

Working Paper Series

Massimo Florio, Davide Sartori

GETTING INCENTIVES RIGHT: DO WE NEED EX POST CBA?

WORKING PAPER N.01/2010

GETTING INCENTIVES RIGHT: DO WE NEED EX POST CBA?

Massimo Florio*, Davide Sartori**

* University of Milan

**CSIL, Centre for Industrial Studies (Milan)

This version: 12 January 2010

Abstract

This paper, presented at the Sixth European Conference on Evaluation of Cohesion Policy (Warsaw, 30 November-1 December 2009), discusses why there is a strong need of ex-post Cost-Benefit analysis and which conditions should be met for a proper ex-post exercise to be carried out in the framework of Cohesion Policy major projects. After an introduction about the objectives and instruments of the 2007-2013 EU Cohesion Policy, and in particular the legal framework for co-financing environmental and transport projects, the paper illustrates and discusses some methodological choices which have been made by the authors of the EC CBA Guide. It is showed that, without an ex-post Cost-Benefit analysis, the ex-ante exercise is also weakened as a decision making tool. In particular, in the light of evidence from literature about the most common mistakes and pitfalls in ex-ante project appraisal, it is explained how systematic ex-post evaluation is important in particular linked to ex-ante incentives to reveal true information about the projects characteristics (especially on investment costs and demand forecast which are often respectively under and overestimated due to an optimism bias) and ex-post performance assessment.

The EC has a unique role to play in this context, and recommendations are given about how to improve the use of CBA for investment decisions and how to contract co-funding of major projects in the framework of incentive theory.

Keywords: CBA, Cohesion Policy, Incentives

JEL codes: D61, H43, O22, R58

1.Introduction¹

In the 2007-2013 programming period the EU Structural Funds and the Cohesion Fund will contribute through grants to the infrastructure plans of 27 countries, including some former transition economies. Additional funds are assisting Turkey, Croatia and other candidate and potential candidate countries. The EU seven-year budget supporting this effort will draw from a provision of around EUR 350 billion for Cohesion policy (EC, 2008).

Some authors have taken a highly critical attitude about the effectiveness of this EU funding mechanism. In particular, the Sapir Report (Sapir et al., 2004) has proposed a wide reform, targeted to concentrating available EU resources on the new Member States (the so-called re-nationalisation of EU regional policy), and to entirely delegating the project planning to them, with the argument that local actors know better what to do with capital subsidies than Brussels. However, this proposal has been rejected by the EU members, for two reasons. First, some infrastructure, e.g. the Trans-European Networks in energy and transport need a supra-national coordination. Second, the EC is in a unique position to capitalize infrastructure knowledge across countries and regions, and is less captured by local interests. This coordination-benchmarking mechanism has an intrinsic value that will be entirely lost by full re-nationalization of planning and evaluation (Florio, 2007). The core of the potential added value of a multi-government co-financing mechanism for infrastructure investment lies, in fact, in its information/incentive structure, when there is ex-ante and ex-post project evaluation by evaluators who report information to different actors. Cost-Benefit Analysis (CBA henceforth) lies at the heart of this framework, and is now firmly embodied in the EU Regulations.

The EU Structural Funds are financial instruments that offer Community assistance, in the form of mainly capital grants, to different kinds of regional programmes and projects. In the framework of the 2007-2013 Cohesion Policy there are three main objectives. The first one, and by far the most important in terms of funds available under the Cohesion Policy (almost 82%), is the objective of supporting the convergence of sustainable economic growth in lagging behind regions. Most of these regions are located in the EU-12, but there are many relatively under-developed regions in some rich countries in the EU-15². A second objective is to increase the competitiveness and employment outlook in the remaining regions. Many of them, while located in the core areas of Europe, face high unemployment and relatively modest growth. Third, there is an objective of territorial cooperation that is of some relevance for regions facing trans-boundary problems and in some specific geographic conditions.

EU assistance to achieve these objectives revolves around a small number of financial instruments, each with a set of operating rules, eligibility conditions, co-financing rates. The most important of these funds is the European Regional Development Fund (ERDF). The ERDF has a

¹ This paper draws from M. Florio, 2007, *Cost-Benefit Analysis and Incentives in Evaluation*; M. Cella & M. Florio, 2007, *Hierarchical contracting in grant decisions: ex-ante and ex-post evaluation in the context of the EU Structural Funds*; M. Florio and S. Vignetti, 2005, *Cost-benefit analysis of infrastructure projects in an enlarged European Union: an incentive oriented approach*; and from the EVA-TREN study on ex-post evaluation of major transport and energy projects.

² Particularly in Italy (the Mezzogiorno), in Germany (the Eastern Lander of the former DDR), in Spain, Greece, Portugal, in the overseas French and Portuguese islands, and elsewhere.

very wide range of possible intervention areas³ especially in the Convergence regions (defined as those where GDP per capita is below the threshold of 75% of the EU average), while in the Competitiveness regions it focuses on three priorities: innovation and the knowledge economy, environment and risk prevention, and accessibility (transport and telecommunication services of general economic interest). Finally, under the Territorial Cooperation objective, the priorities are cross-border, trans-national and interregional cooperation, as well as networking of regions.

While the ERDF is in a broad sense targeted at infrastructure and productive investment, the European Social Fund (ESF) is mainly concerned with human capital, including support to vocational training and education programmes of different nature, public or private.

Lastly, the Cohesion Fund (CF) was established in 1993 under the Maastricht Treaty to promote economic and social cohesion and solidarity between EU Member States. It co-funds projects in the field of environment and Trans-European transport infrastructure networks. Member States eligible for CF assistance are those whose per capita Gross National Income (GNI) measured in purchasing power parity is less than 90% of the EU average. These countries originally were Greece, Portugal, Ireland and Spain. As for the 2007-2013, the CF is one of three funds, out of the previous six, that remain as instruments for the convergence objectives. This includes Greece, Portugal, Spain and the EU-12. Eligible investment projects include Trans-European transport networks, sustainable transport, environment, and renewable energy. Finally, the “regional development” component of the Instrument of Pre-Accession (IPA), supports candidate countries’ preparation for the use of ERDF and CF and co-funds major infrastructure projects in the environment and transport sectors.

After this introduction about the objectives and instruments of the 2007-2013 EU Cohesion Policy, the paper shows the need of ex-post Cost-Benefit analysis and the conditions to be assured for a proper ex-post exercise in the framework of Cohesion Policy. In particular, it is showed that, without an ex-post Cost-Benefit analysis, the ex-ante exercise is weakened as a decision making tool (HM Treasury, 2003). In light of the evidence about the most common mistakes and pitfalls in ex-ante project appraisal, the paper explains that systematic ex-post evaluation should be included into decision making process and linked to ex-ante incentives to reveal true information about the projects characteristics.

The structure of the paper is as follows:

- Section 2 describes the role of ex-ante CBA in deciding co-financing of major investment projects.
- Section 3 shows the main errors and methodological weakness of ex-ante appraisal as resulting from empirical studies.

³ These include inter alia: research and development, innovation and entrepreneurship, development of business clusters, support to SMEs; information society projects, including adoption of ICTs by small and medium enterprises; environmental projects, including water, waste management, air quality, rehabilitation of contaminated land, pollution-preventing technologies; natural and technological risk prevention; promotion of sustainable tourism and enhancement of the cultural heritage; transport investment (rail, highways, ports, airports), including the trans-European networks and clean urban transport; energy investment (electricity and gas, etc) including the trans-European networks; education infrastructures; health infrastructures; direct aid to investment of SMEs for job creation or safeguard of existing employment. (See art. 4 Reg. 1080/2006).

- Sections 4 and 5 describe what ex-post CBA is and its role and function.
- Section 6 introduces the concept of conditionality to results and how incentive theory feed into project appraisal.
- Section 7 draws some conclusions and recommendations.

2. Ex ante CBA and Grant mechanisms

Project selection and ex-ante evaluation within the Cohesion policy framework is normally the sole responsibility of the national authorities. However for major projects (with a total investment cost of more than EUR 50 million, or 25 for environmental projects and 10 million in the case of IPA projects⁴), the EC requires Member States to submit, among others, a Cost-Benefit Analysis (CBA)⁵ and then takes a specific co-financing decision⁶.

In addition to relying on the governments of the Member States to acquire this information and ex-ante project evaluation, the SF regulations state that the EC is responsible for ex-post evaluation: it can appoint independent experts that after the completion of the project will re-assess its benefits and costs⁷.

Hence, there is a clear provision for ex-ante and ex-post evaluation in the SF regulations, but there is, however, no clear link between the investment co-financing decision and such evaluations (except when fraud is discovered in rather extreme situations). Florio and Vignetti (2005) suggest that without a 'contractual' link between evaluation and co-financing, a misallocation of SF may arise. Occasional observation shows that there may be, however, some informal punishment for regional governments who are thought to having disclosed insufficient information ex-ante (e.g. the co-financing decision by the EC will be delayed) or when ex-post evaluation discovers unsatisfactory outcomes. One of these mechanisms is the loss of reputation of those managing authority, and their new project funding being subject to more intensive scrutiny by the EC. There are however some shortcomings that are built-in the SF allocation mechanism.

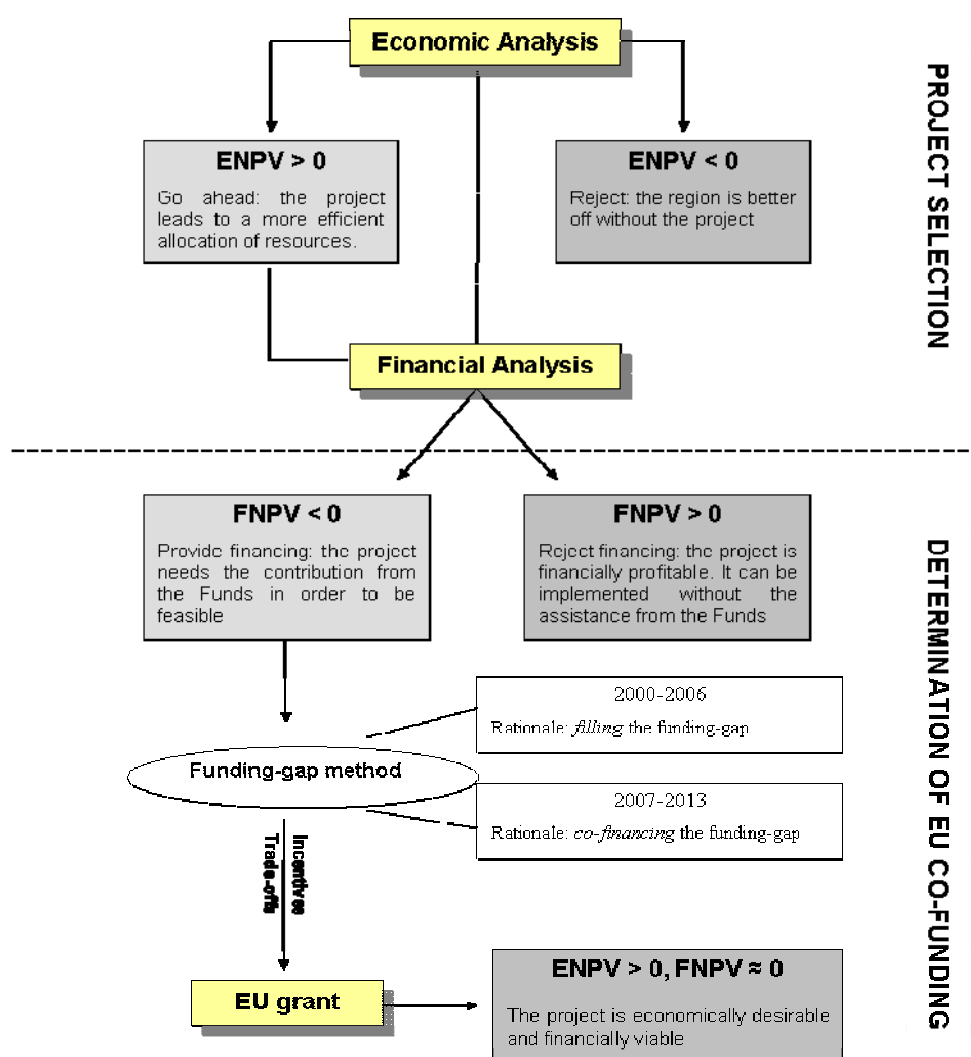
⁴ Article 157(2) Regulation 718/2007

⁵ Article 39 Regulation 1083/2006: The Member State or the managing authority shall provide the Commission with the following information on major projects: a) information on the body to be responsible for implementation; b) information on the nature of the investment and a description of it, its financial volume and location; c) the results of the feasibility studies; d) a timetable for implementing the project and, where the implementation period for the operation concerned is expected to be longer than the programming period, the phases for which Community co-financing is requested during the 2007-2013 programming period; e) a cost-benefit analysis, including a risk assessment and the foreseeable impact on the sector concerned and on the socioeconomic situation of the Member State and/or the region and, when possible, of the other regions of the Community; f) an analysis of the environmental impact; g) a justification for the public contribution; h) the financing plan showing the total planned financial resources and the planned contribution from the Funds, the EIB, the EIF and all other sources of Community financing, including the indicative annual plan of the financial contribution from the ERDF or the Cohesion Fund for the major project.

⁶ Article 40(e) Regulation 1083/2006

⁷ In fact, Art 49 of the above mentioned regulation states that: *The Commission shall carry out and ex post evaluation for each objective in close cooperation with the Member States and managing authorities. Ex post evaluation shall cover all operational programmes under each objective and examine the extent to which resources were used, the effectiveness and efficiency of Fund programming and the socioeconomic impact.*

Fig. 1 The allocation of Funds to the projects: CBA and the funding-gap method.



Source: Mairate A. and Angelini F., 2007

Figure 1 shows how the EC evaluation and grant decision framework currently works for major investment projects (2007-2013). First, the applicant should show to the EC that, after a suitable CBA, the economic net present value (ENPV) is expected to be positive: if negative, the project will be immediately rejected. Second, in the case of revenue generating projects⁸, the financial profitability is assessed in order to establish whether the project actually needs a grant and to what extent this applies. Third, under the so-called “funding-gap method”, the EU grant co-finance the portion of the investment cost which is not covered by the future net revenues. The funding gap-rate R is simply⁹:

$$R = (DIC - DNR) / DIC$$

⁸ Article 55 Regulation 1083/2006

⁹ See European Commission, Working Document N.4 and European Commission, Guide to Cost Benefit Analysis of Investment projects, 2008.

where DIC is the net present value (NPV) of investment costs, DNR is the NPV of net revenue, (i.e., the difference between discounted revenues and discounted operating costs plus the discounted residual value).

Then, the Decision Amount (DA , “the amount to which the co-financing rate for the priority axis applies”, Art. 41.2) is:

$$DA = EC * R$$

where EC is the eligible cost.

The (maximum) EU grant is given by:

$$\text{EU grant} = DA * \text{Max } CRpa$$

where $CRpa$ is the maximum co-funding rate fixed for the priority axis in the Commission’s decision adopting the operational programme (Art. 53.6).

In principle, projects expecting a positive financial net present value (FNPV) have no funding gap and thus do not generally receive a grant from the SF (special rules apply to productive investments under state aid regimes). The rationale of the ‘funding-gap’ approach is to determine the project’s self-financing ratio so as to grant to the investor not less and no more than what is actually needed to implement a socially beneficial, but financially loss-making, project. The problem with this approach is obvious: the applicant has a clear incentive to exaggerate expected costs and to underestimate revenues, in order to maximize the EU grant.

3. Common mistakes and pitfalls in ex-ante CBA

As pointed out by many studies, the ex-ante evaluations can show a large variation in terms of quality and assumptions. For example, a previous Ex-post evaluation of the Cohesion Fund, which included an in-depth analysis of 60 projects co-financed between 1993 and 2002¹⁰, has shown that many ex ante evaluations suffer from methodological fallacies such as not covering essential information or including errors. It was shown for example that different time horizons for similar projects or different assumptions in the treatment of taxes and in the calculation of externalities (see for example Pearce, D.W., Atkinson, G., Mourato, S., 2006) were commonly used.

A more recent study¹¹, supported by the European Commission, DG Energy and Transport, and developed within the VI Framework Programme, has provided some illustrative examples of

¹⁰ ECORYS (2005) Ex Post evaluation of a sample of projects co-financed by the Cohesion Fund (1993-2002), Final report, Rotterdam. (http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/cohesion_project.pdf)

¹¹ EVA-TREN is a research project aiming at improving the ex ante appraisal practices for the assessment of large energy and transport infrastructures projects through the ex post analysis of several case studies. Furthermore the project will also developed a document containing evaluation guidelines on the topic (<http://www.eva-tren.eu/home.htm>).

how common mistakes and pitfalls, as well as heterogeneous assessment approaches, can occur when appraising major projects in the sectors of transport and energy. One of the strongest evidence that can be derived from the ex post analysis of the case studies completed under EVA-TREN project is the inaccuracy in the estimate of future demand (and particularly demand overestimation) and investment cost (and particularly cost overruns, see Table 1).

EVA-TREN study demonstrates there are many reasons behind this tendency. In the case Tran European Network projects, for example, passenger and freight international flows are the most relevant component of demand and too often such component is estimated at an aggregated level (i.e. from country to country and not from region to region) and this does not allow for accurate network assignment. This is quite important, especially considering that international flows are recognized to be growing faster than national flows. In fact, in most EU countries, and particularly in the transit ones, international transport reaches a significant share of the total TEN-T network traffic, rarely lower than 10 or 20% and sometimes higher than 50%. This share is higher for rail infrastructure, which is a priority of TEN-T guidelines, and it is a growing share according to the previous remarks. Therefore, a better understanding of international flows development, analysed at the opportune scale of origin and destination, can contribute to better predict the evolution of traffic also on national networks (Flyvbjerg, 2003).

Although the pattern of costs overrun might seem similar across projects, the causes typically differ. As the Table 2 points out, it is not possible to find one single reason for the deviations, while different factors occurred for the case studies. What exactly causes costs overrun is difficult to predict, but for sure the decision making process plays a significant role. The decision process for a large transport and energy project might take 10 to 20 years, although there are examples of shorter decision processes (around 5 years at minimum), but also longer ones (more than 30 years).

Tab. 1 Forecasts and actual cost for EVATREN projects (in million EURO)

Project	Total construction costs		Cost
	Forecast	Actual	Overrun (%)
ICE Frankfurt - Cologne	2784	6015	116%
Eurotunnel	2702	4568	69%
Oeresund Fixed Link	1795	2924	63%
Paris – Lille TGV	2666	3334	25%
Madrid - Seville AVE	3263	4029	23%
Magdeburg Waterway Crossing	2064	2435	18%
Lyon - Marseilles TGV	4015	4338	8%
Malpensa 2000*	990	945	-5%
Baltic Sea Motorway*	2200	1830	-17%

Note: *In the cases of Malpensa 2000 and Baltic Sea Motorway the comparison between forecast and actual costs is uncertain because of changes in project scope and physical boundaries.

Source: EVA-TREN

Tab. 2 Main causes of errors in costs estimation for EVATREN projects

	Magdeburg Waterway Crossing	Oere-sund Fixed Link	ICE Frankfurt-Cologne	Paris-Lille HST	Lyon-Marseilles HST	Madrid-Seville AVE	Eurotunnel	Malpensa Airport	Baltic Sea Motorway
Delays in implementation	X	X	X	X			X		
Changes in project specifications & design		X	X				X		
Changes in rates between currencies									
Geological risk									
Changes in quantity and prices				X			X		
Underestimation of expropriation costs					X				
Changes in safety requirements		X					X		
Changes in environmental requirements	X	X	X						
Technological risks		X					X		

Source: EVA-TREN

4. Systematic ex post evaluation

What causes deviations between ex ante assessment and ex post appraisal? These may result from methodological errors, but also from false assumptions or changes in the external environment. It is important to distinguish between the various factors that create wrong forecasts in order to be able to assess the potential for improvement.

The evidence provided by the EVA-TREN study shows how an ex-ante exercise *per se* is weakened as a sole decision making tool. Methodological weaknesses may require adjustments in the ex ante analysis and for a sensible comparison of project appraisal ex post and ex ante it may be necessary to correct the ex ante assessment for methodological errors to create a basis for comparison.

More specifically, evidence about the most common mistakes and pitfalls in ex-ante project appraisal suggests that systematic ex-post evaluation is important in decision making and in particular if it is linked to ex-ante incentives (see section 6) to reveal true information about the projects characteristics.

EVA-TREN defines ex-post evaluation as an activity based on the reassessment of ex ante appraisal, that is informative and useful for understanding whether the conceptual forecasting model adopted before project implementation was adequate to support the investment decision. It allows understanding where the efforts in improving the quality of project appraisals should be

addressed, identifying those areas where the actual ex ante methodology and decision tools are effective and those where they are weaker. Scope of the ex post evaluation is not discovering deviations from forecasts per se, but understanding the causes behind the deviations. The key point is whether the deviation should be attributable to endogenous or exogenous factors. While the latter are hardly predictable and outside the control of the project management, the former might be included in the ex ante analysis to reduce the related risks. Basically, endogenous forecasting error is a matter of cost, effort, or incentives of the ex-ante evaluation.

According to EVA-TREN, ex post evaluation has the following objectives:

- Increase transparency by giving evidence to the effectiveness of the investments in relation to the reached financial, economic, environmental and social objectives.
- Measure the effectiveness: the actual impacts are compared with the forecasted ones or the achievements are compared with initial objectives in order to give a measure of the utility of the project and the quality of the ex-ante evaluation/forecast.
- Provide elements to improve the ex-ante assessments of future interventions: one useful purpose of re-appraisal of the projects is to provide feedbacks to the ex-ante techniques used in order to improve their performance.
- Collect relevant information about past projects to be used as reference.
- Provide incentives for better and more accurate ex ante analysis by given publicity to the real achievements of the projects.

In practice ex post evaluation is similar in techniques to the appraisal, although it obviously uses historic rather than forecast data. It should be conducted in the same manner as an economic appraisal and it should apply almost identical procedures. It focuses on conducting a cost benefit analysis in the knowledge of what actually occurred rather than what is forecast to happen (Little and Mirrlees., 1974).

Despite the fact that literature shows the need for ex post evaluation, and studies have identified significant benefits of undertaking ex post evaluation, it is surprisingly small the number of ex post evaluation results as compared with the many studies that estimate the potential effects of planned projects. Among the reasons for this lack of success are the difficulties in conducting detailed ex post evaluations, the fact that are considered costly (the costs are obvious while benefits are not clear) and that are not always welcomed by the project promoters.

5. Steps in ex-post evaluation

EVA-TREN summarises the path of a correct ex post assessment as follow:

1. *Establish exactly what has to be evaluated.* The definition of what needs to be compared with what is a preliminary need that should be clearly stated. This involves the clear identification of the project boundaries, of the project main objectives and targets, and the questions the re examinations should seeks to answer.
2. *Measure the outcome of the project.* The first step in measuring the outcome of the project is to establish what would have happened if the project had not been implemented. The first

problem encountered in measuring the outcome of a project is to establish against what should the outcome be measured, in other words what is the reference solutions. Looking at the foreseen reference solution at the appraisal stage is helpful in order to have a benchmark against which compare the achievement of the project.. The second issue concerns the availability of outputs and performance measures. Collect ex post information about projects performances is in general costly, it is important to concentrate on the main indicators and to use standard approaches. Three main types of sources can be considered, data collection, which is the main source for cost, revenues and construction times, experts interviews, which allows to investigate on the possible cause of discrepancies between ex ante and ex post results, and finally comparative assessment that can help in trying to assess the actual project impacts for instance on regional development or employment.

3. *Comparison of the outturn of the ex post evaluation with the expected project outputs.* The expected costs, revenues, demand and impacts of the project have to be compared with project performances collected in the previous step. It is not sufficient to identify and quantify the discrepancies between the ex ante appraisal and the ex post results, but as far as possible to assess what caused the discrepancies.
4. *Classification of the results and classification of the causes of success and failure.* The case studies re-examination has highlighted the importance of distinguishing among different types of discrepancies between what was foreseen in the appraisal and what was outturn in the evaluation. The outcome of an infrastructure project will never be exactly as projected in advance. The reasons for the outturn being better or worse than expected might be attributable to external factors, “the state of the world” or to the management of the project, the forecasting assumptions, the inherent design of the project. The key point is whether the deviation is because of endogenous or exogenous factors. While the latter are hardly predictable and outside the control of the project management, the former might be included in the ex ante analysis to reduce the related risks. Only a careful distinction between forecasting errors in exogenous versus endogenous stochastic variables, and between the latter and planning parameter changes in economic analysis, can offer a meaningful ex post evaluation:
 - Was the ex-ante evaluator unprofessional in forecasting the future?
 - Was she professional but the project was unlucky because of unexpected adverse events?
 - Were risks underestimated?
 - Were overall the forecasts good, but the incentives for the management too low to fulfil expectations?
 - Was everything ok, but the social planner changed the shadow prices or other policy rules?

6. CBA and incentives in evaluation

Ex post evaluation results should be widely disseminated and the data should feed into future decision making. Only in this way ex post evaluation can really enable the ex ante evaluation procedure to be fine tuned through an ongoing feedback process between the operating results of existing infrastructure and the assumptions used to evaluate new capital expenditure decisions.

Besides helping to make more realistic estimates in the future, ex post evaluation can be even more useful to take corrective actions and to build confidence in the appraisal process by introducing the concept of linking the access to funds to the conditionality of achieving the targets initially set. In this context, an appropriate performance indicators system as an incentive in regional development policies assumes great importance. A well-developed system of indicators can contribute to improving the governance of regional development policy. This is achieved by formalising the process of deciding on the allocation of regional funds (which involves a complex interaction between regional, national, and European governments) in such a way that availability of the funds is conditional to the achievement of results, as described by the indicators.

The concept of conditionality to results stems from incentive theory. This theory deals with the study of the mechanisms that push to act in a certain direction and would not be undertaken in the absence of some incentives. The incentive systems are tools for monitoring efficiency and for reducing the risk of moral hazard.

An evaluation model: investment game with ex-ante ex-post evaluation

In this context Cella and Florio (2007) propose an investment game with ex-ante and ex-post evaluation. This is a simple principal-supervisor-agent model of the investment game between a supranational player (the principal), such as the European Commission (EC), a regional government (the supervisor) and a private firm (the executing agency) . The EC is a benevolent social welfare maximiser, the regional government has an objective function that combines private benefits to politicians and the welfare of their constituency, while the agent is a utility maximiser.

Cella and Florio suppose the EC wants to finance a project in one of the member states which is not financially viable without government intervention. The project has an economic rate of return (ERR) that is above the social discount factor used but a low financial rate of return (FRR) that makes the project unprofitable for a private firm. A grant covering the difference between Revenues and Investment costs and Operating costs would allow the private firm to carry out the project without a loss.

In other words if the return from the projects are given by the Revenues R , there is a situation where, without a grant: $R - \text{Total Costs} < 0$, while with a grant the total profit become non negative: $R + \text{GRANT} - \text{Total Costs} \geq 0$.

The cost function of the firm is given by:

$$\text{Total Costs} = \beta - e + K$$

Where: K is the cost of capital, $\beta - e$ is the operating cost which is composed of a firm technology parameter β and a managerial effort e to minimize costs. β is an adverse selection parameter that indicates the level of efficiency of the firm and can take two values β_1 and β_2 (with $\beta_1 > \beta_2$). e is non-negative and is a moral hazard variable which is decided by the firm after the grant has been approved and is also private information to the firm. For each level of effort e the firm must endure a disutility $\psi(e)$.

In the Cella and Florio model, the utility function of the private firm is: $U = R + \hat{G} - (\beta - e) - K - \psi(e)$, where: R are the revenues, \hat{G} is the grant, $(\beta - e) + K$ are total costs and $\psi(e)$ is the disutility of effort.

The European Commission sets the grant with the goal of maximizing social welfare, the grant is financed with distortive taxation which causes a social cost λ .

Consumers' net welfare from the project can be written as: $V = S - R - (1 + \lambda)\hat{G}$, where: S is the surplus generated by the project, R is the revenue (paid by consumers) and $(1 + \lambda)\hat{G}$ is the total cost of the grant.

Cella and Florio assume that total costs and revenues are ex-post observable and make the accounting convention that the European Commission receives the revenues, pays the costs and gives the firm a "net" grant: $G = R + \hat{G} - (\beta - e) - K$ so that the expression for the firm's utility function is: $U = G - \psi(e)$ and consumers' net welfare is: $V = S - R - (1 + \lambda)[G - R + (\beta - e) + K] = S + \lambda R - (1 + \lambda)[(\beta - e) + K + \psi(e)] - (1 + \lambda)U$

Social welfare is then: $W = V + U = S + \lambda R - (1 + \lambda)[(\beta - e) + K + \psi(e)] - \lambda U$.

If the Commission knew the true value of β and could observe e , then the only constraint it would face is the participation constraint of the private firm, i.e. $U \geq 0$ ¹².

However, it is asymmetric information to be characterizing the model so that the Commission cannot observe e and knows only the probability distribution of β . Knowing that the grant can take the form of an optimal revelation mechanism which will apply the standard results of incentive theory, this will be a contract conditional on the revelation of the efficiency parameter. In other words, a firm claiming to be efficient will be offered a grant-cost reimbursement pair which is different from the one that it will be offered to a firm revealing to be inefficient. These contracts specify an ex-post rent and an effort level, for each type of firm.

Cella and Florio (2007) then introduce two additional players, the regional government and an ex-post evaluator.

The regional government pays a predefined share of the grant awarded by the Commission and covers a supervisory role. Because of its proximity to the firm the regional government is in fact assumed to have an informational advantage with respect to the Commission. It is assumed that, before the grant offer is made, the regional government receives a signal σ about the efficiency status of the firm. The regional government, is non-benevolent and can be led by the firm into not disclosing information to the Commission in exchange of private benefits.

The ex-post evaluator is sent, with some probability, by the Commission after the project has been built. If sent, the auditor will learn, with probability one, verifiable information about the parameter β . There is the further assumption that the ex-post evaluator has no discretion and cannot lie about what he has learned. If the outcome of the valuation is that the firm has lied at a previous stage then there is a fine to pay.

What is then the effect of the introduction of an ex-post evaluator? Let p be the probability of sending an ex-post auditor, p^2H the cost of the audit and P the exogenous punishment for the firm if it turns out it lied to the Commission. An optimal grant will be a pair of triplets $\{(U_2, e_2, p_2), (U_1, e_1,$

¹² Thus, under complete information, the regional government acting on behalf of the Commission, extracts optimal effort, does not leave socially costly rents to the project manager, and hence will offer an incentive $t = y(e^*)$, such that $U=0$ (and $y'(e^*)=1$).

p_1 }}, in other words the offer by the Commission will include contingent probabilities of audit together with a rent and effort level.

If the punishment is considered to be exogenous and not too high, then the participation constraint will be satisfied. It is worth stressing that there is no need to evaluate a firm claiming to be efficient, because the inefficient type incentive constraint is slack anyway and auditing is costly. Hence, at an optimum, we necessarily have $p_2 = 0$.

The only constraint that needs to be modified is therefore the IC of an efficient firm: $U_2 = \Phi(e_1) - pP$.

In other words, the benefit from an untruthful report are lowered by the probability of audit and the expected punishment. As a consequence also the informational rent that needs to be paid to ensure a truthful report is also reduced.

As can be shown, the role played by the regional government is complex. By assumption the regional government either discovers the firm to be efficient or it will learn nothing from the signal. Some private benefits paid by the firm would represent the gain for the regional government. The firm is to stand losing the informational rent if evidence about $\beta = \beta_2$ is brought forward to the Commission, this amounts to $\Phi(e_1) - pP$. This implies that any payment b that the firm might be willing to offer to the local government has an obvious upper bound:

$$b \leq \Phi(e_1) - pP$$

The utility function of the regional government is given by the sum of the regional consumer's net surplus plus the private benefit it might receive from the firm:

$$LG = S - R - \alpha (1 + \lambda)\hat{G} + kb$$

where S is the change in regional consumer surplus from the project, R is the share of revenues paid by regional consumers, α is the share of the grant that the regional government will have to finance, $(1 + \lambda)\hat{G}$ is the total cost of the grant as before, b are private benefits and $k \in (0,1)$ is the efficiency of collusion. $k \in (0,1)$ implies that not all the funds spent by the firm arrive in the pockets of the regional government, this may be due to the transaction costs of such not-very-legal activity or to the nature of the goods exchanged.

To avoid collusion in equilibrium the Commission will have to pay some contingent transfer m to the local government whenever it reports that the firm is efficient.

Given an incentive compatibility constraint for the local government (not detailed here) the Commission must compensate the regional government for its help in the evaluation of the project, in this way truthful reporting about the firm parameters becomes convenient for the regional government.

After a few calculations Cella and Florio (2007) find:

$$m \geq [k - \alpha (1 + \lambda)] (\Phi(e_i) - pP)$$

Thus, in case the firm is efficient and the regional government finds hard evidence about that, then the Commission does not pay any informational rent to the firm, instead it pays a transfer to the regional government. The gain for the Commission comes from m being lower than U_2 for two reasons:

1. inefficiency of collusion ($k < 1$),
2. cost sharing between the Commission and the regional government (if the firm is efficient also the local government saves on his share of the grant).

8. Conclusions and recommendations

Ex post evaluation based on the reassessment of ex ante appraisal is extremely informative and useful for understanding whether the conceptual forecasting model adopted before project implementation was adequate to support the investment decision. Ex post evaluation allows understanding of where the efforts for improving the quality of project appraisals should be addressed, identifying those areas where the actual ex ante methodology and decision tools are effective and those where they are weaker.

Ex post evaluation is not, however, about discovering deviations from forecasts *per se*, but understanding the causes behind the deviations. The key point is whether the deviation is the result of endogenous or exogenous factors. While the latter are hardly predictable and outside the control of the project management, the former might be included in the ex ante analysis to reduce the related risks. The nature of the error in demand and cost forecasts is known to be systematically optimistic. The decision to implement a certain project is often taken by the authorities before they carry out the ex ante analysis. In these cases, such appraisals respond more to the need to justify a decision already taken than to understand the best decision to take.

Beside this key aspect, focus should be also put on the complexity of the stakeholders' maps and the recognition of possible conflicting objectives during decision making process. The functioning and the interests of the different levels of public administration can make the decision-making processes slow and open to mismanagement, therefore causing delays that influence the project costs negatively. Ex post evaluation should be therefore part of the project cycle and the decision making process in order to improve the ex ante appraisal by speeding-up the process and taking corrective actions.

Ex-post CBA is even more effective if incentives at different points of the decision-making process are introduced to promote rationality in the ex ante analysis of the project's future performance, strengthening budget constraints and financial responsibilities. The incentive mechanism should, however, be designed in such a way that a bond between who takes the decision and who will be responsible for it in the long term is ensured.

Standard incentive theory provides a basis for understanding how different players interact in an investment planning game. It assumes that each player acts to maximize his or her particular

objectives. Having two governments, one supra-national and the other one with a private agenda, adds complexity to the principal-agent framework. This planning complexity is particularly important in the case of regional development policy, which is characterized by a multi-government setting with many actors.

The investment game model of Cella and Florio (2007) contributes to the application of incentive theory in a multi-government setting by focusing on a co-financing decision in the context of regional policy. The model shows that ex-ante and ex-post evaluation can critically contribute to contain socially costly rents if a contract between the EC is establishing a formal mechanism of rewards and punishment. The regional government, responsible for ex-ante evaluation, should be paid to disclose information on the executing firm. There should be a punishment following ex-post evaluation when the firm has been discovered to be more efficient than it claimed ex-ante. The advantages of the incentive based mechanism are:

- There is a performance bonus for socially deserving projects, and the incentive to manipulate financial and economic project analysis go in opposite directions.
- Lack of realism in ex-ante evaluation incurs in a penalty, because the economic performance bonus will be decreased ex-post.
- If the *bonus* is shared between the firm and the regional planner, the incentive works for both players. The ex-ante evaluator gets a reputation *bonus* (penalty) for realism (optimism bias).
- If the ex-post evaluator is a rating agency on behalf of the EU, there will be a more transparent learning process on regional/national/sector projects success and failures.

References

Cella M., and Florio M., 2007, *Hierarchical contracting in grant decisions: ex-ante and ex-post evaluation in the context of the EU Structural Funds*, Working paper 22, University of Milan, Research Papers in Economics, Business, and Statistics.

ECORYS (2005) Ex Post evaluation of a sample of projects co-financed by the Cohesion Fund (1993-2002), Final report, Rotterdam.

European Commission, 2007, *EVA-TREN: Improved decision-aid methods and tools to support evaluation of investment for transport and energy networks in Europe*, Deliverable 2, Brussels.

European Commission, 2007, *Growing Regions, Growing Europe*. Fourth report on economic and social cohesion. Brussels

European Commission, 2008, *Guide to Cost-benefit analysis of investment projects*, available at: http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide2008_en.pdf. (last visit July 2009)

Evans, D., 2006, Social discount rates for the European Union: new estimates, in Florio, M. (ed.), 2007.

Florio M. 2007, "Multi-government Cost-Benefit Analysis: shadow prices and incentives" in Florio M. (ed.), 2007, *Cost-Benefit Analysis and Incentives in Evaluation*, Edward Elgar, Cheltenham.

Florio M., Vignetti, S., 2005, *Cost-Benefit Analysis of infrastructure projects in an enlarged European Union: an incentive oriented approach*, in 'Economic Change and Restructuring', Volume 38, issue 3.

Florio, M., (2007) *Introduction: multi-government cost-benefit analysis, shadow prices and incentives*, in Florio M. ed. *Cost-Benefit Analysis and Incentives in Evaluation, the Structural Funds of the European Union* (Edgar Elgar, Cheltenham, UK)

Flyvbjerg B., Bruzelius N., Rothengatter W., (2003), *Megaprojects and Risk: An Anatomy of Ambition* (Cambridge University Press, Cambridge)

HM Treasury, 2003, *The Green Book: Appraisal and Evaluation in Central Government*, Stationery Office Books, UK. Available at http://www.hm-treasury.gov.uk/data_greenbook_index.htm (last visit July 2009)

Little I.M.D. and Mirrlees J.A., 1974, *Project appraisal and planning for developing countries*, London, Heinemann.

Mairate A. and Angelini F., 2007, *Cost-benefit analysis and EU Cohesion Policy*, in Florio M (ed.).

Pearce, D.W., Atkinson, G., Mourato, S., 2006, *Cost-benefit analysis and environment: recent developments*, OECD, Paris.

Sapir A. et al., 2004, *An Agenda for a Growing Europe - The 'Sapir Report'*, Oxford University Press