CONSIDERATIONS ON THE EVALUATION METHODS OF PROJECTS WITH LONG-TERM CAPITAL INVESTMENTS

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ABSTRACT: *For substantiating investment decisions, the rate of return on invested capital (which shows how much the invested monetary unit "earns" annually) is of "critical" importance. Consequently, any economic study of a project that involves capital investments must be prepared so as to include aspects regarding the return on invested capital that the considered project will produce or will be required to produce. By convention, long-term capital investment projects are considered those projects for which the flows of revenues and current costs are scheduled over time for a period longer than one year. For the economic evaluation of such projects, worldwide practice has established the use of certain methods. Among these, there are certain similarities and interdependencies, on which the present paper focuses.*

KEY WORDS: *project, economic evaluation, evaluation methods*.

JEL CLASSIFICATIONS: *D81, G31, O22.*

1. INTRODUCTION

The primary objective of management is the maximization of the firm's value. This objective is achieved only if the optimal combination of financial management decisions is ensured, regarding investment opportunities, sources of financing, and the distribution of dividends.

Any management decision that does not pursue maximizing the firm's share price falls into the category of decisions that allocate the firm's wealth for the benefit of its legal owners.

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The investment decision is directly related to the evaluation of the economic efficiency of the proposed investment and to the allocation of available capital among alternative or competing projects.

It is important to emphasize that allocating the available capital among projects assumes that all the analyzed investment projects do not differ in terms of the risk of implementation within the firm and that adopting one project or another (or a certain group of projects) does not change the overall risk that characterizes the firm.

Making the investment decision requires the evaluation of each alternative project. In the economic evaluation of projects, worldwide practice uses a series of methods known as methods for evaluating the economic efficiency of investment projects.

In other words, these methods make it possible to solve the problem of feasibility and of the degree of attractiveness of investing in one project or another. In addition, with the help of these evaluation methods, all investment projects that are subject to analysis can be ranked according to their degree of attractiveness.

All methods of economic evaluation of projects are based on two fundamental principles:

- higher gains are preferable to lower gains;
- gains obtained earlier are preferable to those obtained later.

It is important to underline that all methods of economic evaluation of projects are based on quantitative indicators of efficiency, but they alone do not ensure the substantiation of the investment decision.

The methods determine the general orientation in adopting the decision, which must be supplemented and may be corrected by taking into consideration qualitative information about other economic consequences of project implementation, scientific and technological progress, social aspects, etc.

In addition, in adopting the decision, account must also be taken of the risk of implementing the project.

With regard to objective quantitative evaluation of long-term capital investment projects, worldwide practice widely uses the following methods:

-Rate of Return (RR);
-Payback Period (PP);
-Discounted Payback Period (DPP);
-Net Present Value (NPV);
-Net Future Value (NFV);
-Net Annual Value (NAV);
-Profitability Index (PI);
-Internal Rate of Return (IRR);

-External Rate of Return (ERR);
-Wealth Growth Rate (WGR);
-Growth Rate of Return (GRR).

2. THE INTERDEPENDENCE OF THE ECONOMIC EVALUATION METHODS OF PROJECTS WITH LONG-TERM CAPITAL INVESTMENTS

The methods for evaluating investment projects can be used both independently and in various combinations. For this reason, it is very important to consider the interdependencies among them.

2.1. THE NPV METHOD AND THE IRR METHOD

When analyzing the same project, these evaluation methods provide the same answer to the question regarding the acceptability of the project.

However, it should be emphasized that these evaluation methods are based on discounting cash flows and may lead to contrary results when comparing mutually exclusive projects. The conflict that appears between these two methods results from the way different values are adopted for the discount rate.

The IRR method assumes that cash flows are reinvested at a rate of return equal to the IRR (throughout the project's duration), while the NPV method assumes that cash flows are reinvested at a rate of return equal to the discount rate used.

In the case of using the IRR method, implicitly, for projects with a high IRR it is assumed that a high reinvestment rate exists, while for projects with a low IRR it is assumed that a low reinvestment rate exists, in both cases without taking into consideration the reinvestment rate within the company that implements the projects. Only in a situation, when the calculated IRR coincides with the company's reinvestment rate, is the mentioned deficiency eliminated.

From here, a particularly important conclusion can be drawn: even if projects are characterized by different IRR values, it is unlikely that the reinvestment rates that characterize them differ significantly from one another (because whichever project is chosen, it will be implemented within the same company).

Unlike the IRR method, the NPV method assumes that the discount rate used represents the reinvestment rate that remains unchanged throughout the entire life of the project. This rate has the character of a minimum acceptable rate of return required by the company.

However, the actual reinvestment rate may exceed the minimum required rate of return. As a consequence, it follows that there are not many advantages to using the same rate of return for all analyzed investment projects.

2.2. THE WGR METHOD AND OTHER METHODS

WGR is considered a fundamental criterion for evaluating investment projects because it allows comparison of projects with different lifetimes.

This evaluation method presents the advantages of each evaluated project through the rate of return, which can be directly compared with the company's own reinvestment rate or with the required (acceptable) rate of return.

It can be said that WGR is equal to the reinvestment rate or the acceptable rate of return when NPV = 0 or PI = 1. Therefore, this evaluation method ensures the same accept/reject decision as the NPV method.

However, because the WGR method allows comparison of projects with different durations, it constitutes a better method for ranking investment projects.

For example, projects with the same NPV or PI value, but with different durations, can be ranked only on the basis of the WGR criterion.

2.3. THE GRR METHOD AND OTHER METHODS

The GRR method presents the same particularities as the WGR method, except for the assumption regarding the moment of project evaluation. GRR evaluates projects after an arbitrary period of time, unlike WGR, which evaluates them at the end of their operating life.

In addition, the WGR method uses two different values of the reinvestment rate for a project, while the GRR method uses the same value of the reinvestment rate for all projects.

In essence, the choice between the WGR and GRR methods are related to adopting the most realistic assumption regarding the reinvestment rate. Evidently, the computation of GRR depends on the moment in time chosen for evaluation.

However, if projects are compared at one and the same moment in time and for one and the same reinvestment rate, the GRR and NPV methods lead to the same accept/reject decision result for the project, respectively to the same ranking of projects as the PI method. This represents a consequence of the particularities of the calculation and of the assumptions regarding reinvestment.

3. PROJECT RANKING

There are two fundamental principles that must underlie the methods of evaluating investment projects, namely: higher profit is preferable to lower profit, and profit obtained earlier is preferable to profit obtained later.

The evaluation methods that respond to these principles take into account the influence of the time factor on money. Usually, these evaluation methods ensure a unique decision regarding the acceptance/rejection of a project, but they may lead to different results regarding the ranking of projects.

The problem of ranking projects is essentially related to the concept of long-term capital allocation. The concept of long-term capital allocation is based on the process of optimally allocating the capital available to the company among possible investment projects.

In general, capital allocation involves the following stages:

- development of investment projects;
- estimation of the dynamics of project cash flows;
- selection of the criterion (criteria) for assessing project feasibility;
- ranking of projects according to each evaluation criterion used;
- presentation of proposals for project re-evaluation.

The final selection of investment projects is based on determining their relative efficiency. Essentially, the problem of capital allocation is analyzed as a selection problem: from the set of all projects, certain groups (categories) of projects are chosen.

This selection is based both on restrictions regarding the allocation of the company's capital and on restrictions regarding the use of its other resources (technological, human, informational, and of other nature).

4. INDEPENDENT PROJECTS AND DEPENDENT PROJECTS

Projects are considered independent when their selection or adoption does not depend on the selection of other projects. Evidently, among a company's possible projects it is difficult to find absolutely independent projects, but, usually, projects are considered independent if they are functionally different.

For example, the project of acquiring new equipment and the project of developing and supporting a new competitive strategy can be considered independent projects.

The problem of allocating capital among independent projects is usually simpler. In this case, using evaluation methods, decisions are substantiated regarding acceptance/rejection of the analyzed projects or a ranking of projects is prepared in order to choose the best ones.

The most typical situation of dependent projects (linked to one another) is such that choosing one project influences the decision to choose another. A sufficiently widespread situation of dependent projects is that which appears as a result of investing in a certain project, a project that should be continued with other, additional projects. These additional projects are dependent because their acceptance depends on earlier decisions.

However, the earlier project is not dependent on the complementary (additional) projects.

In many cases, project dependence represents a condition of mutual exclusivity (choosing one project automatically leads to excluding another/others). For example, dependent projects may be projects for purchasing different types of equipment, when choosing a certain one leads to excluding the purchase of the others.

5. PROJECTS WITH DIFFERENT ECONOMIC LIFETIMES

Mutually exclusive projects are very often characterized by different lifetimes. Despite the dependence among projects, they may differ in duration. With the help of the WGR and GRR methods, the problem of evaluating projects with different lifetimes can be solved.

However, it is necessary to take into account the fact that both mentioned methods are based on specific assumptions regarding the reinvestment period and a general end of the project evaluation period.

In general, the principle of comparing projects with different lifetimes consists in the fact that all analyzed projects must be brought to a comparable form, which means the same evaluation period.

The comparison of projects with different lifetimes is usually based on one of the following general assumptions:

- the profits of the projects will be reinvested in other active operations, at minimum acceptable rates of return, over a period equal to the actual duration of the project;
- each project will be repeated cyclically over a certain period (this means that it is assumed that the cycle of the initial investment is repeated over a duration equal to that of the project, with the remaining value at the end of the project and the annual cash flows being equal in size to those established for the first cycle).

6. PROJECTS CHARACTERIZED BY DIFFERENT INVESTMENTS

The basic principle used in the evaluation of mutually exclusive projects with different investments is formulated as follows: “it is assumed that there exists a project which, under the conditions of limited available capital, requires the highest investments, and allocating capital for this project, in comparison with the others, is fully justified.”

Under the conditions of limiting the capital available for investments, not all projects exceed the minimum rate of return required by the company.

Overall, however, the company may obtain a higher return by choosing several smaller and less efficient projects, while fully using the capital intended for the investment process, than it would by choosing the most efficient projects but not fully using the available capital.

7. CONCLUSIONS

As a result of the analysis of the methods and criteria for evaluating the economic efficiency of long-term capital investment projects, it can be concluded that each evaluation method has its own field of applicability, and the choice of the appropriate method depends on the characteristics of the projects and their implementation conditions.

Regarding the economic evaluation of projects carried out in complex economic situations (characterized by variation and high levels of interest rates), several recommendations can be made regarding the use of evaluation methods.

High interest rates reflect a high level of inflation and/or risk related to investing capital in long-term projects. Such conditions, as expected, are characterized by a decline in investment activity.

Under these circumstances, correct investment decisions acquire increased importance.

For large, long-term projects with an uneven distribution over time of revenue and expenditure cash flows, the best method for evaluating economic efficiency under unstable economic conditions is IRR. The main reasons are that applying this method takes into account the influence of the time factor on money and does not require a rate of return given externally.

For the comparative evaluation of projects represented by technological solutions that do not differ in terms of production volume, the criterion of discounted costs can be used.

In this case, if projects have different durations, it is necessary to bring them to comparable forms by repeating the cycles of projects with shorter lifetimes.

In project evaluation, special attention must be given to risk. It should also be taken into account that substantiating investment decisions is influenced by factors that do not lend themselves to numerical quantification; the manner of taking them into consideration falls within the scope of the company's management competence.

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