy) and of the existing products, each polluter, as distinct unit and the whole polluting industry, are indispensable to the people, to the consumers, because they produce goods and services needed by the consumers.

These goods and services are produced concomitantly with the pollution of the environment. However, this relation is, hopefully, not indissoluble: the economic (industrial) products can be produced presently only using polluting processes and production means; optimistically, they might be produced, also presently, without pollution, but at (much) higher costs.

The problem is that there is no contradiction, a recoil effect, which while preserving a component – the production of the socially expected outcomes, may discard the second component (it is not desirable to discard the economic activity/reality which affects by pollution). In other words, the problem of pollution, of financing the investments, while intensifying the efforts towards environmental protection, cannot be treated as a willingly environmental protection because it cannot be solved in the same manner.

More clearly, we cannot approach it in a similar manner: the industries, and not just them, but all the polluting economic activities – produce (practically) all the consumer goods and services on the market; on the short term, halting the production of the polluting factories, to give just one example, would be similar to living a subsistence life.

On the other hand, however, the difficulty of financing the investment projects on the background of an active environmental protection will be judged with conceptual-mathematical instruments. We will not use a true mathematical tool but we will input the basic variables of the

microeconomic processes into several inequalities, sufficiently precise and concrete, as to delineate the limit beyond which it is impossible to go.

Our previous analysis is related directly to the following inequalities and this has solid justification: the, supposedly positive, utility of a polluting production as it is the case here – produces the effect that not just the whole society, but the management of the polluting company too, or maybe primarily it, cannot conceive *caeteris paribus*, the variant of a strong decrease of production.

The available models, supplied by the literature, show precisely how much a polluter moves off the borders of the sustainable economic growth (environmental and macroeconomic), the size of production being one of the two poles. More clearly, the society, more precisely the state, must finance one way or the other, the actions of removing the pollutants from the environment. A “typical” polluter:

- a) Has a production (Q) which is larger than the *optimal production* (Q^*) – from the social and macroeconomic (e.g. budgetary) points of view, thus also producing a very large amount of pollutants;
- b) Calculates a (much) lower marginal cost than the real one¹, which is detrimental both the real economy in which it operates and the state, because it doesn't include the marginal cost of the production and release of pollutants into the environment and their subsequent removal from the environment.

In conclusion, capacity of a polluter to finance its own investment projects (if the polluter decides to modify the above parameters so as to be in agreement with the environmental requirements) follows strictly the path established by the adjustment of the production size and of the marginal costs.

This can be observed immediately from the following two inequalities, where we note with Q_0 and C_{mg_0} the initial production (the „very polluting”

¹ Algebraically, if we note with C_{mg} the marginal cost calculated and recorded by the polluting enterprise, and with C_{mg}^* the optimal marginal cost – also from the social and macroeconomic points of view, $C_{mg} \ll C_{mg}^*$.

one), and the initial marginal cost, and with Q_1 and C_{mg_1} the adjusted size of these two indicators:

$$\begin{cases} Q_1 = Q^* < Q_0 \\ C_{mg_1} \gg C_{mg_0} \end{cases}$$

It is not difficult to notice that on these economic bases the financing capacity of a polluter – which took the necessary measures to pollute just as much as it is allowed – to bear itself as much as possible the depollution activity, is drastically reduced, under the conditions in which the product which it manufactures is demanded much on the market.

Financing the investment projects vs. maximization of the polluter's profit

The classical target of any company operating within a market economy – profit maximization – is rather difficult to be achieved by a polluter which acts in agreement with the social requirements, and not only, for the reorganisation of its (polluting) production flow with the view to reduce drastically the polluting emissions.

However, this objective of profit maximization cannot be omitted from the strategic plan of a polluter since that particular company has to be profitable in order to function for a long period; at the same time, it needs financial funds which it can earn by financing the investment funds.

As it is known, funds allocation for an investment project involves three basic decisions:

- A. Budgeting the capital;
- B. Financing;
- C. Dividend policy.

Dealing more with the risks of the *major* financing of the investment projects and less with the outcomes of the (successfully) implemented investment projects – possibly talking about the profit sharing policy, about the secondary and indirect financing by the payment of small or null dividends available to the company after the **profit has been assured and shown in the accountancy books** – we are more interested by the previously mentioned two decisions and will therefore go into detail with them.

The microeconomic theory, validated by the practice of economic life (under market conditions, at least), says that a company may produce (provided it sells completely or much of the production from each production cycle) and function successfully if the marginal income is higher than the marginal cost. Hence, the risks of financing for a polluter have both a financial form and content and an actually economic property.

Looking in detail to the impact of these microeconomic variables, when the marginal income *starts to decrease* in relation with a moment of reference (when $V_{mg} > C_{mg}$, V_{mg} being the marginal income) while the marginal cost *starts to increase*, until the moment when these two variables are equal, this is the limit of the efficient functioning of the firm.

This also is the limit of the financial efficiency, meaning that if the marginal cost keeps increasing while the marginal income at least remains constant, the company starts to produce with losses.

All these principles function, in average, only against the polluter, with a single exception, e.g. if the polluter decides to change the production process and strategy in order to control its polluting emissions by re-technologization and by cutting down the production.

In order to be synthetic, we will describe these risks², the most important and numerous ones which we grouped so as to highlight their identical economic and financial substrate; however, there is one more risk, not actually typical, "just" a major risk (which is not related exclusively to the financing of an investment project for environmental protection).

These risks are:

(A') Risk of payments cessation (bankruptcy)

(B') Risk of taking (too) expensive loans

(Γ') Risk of underfinancing (regarding the actual financing of the investment project)

(Δ') Risk of bearing an average cost³ which is higher than its minimal (theoretical) value

(E') Risk of bearing much of/completely the marginal cost

Adding to these is the

(Σ') Risk of unprofitable acquisition/merger

² For the content of the risk concept in economics and for its typology, see Eatwell, J., Milgate, M., Newman, P., *The New Palgrave: A Dictionary of Economics*, The Macmillan Press Limited, 1996.

³ Cost of procuring the financial funds.

We consider that for any company operating within a market economy the financial loss is the extreme benchmark of the financial loss because this is the state which the company can no longer leave because it cannot cover the loss by its existing means (own or borrowed).

The risk of a permanent financial loss, in other words the bankruptcy risk is one of the risks of financing the projects for environmental protection. The financial risks of an (ex) polluter which "ecologizes" its activities and processes as much as possible are highly variable and directly proportional to the size of the marginal cost, on the one hand, and with its capacity for (self)financing, on the other hand.

In the practice of financing the activity of a company, its investment projects included (with a decreasing "ecological" production and with a much higher marginal cost than before the decisions for the *actual* environmental protection), it is really difficult to decide going on with the production just on the basis of the increasing marginal income.

One cause relies in the current technological reality that, at least to some extent, the less/non polluting technologies do not guarantee the (exponential) increase of the marginal income of the company using them: the dynamics seems to be rather opposite. This is what we called the **risk of bearing much of/completely the marginal cost**.

On the other hand, the exception mentioned above is the possible situation of monopoly of the polluter, which is quite often in such cases. If the polluter is a monopoly in its area of activity it may undoubtedly adopt *de facto* the stance of economic agent which invests only in the investment projects related to environmental protection, under the conditions mentioned previously, since it can do this if the market, the consumers of its products accept the effects of this decision, i.e. forcing the consumers to assume – by increasing the price of the product – the entire increase of the marginal cost.

If we admit the equivalence one unit of product – one (more) unit of pollutant expelled into the environment, a polluting company is asked to reduce drastically the polluting emissions if this happens when the extent of the damages due to pollution is maximal at the moment of the highest economic efficiency – at least since it is represented by the volume of production.

Reverting to the investments strategy of a (former) polluting company we must say that ensuring the budget for the capital presumes the exact

quantification of the financial resources of the company, both its own resources and the borrowed ones. This allows calculating precisely the necessary proportion of each type of financial resource within the mix of financial resources used for a specific project of investments.

The substrate is economic-financial: the management can decide the implementation of a very important investment project, basic for the future of the company, or which will allow expanding the activity and thus the financial power of the company, but this claims an important financial sacrifice. This sacrifice is a long-term one if the cost of the borrowed financial resources is high. This may bring a risk which cannot be neglected, the **risk of taking (too) expensive loans**.

On the other hand, if the own resources of the company have a (much) lower cost than the external resources, a particular project of investments which is less important for the company or which runs while not having enough financial resources to cover the cost of the exogenous financial sources, must be financed as much as possible from own sources provided they are available in sufficient amounts to finish the investments project and that it doesn't fail due to underfinancing. This brings about another risk, the **risk of underfinancing**.

The actual financing, as distinct decision within the process of funds allocation for investment projects, has a precise and hardly attainable objective, which enables the financial dynamics to be sustainable indeed. This is materialised in the procurement of financial funds for the investment projects (for environmental protection) at the lowest average cost. In other words, all measures have to be taken so that the risk of procuring financial funds whose average cost is higher than their minimal value (that can be obtained in practice) doesn't materialise.

This objective is a double one because the financial funds procured at the lowest average cost entail a lower rate of their yield⁴; the rate of yield is usually expressed as the percent increase *above* the *cost of investment* at moment t_0 (the initial moment, against which the specific financial dynamics is compared). Anyhow, a major risk of the companies investing in environmental protection is the **risk of bearing an average cost⁵ which is higher than its minimal (theoretical) value**.

There is a relation between the capacity of the company to materialise profit maximization and the need for proper financing of the investment

⁴ This rate of the yield is used to calculate the actual cost of the project.

⁵ Cost of procuring the financial funds.

projects for environmental protection making use of a special type of investment project.

This special type of investment project is the investment in another company or companies, by buying them or by merging with them. The company, particularly if it is a monopoly, may wish to reach the stage of scale economy, which may also be beneficial for the environmental protection, particularly if there is an acquisition on the vertical (companies supplying raw materials or which clean up the pollutants from the environment and which restore the environment).

If such project of investments materialises, this may increase significantly both the operational efficiency of the resulting company and the quality of activity coordination. It will also increase the financial efficiency because the double financing will disappear: activities which the company was doing and simultaneously paying before the acquisition/merger, as well as similar or identical activities which the polluting company had to externalise.

One of the positive consequences – at least on the short term – of the acquisition/merger is the expansion of activity. This can bring benefits by decreasing the global financial risk for the company by:

- (1) Obtaining (possible) fiscal advantages;
- (2) “Free” acquisition of a stock of liquidities.

The potential benefits are as important as possible; however if, after the merger, the company which bought or merged with another company is in a precarious financial situation it may miss these potential benefits because of the **risk of unprofitable acquisition/merger**.

Several risks, typical or not, have been identified for the company which finances projects of environmental protection, compelled by the circumstances, by the state institutions or just aware of the environmental damages that it causes.

A graphical representation can be drawn up, a diagram of the risks, whose structure is precisely fundamented by the evaluation of the company costs (cost of depollution included) versus the risks of financing the economic processes of the same company. This is a quasi-mathematical expression of the risk function of the costs incurred by the company.

Not to let it remain a purely literary abstraction, the risk is approximated by the quantification of its inexistence and of its effects, in

other words, by what the company can obtain by avoiding the economic and financial risks.

Put differently, we presume the continuous deployment of efforts so that the company growth harms the environment as little as possible. The costs include every expenditures incurred by the company, not just the costs associated to the depollution activity.

The diagram looks like this:

←

	C (cost)	<i>max.</i>				<i>min.</i>
↓	Q (production)					
	<i>Minimal production</i> ⇔ Maximal risk	(A')	(Σ')			
			(B')			
					(E')	
	<i>Maximal production</i> ⇔ Minimal risk			(Δ')		(Γ')

It is also interesting and relevant, for the manager of the (former) polluting company included, to make a connection between the risk confronting the company, irrespective of its severity, and the quality, structure of its liabilities.

The liabilities consist of own capitals and debts. The liabilities of a company depend on the size of the company and on the cost of its investment projects whose financing has to be secured.

A basic principle of financial technique, recently discovered or rediscovered after the 1933 crisis, expresses an obvious truth: the short-term credits **cannot** finance large investment (projects) spanning over (several) years, because such utilizations cannot be paid from the results of the investments because of the different periods of the credits and

because the long-term investments cannot become, on the short-term, cash-flow sources.

A polluter which considers playing this role at the minimal level, or a former polluter (industrial or other economic branch), can allocate important funds for the investment projects from its own capital (shareholders contributions).

In this case, however, on the long term, the dividend policy is necessarily directed towards the shareholders by not allowing the company to accumulate important financial reserves; within its liabilities, the polluting company may establish a volume consisting of own capitals, as large as the management decides, but it will not be allowed to use this capital for long-term projects, as one might think.

The need to ground de investment decision particularly on long-term debts is more than justified by the following variables:

1. Number and amplitude of the investment projects needing large funds (may have at least two running simultaneously);
2. The productive, industrial activity of a (large) company whose projects are directed towards environmental protection necessarily runs on the long term;
3. The financial requirements of the depolluting activities and of the related activities usually require important financial funds and often run on the long term.

The risks of financing environmental protection projects must be evaluated from various perspectives; the financial perspective is important for the long-term development of the company and is relevant for decision-making process of the management and for the acceptance of these decisions by the shareholders.

Conclusions

The importance of some indicators such as the marginal income and the marginal cost, next to the advantage of the monopoly, proves that the economic sector of activity of the company is very important. The production type of the company is crucial for the financing of the environmental protection projects.

It is also important to know if, or for how long, the product is competed on the market by products with role of replacers.

The analysis of the – typical or less typical – risks confronting the company which invests in environmental protection projects is a subject of

fundamental research; a cybernetic or purely information structure of it will be required in the future.

In conclusion, complex effects on the company liabilities appear in relation with the risks of financing the environmental protection projects; these risks are interconnected within a network of economic variables by which they are influenced and which they also influence.

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