

Yield and Risk - The Basic Coordinates of Socio-Economic Development Programs

EMILIA CORNELIA STOICA
Associated Professor PhD.
Nicolae Titulescu University,
liastoica@gmail.com

MIHAELA SUDACEVSCHI
Associated Professor PhD.
Nicolae Titulescu University,
msudacevschi@univnt.ro

Abstract: Public policies are implemented through larger and smaller public programs and projects that have to comply with very strict governance conditions. Evaluating the net benefits generated by public programs or projects allows for the identification of the cost-effective ones in order to select them. For this purpose, a lot of indicators, mainly the Net Present Value (NPV), both in financial and socio-economic terms, as well as the recovery period, are being constructed, the probabilistic modeling of which provides the information needed to determine the public spending performance, public expenditures financing the national economy development. Development and implementation of the public programs are faced with risks, their prediction being a complex approach. For the identification of risks, a wide range of values of indicators involved in risky actions is assigned so that probability appraisal of the occurrence of those risks can be made, including their impact upon environment and / or community. The mix of the probability of producing the risk and its impact leads to the identification of most of its manifestations, so that we can retain to evaluate the program only the significant risks. The paper also presents the most important criteria for the selection of the development programs / projects, focusing on addressing economic and social benefits, expressed in monetary terms. The cost-benefit analysis that must accompany any public project proposal will identify both its utility for the intended community and externalities, positive and / or negative, that will be a factor of impact upon the NPV.

Keywords: *yield, risks, socio-economic development, appraisal, Net Present Value (NPV)*

1. Introduction

The analysis of the impact of the projects implemented in the economic and social environment for which they are conceived reveals important differences (gaps) between the information contained in the project and those obtained after its implementation. The risks generated by these gaps can produce significant negative effects and should therefore be estimated as accurately as possible, to prevent its being necessary to propose treatment methods for disposal or only reduction.

The gaps that may appear in socio-economic assessment have different causes, but most of them are produced by underestimating the costs and overestimating the benefits to be considered in the cost-benefit analysis underlying any feasibility study. To assess the level of risk in a project, statistical laws of functional distribution of sources of error are used: normal law, beta law, Gamma law, which are applied to available information, which also implies a risk.

There are several methods of risk management, most of which are of a quantitative nature, generally of a high degree of complexity, such as scenario analysis; sensitivity tests - Current Socio-Economic Net Value, etc. Qualitative analysis is a simpler, descriptive method and is therefore used for small-scale projects.

2. Methods of evaluation of macroeconomic development programs and projects

The assessment of macroeconomic and sectoral development programs can be achieved (***, 2011) by using several methods, such as:

- cost-benefit analysis, which calculates the net benefit (the sum of the results minus the sum of costs, expressed in updated monetary values), which provides information on the performance of a program. This analysis involves the observation of the impact of the actions proposed in the program concerning the most important aspects of economic and social activity. Currently considered a basic element for designing and evaluating any public program or project, this method involves the use of techniques for updating and estimating economic and social risks involving sophisticated statistical-mathematical models, as:

- multicriterial analysis, which seeks to satisfy multiple options simultaneously, each of these options being aimed at achieving a specific objective. The approach of this method requires the estimation of each set of option - impact - objective, the determination, generally by probability calculations, of the coefficients for each criterion, etc. ;

- the cost-effectiveness analysis is intended to be a simpler version of the cost-benefit analysis because it attempts to propose to achieve the objectives specified in the program or project with lower costs. However, using this method raises a number of issues if the results are to be the basis for making public policy decisions. Thus, some social aspects can be ignored; also, if the impact of proposed actions on the economic and social environment is not analyzed, negative externalities can occur which can not be ignored by the responsible public authorities. In addition, if certain costs are not taken into account, it may be possible to see an important difference between the estimated output of the program or project and the actual one that will compromise that policy;

- the development of macroeconomic, statistical and mathematical models that use databases containing medium and long-term variations of macroeconomic indicators describing developments at national and supra-national level - for example across the Union European or Eurozone. For the information produced by these models can also be used at lower levels: local, regional, microeconomic, they can be introduced as exogenous sizes in the models specially designed for those levels.

In the wide range of methods and techniques used to evaluate public programs (Le Maître – Sétra, 2014), two are most commonly used: macroeconomic scenario-based methods built on probabilistic estimates and methods based on the introduction of a lump-sum premium that expresses the risk in the discount rate of all financial and social sizes, denominated in monetary terms.

The selection of programs according to the criteria previously formulated by public authorities takes into account the foreseeable sensitivity in the different macroeconomic scenarios, which will be estimated for the main components of the net present value (NPV).

In the macroeconomic scenarios, the initial stage is represented by the probabilistic distributions of the indicators describing the added value gain achieved through the implementation of the proposed program.

3. Definition of the risks

A public program or project presents and substantiates the proposal to carry out an activity that will improve the characteristics of the economic, social, natural, technical environment, etc. In order to achieve the established objective, the program or project will allocate resources, use appropriate mechanisms and achieve results that should lead to the goal expressed in public policy. During the implementation period of the program / project, the risks may appear to disrupt the operation according to the program or project provisions and the ex-ante analysis of these risks is intended to diminish and even eliminate the effects of these risks, hence the importance of knowing them.

In the category of economic risks, two different categories are distinguished: systemic and non-systemic risks. The former are macroeconomic risks that affect the newly created national level (which can be expressed by the macroeconomic indicator Gross Domestic Product (GDP) or similar indicators, National Income (VN), Gross Global Product (PGB) or Net (PGN)

- non-systemic risks are those risks perceived as belonging to the assessment inability of those conducting the assessment operation. They may be confronted with insufficient information on macroeconomic

and social indicators, the use of non-performing or inadequate software for high issues, the lack of reliable information on the evolution of the macroeconomic indicators, etc. ;

- systemic risks are generated by its functioning, as described by macroeconomic indicators, such as GDP and other assimilated ones. If they vary, it is expected that the level of development and, implicitly, the quality of life of the community will vary accordingly. In this respect, both public institutions and other organizations involved in macroeconomic forecasting activities elaborate several scenarios on the development of the economy as well as its main sectors.

All evaluations are based on the components of the internationally recognized macroeconomic indicator: GDP per capita at purchasing power parity (PPP). Considering the components of GDP formation, ie Gross Value Added (excluding asset depreciation) and net indirect taxes (involving fiscal policy coupled with commercial policy), it will be possible to follow the behavior of the community towards the potential of national gains, balancing the risks detected to achieve these earnings.

For this purpose, two statistically determined quantities are computed and compared based on the multiannual macroeconomic information: the hope of the key indicator (in this case, the NPV) :

$E(NPV - NPV_{equivalent}) =$ the risk premium that the collectivity would agree to bear in order to avoid the risk, where $E(NPV) = NPV_{hope}$,
and the NPV equivalent = current, net present value of a risk-free program / project in the sense that the NPV is not dependent on macroeconomic developments, ie GDP variation, which shows the equivalence with the preference of the community not to face risks.

4. Methods of risk assessment

- Scenario-Based Methods

Within each scenario, input and output financial flows are calculated to determine the net value of the value added, then the updated utility expectancy is calculated using the risk-free rate to calculate the NPV equivalent.

- Beta-based methods

Beta methods consist of computing the updated value of the macroeconomic indicators and their components retained in the program by completing the discount rate with a program / project specific risk premium, followed by the ways of applying the algorithm used for the scenario method.

The variation of the utility of the community in a certain economic and social environment, determined at the date of evaluation, follows two situations:

- without implementation of the project, so that only the foreseeable evolution of the current environment will be predicted. This situation is the reference situation, to which the analysis of the differences and, implicitly, of the benefits and risks generated by the proposed development project will be reported;

- the situation in which the project is being put into operation: the updated value of the equivalent NPV project is added to the existing wealth;

The updated sum of the annual community collectivity sampling values, calculated for the assessment period, will follow the same algorithm:

- without implementing the project, considering only the current year's (Ct) fuel wealth;

- the situation in which the project is put into operation, when the random gains obtained in the current year through project implementation are added to the random gain of the reference situation.

When the community has a risk aversion, the equivalent NPV is less than the hope NPV, in the sense that it would prefer to obtain a certain gain (NPV equivalent), rather than the uncertain gains that the risk situation would bring. The difference between the NPV's certainty and the expectation of NPV is what the community is willing to pay to avoid the risk, and this quantity is defined as a risk premium.

This risk premium is the product of the community's aversion to risk and is calculated by the actual value of the correlation between the annual benefits of the project and the wealth obtained by the community through its implementation in that year, a correlation that is quantified by the covariance of these two statistical variables.

As a project is most often aimed at replacing or completing an already existing service offer, the socio-economic assessment will attempt to estimate the cost-effectiveness of a project by comparing two situations obtained in a future context: one where the project is not realized (reference option), the other is the project. In

the next sequence, the change process will focus on the clear definition of the overall macroeconomic context or the "baseline scenario", and the option to improve it by implementing the selected program / projects.

It should be noted that the baseline situation can not be confused with the present situation, this being the most probable situation that would occur in the future period in the absence of the project.

At the same time, the option to implement the program / project will predict in detail the most likely situation that would occur in the presence of the project.

5. Socio-economic assessment compared to financial evaluation (Waaub Jean-Philippe, 2012)

While the financial assessment only examines the financial effects of the project operator, the socio-economic assessment (***, 2015) compares, for every each major category of actors, the impact of the chosen version of the project version for which it was chosen the impact of the project version for which it was chosen with the reference project.

In addition to commercial goods and services - which can be valued through market prices - included in the financial evaluation, respectively the commercial expenses and revenues related to the project, the socio-economic evaluation also looks at the value of the non-market goods and services produced by the project. Known as externalities, these positions are initially quantitatively assessed, as is customary in social, environmental and economic disciplines.

Also, with regard to costs, it is the question of determining the full cost, which entails evaluating both total costs, including investment costs, operating, maintenance and renewal costs, as well as the monetary estimation of negative externalities regarding the social and economic effects of human resources policy review, etc.

In terms of benefits, it is imperative to predict revenues and the monetary outlook of positive externalities what can happen with the time saved by economic agents, the gains in the safety of people's lives, or reducing the number of injured people, improving the environment and quality of life, social and economic ones by increasing the abilities of the population, decreasing morbidity, etc.

The socio-economic evaluation aims to synthesize, as far as possible, all the financial and non-financial effects of the project under evaluation.

Net present value (NPV) is defined as the sum of the updated benefits minus the sum of the updated costs. This aggregation involves the translation, wherever possible, of the impact of non-commercially-expressed monetary amounts, which should be as standardized as possible in order to achieve the fair comparability of programs / projects involving such sizes. This standardization involves the establishment of calculation conventions and the choice of reference values, also called tutelary values, the valuation conventions being based on the type of impact considered.

The most important factors for establishing the socio-economic profitability of a program / project - quality of life, competitiveness, biodiversity, etc. - will be able to be analyzed due to the monetary units being expressed in terms of NPV-SEs.

This indicator, the Socio-Economic Net Present Value (NPV-SE) of a project, is defined as the difference between the current amount of the benefits obtained through the project implementation and the current amount of estimated costs for realizing those revenues.

In the process of selecting the programs / projects proposed for achieving an objective of socio-economic development of the collectivity, several statistically developed indicators are used which present the essential aspects required for the acceptance of a public-funded approach. These indicators will highlight:

- the program / project profitability or benefit for the company: the net present value in financial or socio-economic terms;
- the liquidity, respectively the speed of recovery of the invested funds, expressed in the recovery period, also under conditions of updating;
- the risks faced by initiators of the program / project, which are very diverse, both financially and in terms of the usefulness of the community.

In terms of cost-effectiveness, public projects have a distinct feature compared to private ones: their profitability will not only take account of the possibility of realizing a monetary profit but social benefits for the community due to the project during its entire duration. These benefits can be expressed by raising living

standards, education, etc., but they are difficult to express monetary, but NPV-SE needs to evaluate them as accurately as possible to present the benefits of implementing a public project.

In this respect, for the public programs / projects, which propose the realization, including the financing of public services, to provide the decision makers with reliable selection criteria, two indicators are calculated which express the net present value (NPV), meaning financial NPV (NPV-F) and socio-economic NPV (NPV-SE):

- NPV-F is defined, from the financial investor point of view, by aggregating the updated cash flows with the discount rate set for the enterprise implementing the project. This discount rate is generally considered equal to the weighted average cost of capital - which is calculated as the average weighting of the debt and the share of equity in project financing, in current monetary units, ie the year considered.

- NPV-SE represents the collectivity's profitability requirements and, in this case, takes into account, in addition to the financial flows expressed in units of currency in the constant prices of the reference year, non-commercial costs and benefits, also expressed in monetary units, updated at the rate set by the public authorities.

NPV, and even NPV-SE, are used as criteria for selecting programs / projects, considering their absolute value without uncertainties, as the risk premium perceived by the community and the socio-economic beta¹ is included in the discount rate, which refers to the variation in macroeconomic development, expressed in GDP per capita.

However, many other risk factors, both exogenous and endogenous, are emerging in the project, such as the timing of the planned activities, the variation in the prices of the resources employed, the different evolution of the labor market, the mortgage market, etc., without taking into account the predictive errors of macroeconomic indicators that may arise from these factors.

In the best case scenario, by conducting a risk analysis or sensitivity analysis for several possible variations of macroeconomic aggregates and factor prices, the discount rate can be estimated and thus determine the value of the NPV-SE, considered a cost-effectiveness criterion for selecting programs / projects.

The profitability of a program / project can also be analyzed using its management rate, ie NPV reported to the invested monetary unit, showing under the same financial update terms the classification of projects in terms of budgetary implications.

6. Conclusions

Although the two profitability indicators: NPV-F and NPV-SE can be calculated for each program / project, they are rarely used at the same time. If, due to the scrupulous decision of the decision-makers, its are analyzed in the same work, several situations should be pursued: both positive, both negative, positive and negative, but in all situations, the interpretation of profitability, and therefore acceptance of the project, being different, thus:

- if both NPV-F and NPV-SE are negative, ie financially, but also as an impact on the social life of the community, its implementation does not improve, on the contrary, it causes unnecessary expenditure, and the project must be rejected;

- if both NPV-F and PSE are both positive, it is assumed that the program / project brings improvements to economic and social life, without compromising the financial balance of the community;

- more controversial situations arise when the two indicators are different:

- if NPV-SE is positive and NPV-F negative, it means that the project can bring benefits to the community, but the costs involved can not be supported solely by public funds. However, it is necessary to reconsider all the costs and sources of funding available to mobilize, including, in the case of the EU Member States, Community subsidies;

- if both indicators are negative, it is recommended to reject the program / project, at least in the form presented, although the analyzes made on the foreseeable developments of the communities and the economic environment may be the subject of some relevant proposals.

The general formula of the NPV of an investment involves using at the denominator of the discount rate, whose essential function is to make comparable economic flows occurring at different times.

¹ The "beta" coefficient represents the risk of the sector and the company considered; mathematically, it is measured by the dispersion of the profitability of the company around the average profitability, Source : Cléon 2018, http://rfcomptable.grouperf.com/dictionnaire/comptable_financier/navigation.php?lettre=a

Due to the importance of the discount rate for determining the profitability, liquidity and risk of a program / project, whether public or private, its sizing requires some clarification:

- the public discount rate is unique and applies uniformly to all public investment projects taken into account and to all sectors of activity. Deviations from this principle would lead to the systematic acceptance of significant inconsistencies in the allocation of public resources;
- the discount rate is a rate calculated without the risk premium. The risk review should not be incorporated by an implicit increase in the discount rate. The risk must be treated for each project together with the quantitative and pricing estimates that are appropriate to it.
- the discount rate is a real rate, in the sense that the values used for its calculation will be expressed in constant prices, generally based on the reference year;
- the update rate, estimated for the entire life of the program / project, decreases over time for long-term assessments;
- this rate should therefore be subject to periodic revisions to avoid a different estimation of developments in macroeconomic indicators: GDP variation, long-term interest rate trends, demographic variables, labor productivity, demographics, etc.).

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