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BUILDING A BRIDGE ACROSS CBA TRADITIONS: THE CONTRIBUTION OF EU REGIONAL POLICY

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Abstract

This paper presents the basic principles of the EU approach to cost-benefit analysis (CBA) of infrastructure projects, as embodied in the recently issued CBA Guide. 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 team authoring the EC Guide. Some 'rules of the game' (i.e. the use of shadow prices, the calculation of a proper shadow wage, the monetisation of non-market impacts, the choice of a social discount rate and the use of welfare weights) have been proposed in the Guide, in the light of regional differences in market conditions and welfare objectives of the EU regional development policy. The analysis shows that, differently from well-known national traditions of Cba in Europe (an explicit comparison is made with the British "Green Book") the EU perspective calls for a general framework which is not so different from the project appraisal practice in less developed countries.

Keywords: Cost-benefit analysis, EU Cohesion Policy, Project appraisal

JEL codes: D61, H43, O22, R58

1. Introduction

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.

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 hearth of this framework, and is now firmly embodied in the EU Regulations.

Tab. 1. – EU Cohesion Policy 2007-2013 (347.41 billion Euro, current prices)

Programmes and Instruments	Eligibility	Priorities	Allocations
Convergence objective			81.54%
Regional and National programmes ERDF ESF	Regions with a GDP/head <75% of average EU25	-innovation; -environment/risk prevention; -accessibility;	70.5%
	Statistical effect: Regions with a GDP/head <75% of EU15 and >75% of EU25	-infrastructure; -human resources; -administrative capacity.	5.0%
Cohesion Fund Including phasing-out	Member States GNI/head <90% EU25 average	-transport (TENs); -sustainable transport; -environment; -renewable energy	23.2%
Regional competitiveness and employment objective			15.95%
Regional programmes (ERDF) and National programmes (ESF)	Member States suggest a list of regions (NUTS I or II)	-innovation; -environment/risk prevention; -accessibility;	78.9%
	"Phasing-in" Regions covered by objective 1 between 2000-2006 and not covered by the convergence objective	-European Employment Strategy.	21.14%
European territorial co-operation objective			2.52%
Cross-border and transnational programmes and networks (ERDF)	Border regions and large transnational cooperation regions	-Innovation; -environment/risk prevention; -accessibility; -culture, education	-73.86% cross border cooperation -20.95% transnational cooperation 5.19% interregional

Source: Author processing DG REGIO data. .

In the rest of this paper we: a) briefly present some institutional features of EU infrastructure funding, particularly grants by the Structural Funds and the Cohesion Fund, which are the key mechanisms managed by the European Commission, and the role of project evaluation; b) show the way a specific CBA approach has been suggested in the EC Guide to Cost-Benefit Analysis (European Commission, 2008)¹; c) discuss the relationship between the Guide and earlier literature on project appraisal in developed and developing economies. The paper is concluded by indications for further research needs on CBA in the context of developed economies.

2. The Structural Funds and the Cohesion Fund²

The EU Structural Funds (SF) is 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-15³. 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 very wide range of possible intervention areas⁴ 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

¹ This is the fourth edition of guidelines prepared by a team led by one of the authors of this paper (M. Florio)

² This section and the following draws largely by Florio and Cella (2007).

³ 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.

⁴ 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).

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.

Ceilings for EU co-financing are different according the region and the fund (the overall 'macroeconomic' cap at national level for EU grants is 4% of GDP per year). Moreover, ERDF finance, in form of a grant, can be combined with loans by the European Investment Bank (EIB), and with other sources of loan or equity finance. Tab. 2 shows the leverage effect of the SF. It is important to understand however, that the grant mechanism is often critical, and thus the usual screening activity by banks is more limited than in purely private projects.

Tab. 2. - Leverage effect of Structural Funds on public and private expenditure under Objective 1, 1994-1999 and 2000-2006 (EUR)

	1994-1999		2000-2006	
	National public funds per euro of SF	Private funds per euro of SF	National public funds per euro of SF	Private funds per euro of SF
BE	0.77	1.18	1.02	1.43
DE	0.37	1.53	0.58	0.02
EL	0.52	0.28	0.5	0.48
ES	0.51	-	0.52	0.04
FR	0.54	0.23	0.88	0.33
IE	0.43	0.34	0.76	0.25
IT	1.4	-	0.89	0.45

Note: * based on actual expenditure 1994-2000

ES, IT: for 1994-1999, national public funds include private funds; EU11: excluding FI, SE

Source: *Third report on economic and social cohesion: A new partnership for cohesion convergence competitiveness cooperation*. Statistical Annex to Part 4: Impact and added value of structural policies, p.180, EC, 2004.

In this paper we focus on revenue generating public projects⁵. For these projects the EC contributes to filling the gap between the present value of investment costs and the present value of the net revenues by the approval of an EU grant. We turn now to explaining the current funding mechanism and its problems.

3. Grant mechanisms and project evaluation.

Project selection and ex-ante evaluation within this very broad 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 projects⁶), the EC requires Member States to submit, among others, a cost-benefit analysis (CBA)⁷ and then takes a specific co-financing decision⁸.

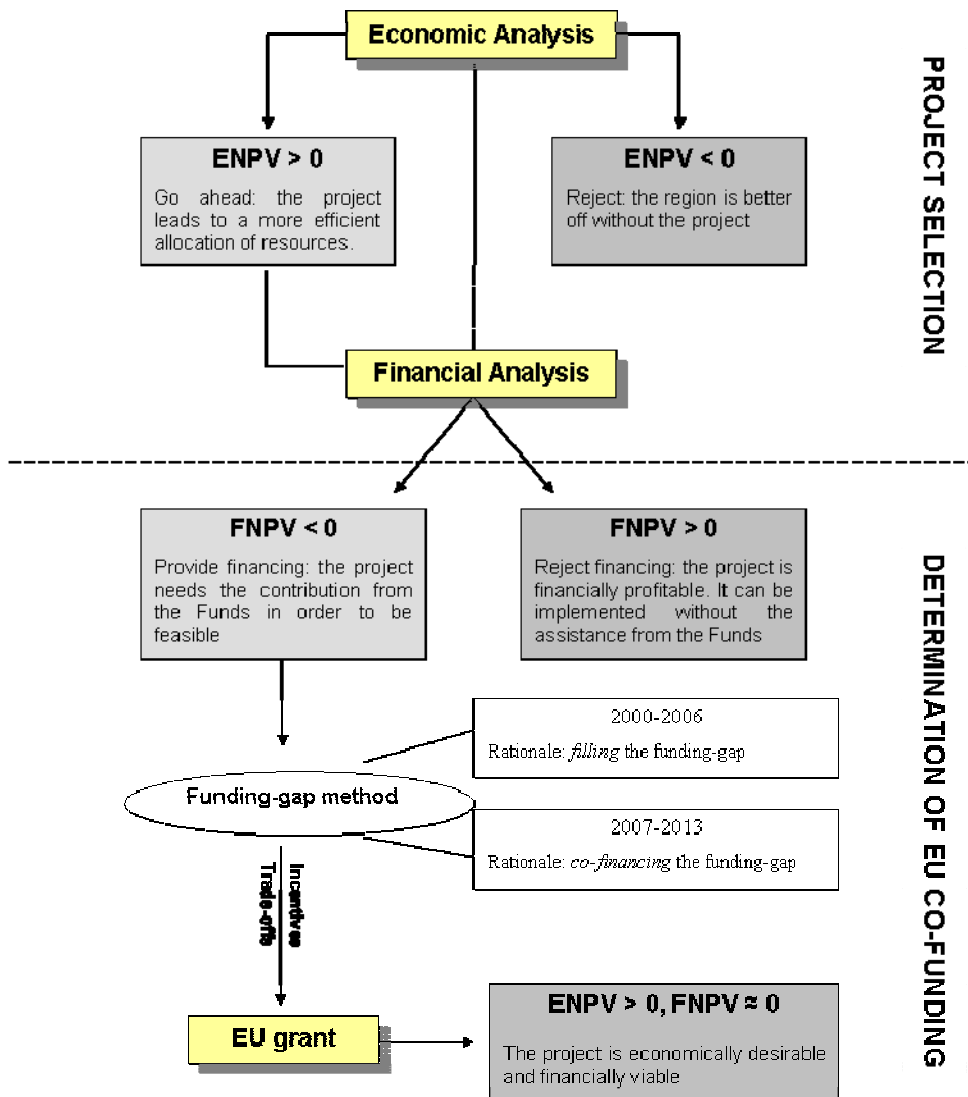
⁵ According to Art. 55 of Reg. 1083/2006, these are defined as *any operation involving an investment in infrastructure the use of which is subject to charges born directly by users or any operation involving the sale or rent of land or buildings or any other provision of service against payment*.

⁶ Article 157(2) Regulation 718/2007

⁷ 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.

⁸ Article 40(e) Regulation 1083/2006

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



Source: Mairate A. and Angelini F., 2007

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 costs⁹.

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,

⁹ 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.*

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.

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, for revenue generating projects, 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 simply¹⁰:

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

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

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

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.

Thus, if the total investment cost is EUR 100 million, and the ceiling is 80%, the grant is simply a linear function of DNR/DIC . In other words, just the part of the investment cost that will not be covered by future net revenues is eligible for co-financing, given one initial threshold. The EU grant does not fill the whole funding gap (as in the period 2000-2006) anymore but it will only *co-finance* it. As before, the national public finance shall cover the difference. The EC expects that this feature of the mechanism will create stronger incentives for the Member State to find additional sources of finance, such as public-private partnerships. Cella and Florio (2007) discuss the incentive issues involved and propose alternative mechanisms. It is important however to notice a positive feature of the project evaluation framework as it has been currently designed. If a project proposer exaggerates the economic benefits of a project, for example the demand for transport services, he will also raise often its financial return (at least for revenue generating projects) and this will decrease the EC grant, and in some cases it would rule it out because the project will end up as not needing a grant at all. Thus, the combination of financial and economic appraisal in one evaluation frame is an advantage. In the rest of this contribution we focus on CBA issues in this context.

¹⁰ See European Commission, Working Document N.4.

4. Some CBA 'rules of the game' under the EU Structural Funds.

The EC Guide (2008) was designed as a simple, operational document. It is currently used by perhaps one thousand project teams, which are involved in the preparation of applications to the EC for assistance under the SF. What follows explains why some decisions were made by the team in charge of drafting of the new edition of the Guide. The team acted with the support of a Steering Committee including officers from several Directorate General (DG) of the EC, the European Investment Bank, and particularly the Evaluation Unit, DG Regional Policy. However the team was free to propose its preferred approach and in general there was no disagreement on substantial issues. What follows, is of course, a personal interpretation of some specific issues. We briefly mention the following ones: (a) use of accounting prices and conversion factors, (b) shadow wage, (c) monetisation of non-market impacts, (d) social discount rate, (e) marginal cost of public funds (f) welfare weights.

a) Differently from several guidelines in some Member States, e.g. the British 'Green Book' (HM Treasury, 2003), the CBA Guide insists on the fundamental intuition that observed prices may differ from the social opportunity cost of some goods. While this point is well established in CBA theory, e.g. in the Drèze and Stern (1987) framework, in practice it has been taken more or less seriously in project appraisal in less developed countries (LDCs) only, particularly following the Little and Mirrlees (1974) contribution. In fact, probably, even in assistance to LDCs, shadow pricing has not been pursued in a systematic way (see the Little and Mirrlees, 1990 critique to the World Bank practice). In fact, shadow pricing has been often seen as an issue mainly related to market distortions in countries affected by trade barriers. As such, it has been dismissed as unimportant within developed economies when it was perceived that such barriers were falling, following international free trade agreements. There are two objections to this attitude to dismiss shadow pricing, which, as far as we know, was never embodied in a rigorous empirical analysis. First, there is here a serious misunderstanding about shadow prices. Some practitioners tend to assume that when markets are in equilibrium, this ensures social optimality of observed prices. In other words, shadow prices are seen as virtual market prices in those markets that are out of equilibrium. While this may be right in some cases, it is not the general rule. Shadow prices are defined as the marginal social welfare change (in a *numeraire*) caused by the additional net availability of a good. In a general equilibrium framework this implies that you need a social welfare function, a policy linking changes in production plans in the public sector (broadly defined) to changes in behaviour in the private sector, and you need to include any indirect effect. While this is an ambitious definition in terms of information needs, it is the only general one that allows defining in an unambiguous way what a shadow price is, hence what CBA is. Thus, the fact that a country is open to trade, as it happens within the EU, is far from ensuring that observed prices can be taken as the best proxy for shadow prices. The second objection, of more practical nature, is that even within the EU, where trade barriers have been officially removed, there still are significant barriers that prevent even the less ambitious assumption that market prices work well as shadow prices. The Guide shows this with a simple example: electricity prices, see Tab. 3.

Tab. 3. - Electricity price dispersion for industry and households in the EU, year 2005, €

Electricity		2005
Industry (annual consumption: 2000 MWh)	Average	6.74
	Median price	6.46
	Coeff. of variation	18.1%
	Max/min. ratio	2.20
Household (annual consumption: 3500 kWh)	Average	10.65
	Median price	9.00
	Coeff. of variation	23.5%
	Max/min. ratio	2.50

Source: European Commission, 2008

Despite all the efforts by the EU to create an internal market for electricity, in fact there have been privatizations and liberalizations on a national basis, cross-border trade of electricity is still limited. This happens for a combination of lack of physical interconnection infrastructure and of national legislations that prevents full tradability of electricity. Thus, given also different energy inputs (e.g. coal, nuclear, hydro, thermal) and different regulatory arrangements, one household can pay a Kwh in one EU member state 250% more than elsewhere. Now, suppose that the country where electricity price is higher, asks for an EU grant to support an investment in electricity generation. This is exactly the situation that led Ian Little in the 1950s to consider that planning in India, a federal country with different electricity tariffs at state level, needed the use of accounting prices. Thus, surprisingly, the reasoning that was relevant to India fifty years ago is still relevant in contemporary Europe, and cannot be dismissed because formally the EU trade is free. Moreover, in a social perspective, the opportunity cost of electricity is also related to important environmental issues. Thus, a Kwh produced with less impact on CO₂ or other pollutants is more desirable than otherwise, and this fact is not always captured by emission permits mechanisms (a complex story per se). This also should enter in the shadow price of electricity. Moreover, a social planner may have specific energy saving objectives, or access issues of disadvantaged users and constraints that may have an influence as well in the definition of the accounting prices.

The example of electricity is far from being exceptional. A second important example is food and all prices related to the agriculture chain. Here the Common Agricultural Policy creates a wedge between border prices and internal prices, but also a very complex pattern of internal prices across EU member states. Moreover, there may be additional objectives and constraints related to food safety that need to be considered and possibly included in CBA. Thus, an EU grant to a water project in a specific region needs to use something different from observed prices, because those prices are distorted in the traditional meaning of being both affected by (external) trade barriers and (internal) subsidies and regulations. This fact is well known to CBA practitioners in LDCs, and neglected in developed economies (an example are the US and their agriculture subsidy policy). A third example that we hope may convince the reader that the prices we observe in developed economies may be far from shadow prices is telecommunications, where recently the EC itself needed to intervene to contain rents in mobile communications related to 'roaming', which is a form of virtual trade barrier not officially acknowledged as such. Thus, surprisingly, everybody seems to agree that CBA is needed in traditional transport services, where tariffs apparently do not capture well costs and benefits for society, but many practitioners tend to forget that prices of energy, communications, or food are not very different from the perspective we have been taking here. Thus the Guide restates some well known shortcuts for computing shadow prices, with all the caveats (border prices when appropriate for tradable goods, willingness to pay or long run marginal costs for non tradables).

In practice, it is not yet known how far the project appraisal teams will comply with this aspect of the Guide, and conversion factors will be introduced in project analysis in the EU, but it is important that this view was restated, thus linking CBA in developing and developed economies.

b) An important shadow price that is often neglected in CBA as applied to developed countries is related to the social opportunity cost of labour. This was briefly discussed in Florio (2006) and the Guide suggests using region specific conversion factor. The rationale for re-introducing the shadow wage rate in the EU is a matter of consistency with the overall objective of regional policy. In fact, the overarching goal of this policy is both to achieve growth and convergence of European regions, and labour is a core ingredient in a growth perspective. Table 4 shows that officially recorded unemployment is substantial and unevenly distributed across EU regions.

Moreover, it is well known that in some countries, particularly in transition economies in Central and Eastern Europe, there is sizeable hidden unemployment in agriculture, meaning that the social cost of displacing a worker from rural activities has a limited social cost. This is far from being captured by observed wages, because for example infrastructure projects assisted by EU grants need to comply with legislation on social insurance and other forms of minimum wages gross of taxes and contributions. Even if the

EU is officially open to internal movements of workforces, different types of barriers make difficult and undesirable to have huge migration flows from one country to another.

Table 4: Labour market and average shadow wages and conversion factors. Preliminary estimates

Labour Market*	N° Obs	Mean	St Dev	Min	Max
FSE Regions 29					
GDP		159.4483	44.38596	106	291
Unemployment.		0.0562069	0.0285724	0.024	0.171
Long term unemployment		0.4217724	0.1046212	0.1556	0.5757
Rurality		0.3841931	0.1688713	0.0066	0.6687
Migration		0.4458828	0.3803997	-0.3926	1.2821
Shadow wage		45143.32	13796.22	13871.1	66528.37
Conversion Factor		0.9987027	0.0010024	0.9959168	1
ULD Regions 132					
GDP		104.5152	18.1017	58	150
Unemployment		0.0524492	0.0170864	0.021	0.11
Long term unemployment		0.2729894	0.1015171	0.0907	0.493
Rurality		0.4586614	0.2025696	0.0073	0.8304
Migration		0.5504265	0.5582344	-0.5485	2.67
Shadow wage		35735.26	12460.37	7257.648	62402.68
Conversion Factor		0.9432365	0.0221134	0.8562889	0.9880329
OKU Regions 74					
GDP		81.87838	21.66934	43	151
Unemployment		0.102473	0.0325076	0.047	0.203
Long term unemployment		0.5224432	0.0978887	0.2161	0.7947
Rurality		0.4589605	0.1487272	0.0258	0.7505
Migration		0.1554838	0.5013599	-0.7856	2.1218
Shadow wage		24028.31	13587.41	4306.473	56289.79
Conversion Factor		0.8005827	0.0929355	0.5289202	0.9280216
RLD Regions 32					
GDP		47.03125	14.06548	23	73
Unemployment		0.0848438	0.0210715	0.039	0.121
Long term unemployment		0.5287344	0.0736536	0.3763	0.6539
Rurality		0.4572125	0.1455784	0.1279	0.6828
Migration.		-0.2559875	0.4690832	-1.0524	0.745
Shadow wage		6554.819	6474.677	89.83778	24076.33
Conversion Factor		0.5197433	0.2450963	0.0340696	0.8346634

Note*: FSE: fairly socially efficient, OKU: quasi-Keynesian unemployment, ULD: urban labour dualism and RLD: rural labour dualism.

Source: Del Bo C., Fiorio C. and Florio M., 2009

In recent research Del Bo, Fiorio and Florio (2009) went back to shadow wages theory and identified four types of labour market conditions at regional (NUTS 2) level. They assume that labour market is in equilibrium in mainly urban, high income contexts, where unemployment is low, rural activities are minimal, migration flows are of modest importance. In these regions in principle a conversion factor of observed wages near to 1 seems sensible, hence the shadow wage and the actual wage coincide. There are, however, other urban contexts where unemployment is high, and a quasi Keynesian labour market, affected by nominal rigidities, may be a more appropriate description, when migration is modest. Third, in other regions there may be a dualism in an

urban context, with part of the work force drawn by informal urban activities. This is more similar to a Little-Mirrlees context, with the difference that the informal sector is not agriculture. Finally, there are regions, e.g. in Romania or Bulgaria, and elsewhere, where the rural activities are still very important, but are plagued by very low productivity.

Table 4 shows the four types of regions, their key characteristics and a tentative estimate of the average conversion factor for each type of NUTS regions.

c) Some goods are entirely removed from market transactions, for a number of reasons, the most important class of them being environmental goods (or bads). This is probably the only area where CBA progressed since the 1980s and Pearce, Atkinson and Mourato (2006) review recent literature. The Guide insists on shadow pricing externalities, because, without this, any CBA would not be meaningful and consistent with fundamental policy objectives of EU regional policy. The Guide also dismisses an objection that has been advanced against this recommendation, as the environmental legislation of the EU already poses the achievement of certain environmental or safety standards as compulsory for project proposers. Thus, one may think that because a certain quality of drinking water is prescribed there is no need to dwell on giving a shadow price to the safety or quality of water, and just cost-effectiveness analysis is needed. This objection can be rejected looking into the options that are open to project investors. In fact, while certain minimum quality or maximum emission standards are required by the EU legislation, this certainly is not the end of the story. For example a sewage system can be designed in different ways and for the same investment cost can achieve different environmental targets. As far as exceeding the minimum standard in terms of physical emissions is desirable, we need to assign a social welfare value to those achievements. This social value can be high or low, linear or decreasing with quantity, and simply ignoring what happens beyond the legal quantity threshold is not well considered. Given the difficulty of estimation in this area, the Guide suggests to take advantage of the substantial literature on estimation of values of non-market goods, with the 'benefit transfer approach', see Atkinson (2006). This approach, if well managed, is practical and sensible, in fact it uses as benchmark values estimations done elsewhere and adapted with appropriate transfer functions.

d) The social discount rate is a core parameter in CBA, and probably the one that has attracted the greatest interest in theoretical and applied literature. Among the different possible approaches, the new edition of the Guide has taken the view that the social time preference rate (STPR) approach is the reference one. The key concepts here are the growth rate of per-capita income (or a related macroeconomic variable), the elasticity of marginal social welfare to this variable and a pure preference time rate, see for example Evans (2006) for a discussion and recent estimates in the EU. The standard formula is:

$$SDR = e \cdot g + p$$

where SDR is the social discount rate, g is a growth rate of an appropriate macroeconomic variable (usually GDP because no long term estimates are available for private consumption), e is the elasticity of marginal social welfare to the variable, and p is a rate of pure time preference.

Table 5. Indicative social discount rates for selected EU Countries based on the STPR approach

Non CF countries	g	e	p	SDR
Austria	1.9	1.63	1.0	4.1
Denmark	1.9	1.28	1.1	3.5
France	2.0	1.26	0.9	3.4
Italy	1.3	1.79	1.0	3.3
Germany	1.3	1.61	1.0	3.1
Netherlands	1.3	1.44	0.9	2.8
Sweden	2.5	1.20	1.1	4.1
CF countries	g	e	p	SDR
Czech Rep.	3.5	1.31	1.1	5.7
Hungary	4.0	1.68	1.4	8.1
Poland	3.8	1.12	1.0	5.3
Slovakia	4.5	1.48	1.0	7.7

Source: European Commission, 2008.

Florio (2006) suggested using as benchmark values for the *SDR* a 3.5% rate in the EU more developed regions, and 5.5% for the remaining ones. Table 5 reported in the Guide offers some justifications.

An estimate for *e* can be based on the ratio $\log(1-t)/\log(1-T/Y)$, where *t* is the marginal income tax, *Y* is total income tax liability, and *Y* is total taxable income¹¹. This would lead to estimates of *e* in the range of 1.10-1.80, without clear differences between EU-15 and EU-12. One way (not uncontroversial) of estimating *p* is looking into mortality rates, based on the idea that individuals discount future against present because their expected survival rate declines with age. The range is here between 0.9-1.4, with possibly the average higher in EU-12. What actually matters then is the growth rate. Long term estimates, and indeed the objective of regional policy, is convergence of the 27 Member States income in the long run, and given the wide differences in their current conditions, it seems that *g* in the EU-12 can be forecasted at around 4%, i.e. twice the long term growth rate in the EU-15 countries. In fact, for the countries considered in the table, the range is 1.3-4.5. Thus simple computation suggests that with *p* around 1% for all the Member States, and *e* around 1-1.5, again for all the MS, a reasonable range of values of the SDR is 3%-4% for the EU-15, and 5%-6% for the EU-12. The Guide suggested an intermediate benchmark value for each group, leaving to each Member State the estimation of more country specific values. As it happens, the 3.5 % SDR is the same suggested by the UK Green Book (albeit with different data, and declining over time, see below).

e) We just mention here that the Guide team, after some consultation with the EC services decided not to offer a discussion of the Marginal Cost of Public Funds (MCPF) and in a footnote (see, page 54) just suggested MCPF=1 as a default rule when national guidance are not available (this will be the case mostly everywhere). The reason of this shy attitude to the MCPF is practical and theoretical. Estimation here heavily depends upon a number of fiscal parameters, not easily available in several countries, see Dahlby (2008) and Hashimzade and Myles (2009) for a discussion. Moreover, the problem is here more complex than the standard one because EU Funds are granted under an assumption of 'additionality', meaning that in principle they do not displace domestic public funding. Hence, it is the EU taxpayer that suffers the burden of distortionary taxation, not (mainly) the national one: in fact, a weighted average of net contributions to the EU budget implies combining different tax sources across countries. This is not the end of the story, because additionality varies across countries, with some evidence of displacement of domestic spending, but not based on systematic evidence. Thus the team concluded that the calculation of the MCPF in this context raised too many problems and justifies a single number to be mentioned in the Guide.

f) The Guide departs from the Harberger and Jenkins (2002) view that distribution issues do not count in CBA. Given that a substantial part of the EU funds is targeted to infrastructures for delivery of public services, such as water, waste collection or

¹¹ See Evans (2006) for details on the derivation of the formula

electricity distribution etc, it was important to stress a concern for social affordability of the services and more in general to focus on poverty issues potentially addressed or worsened by the projects. The suggestion was here rather flexible, ranging from the option to compute welfare weights of the type:

$$W = (C_{\text{average}} / C_{\text{group}})^e$$

Where C is consumption level in a given country or region, and e is the (constant) elasticity of marginal social utility of consumption. Under the iso-elastic social utility function, marginal utility is simply Y^{-e} . This boils down to the convenient expression for the welfare weight $1/Y$. In practice, welfare weights are seldom used, but the Guide insists at least to look into the distribution characteristics or social affordability indexes for the goods and services considered.

While the above remarks have covered only selectively some CBA issues treated in the Guide, they can give the reader some of the core concepts that were adopted. We turn now to compare the EU Guide with national traditions in project evaluation.

5. A comparison with the UK 'Green Book'

In this section we briefly comment on differences between the EU Guide and the UK Green Book (HM Treasury, 2003). The latter is perhaps the best known example of a serious tradition of public investment appraisal at national level¹², and is the latest edition of guidelines that are compulsory for all departments in the UK since decades.

Among the similarities between the two guides we would mention the overall logic of the appraisal and ex-post evaluation cycle that the Green Book summarises as the Rationale-Objectives-Appraisal-Implementation/Monitoring-Evaluation-Feedback sequence. The main broad ideas shared by the two guides, in spite of minor semantic differences, are: the legitimacy of public intervention to address market failures, the concept of a social opportunity cost of inputs and outputs, the need to consider different options from the beginning of the appraisal process, the focus on valuing as far as possible cost and benefits, the concept of discounting by the Social Time Preference Rate (STPR), a consideration of distributional impact, a wide discussion of risk and uncertainty.

Despite these important conceptual similarities, that make the two documents comparable as they use similar ideas, there are also important differences.

a) The Green Book (as several other national guidelines in the EU and elsewhere that we cannot review here) does not recommend explicitly using shadow prices: *Cost and benefits should be normally based on market prices as they reflect the best alternative uses that the good can be put to (the opportunity cost). However market prices may need to be adjusted for tax differences between options* (point 5.11, page 19). This position is slightly qualified in a subsequent statement: *Real or estimated market prices provide the first point of reference for the value of the benefits. There are a few exceptions (...) if the*

¹² Illustrative examples of such national traditions are provided here: Road and Motorway Directorate (2002), *Cost-Benefit-Analysis Handbook for road projects in the Czech Republic*, Prague, Conférence Européenne des Ministres des Transports (1999), *Evaluer les avantages des transports*, OCDE, Robien G. (2004), *Harmonisation des méthodes d'évaluation des grands projets d'infrastructure de transport*, Révision de l'instruction cadre du 3 Octobre 1995, BMVBS (2006), *The Federal Transport Infrastructure Plan 2003 - Laying the foundation for the Future Mobility in Germany*, Federal Ministry for Transport, Building and Urban Development (BMVBS), Berlin, Transman (2004), *Methods for Highway Network Development Planning in Hungary – With argumentation for EU funding*, Budapest, NUVV (2001), *Studi di fattibilità delle opere pubbliche. Guida per la certificazione da parte dei Nuclei regionali di valutazione e verifica degli investimenti pubblici (NUVV)*, Conferenza dei presidenti delle Regioni e delle Province Autonome, Roma (Italy), Department of Transport Canada (1994), *Guide to benefit-cost analysis in transport Canada*, Ministry of Transportation and Highways of Canada (1997), *Monetization of environmental impacts of roads*, Treasury Board of Canada (1998), *Benefit-Cost Analysis Guide*, Federal Aviation Administration (1999), *FAA airport benefit-cost analysis guidance*, US Department of Transportation, Washington, D.C., Federal Highway Association (1998), *Procedural guidelines for highway feasibility studies*, US Department of Transportation, Washington, D.C., Japan International Cooperation Agency (2004), *JICA Guideline for Project Evaluation – Practical methods for Project evaluation*.

market is dominated by monopoly suppliers, or is significantly distorted by taxes and subsidies, prices will not reflect the opportunity cost and adjustments may be required (...) An example of this is the effect of EU subsidies on the market for agricultural land (point 5.26, page 21). We have explained before why this position, albeit simple and practical, may be too restrictive. In fact, once you admit that 'monopoly' prices deserve a special consideration, it is just a logical step to pay a similar attention to oligopoly prices. As it happens, most of the key services of general interest (e.g. water, telecommunications, energy, transport, health, education, etc) are oligopolies. Moreover market failures, of the types mentioned elsewhere by the Green Book (Annex I, page 51 and following) are widespread in all economies (certainly not just in developing economies). Thus, the fact that the Green Book is shy in dealing with shadow pricing (just mentioned in the Glossary, page 105), while the UK government uses this idea in its guidelines for assistance in the LDCs (ODA 1995), seems to be an unjustified asymmetry of approaches. The EU Guide, being targeted to several member states and to wide disparities in regional development, could not avoid using a more general perspective on the concept of opportunity cost, than just the reference to market prices.

b) An example of why the position of the Green Book on shadow prices leads to a cumbersome approach is the treatment of the opportunity cost of labour. This is not explicitly dealt with in the main text of the Green Book, but is treated in Annex I, under the heading of Additionality (of government interventions). In this more general discussion the Green Book deals with such issues as 'leakage', 'deadweight', 'displacement' and 'substitution' effects. For example it reads that: *The appropriate area for analysis of displacement effects will depend on the type of project. In the case of employment displacement, the area considered should usually be the local labour market (...)* *The effect of net employment and net output is likely to be much smaller than the direct employment and output effects of the project. Evidence should support the assessment of the scale and importance of any net employment and net output benefits, taking into account of multiplier effects* (page 54). In contrast, the EC Guide insists on the use of a shadow wage, possibly region specific, and to avoid the recourse to multipliers. In fact, it is well known that shadow prices in principle are sufficient statistics for these effects in a general equilibrium framework, and in practice their use would be efficient. While in principle there is a clear conceptual relationship between shadow wages and output multipliers, it is noteworthy that what the Green Book says would imply a 'local' analysis of the with-without project change of the economy, and this is very often difficult. Moreover, it would decentralise to project appraisal team the calculation of average marginal effects that is best done in some planning central office. Let's consider this statement by the Green Book: *The net benefit of an intervention equals the gross benefit less the benefits that would have occurred in the absence of interventions (the 'deadweight') less the negative impacts elsewhere (including 'displacement' of activity), plus multiplier effects* (page 54). While there is nothing wrong in this statement, and similar concepts can be read in the EC Guide, clearly it is of paramount practical importance to see the implications of using shadow wages (and prices in general) against using the 'net benefit' approach. If the project evaluator is instructed by the government or a planning office to use a shadow wage (or a conversion factor for the observed wage) there is no need in general to embark on the dangerous route of estimating deadweight and displacement effects. If no shadow wage is available when appraising a hospital project, in fact it is right to ask the evaluators whether in future the local labour market would have evolved in such a way as to show a different unemployment rate than the one expected if the hospital is built, and to ask them from where new employees were drawn. In practice the data will not be available and any error incurred either in ignoring the difference between gross and net effects, or in guessing them with very imprecise data, will be often much greater than using a shadow wage, i.e. a planning parameter based on more aggregate information.

c) One crucial difference between the EC Guide and the Green Book is the strong emphasis in the former on having at the same time a consistent financial and economic analysis, in order to take advantage of the two perspectives. While the Green Book certainly does not confuse financial and economic concepts, in fact its treatment of the differences is very limited (see for example Box 3.1, page 73 and following, in Annex 3, where a cost-effectiveness cash flow analysis and a limited CBA are presented on office space options). Thus, while there is an indication for the social discount rate, it is not explicit if the same rate should be applied when focussing on cash flows under financial analysis. In fact the worked example above uses 3.5%

discount rate in both the cost-effectiveness and the cost-benefit analysis, where the former seems to be just a projection of cash flows. The EC Guide, while ending up with similar real rates for the two concepts, carefully distinguishes the justification for the financial discount rate (based on a portfolio of long term financial assets) and the social discount rate (based on the social time preference approach). Moreover, the Guide devotes most of its space in developing five worked project examples (railway, highway, water, waste, manufacturing plant) with financial, economic and risk analysis to show how important the differences are when we move from one perspective of appraisal to the other one. Again, the need to consider different countries and regional contexts, with different financial conditions of the member states, has suggested avoiding any possible confusion between the financial and economic performance of a project.

In conclusion, the contribution given by the EC Guide as compared with the national traditions in CBA in Europe lies probably in suggesting that there is no need to have an entirely different framework for project appraisal in less developed economies and in more mature ones. Having to deal at the same time with countries as different as Sweden and Bulgaria, it was only obvious to try to find a common evaluation language among them, leaving then to field work the identification of specific parameters and solutions. While one does not need to be overoptimistic about the overall quality of appraisal that this process under the EU SF will generate, it was interesting to build a bridge between different traditions in social cost-benefit analysis.

6. Concluding remarks

There are a number of open research issues on project appraisal, and CBA in the EU cohesion policy in particular, which would deserve further investigation. We present here some of the most urgent.

The first issue regards the need of adopting shared national (in some cases perhaps even regional) parameters for CBA (shadow prices and shadow wages, the value of time, the value of the most common environmental costs and benefits, etc) to be used consistently by evaluation teams. The advantage, of course, is not only in terms of efficiency for practitioners having been provided with a ready-to-use set of relevant values for economic analysis, but mainly in terms of consistency and comparability of different projects implemented in the same context or sector. Currently it could easily be the case that two projects in the same region and sector, say transport, are evaluated on the basis of different parameters, for example different values of time are used to estimate social benefits. In terms of the overall planning exercise, the use of a consistent set of parameters would enhance the soundness of analysis and reliability of a coordinated assessment. Attempts to produce some kind of generally applicable (suggested) values of parameters have already been made (see for example the Heatco¹³ project), but not in a systematic way. Originally, in a first draft of the cohesion regulations, it was provided that the European Commission and Member States would have agreed national parameters for performing CBA. This provision has been dropped in the last version of the Regulation¹⁴. It should be hoped that some national initiatives are promoted in order to produce consistent sets of parameters.

Second, given the importance of the climate change issue for regional development and for the appraisal of major infrastructure projects (especially for the transport and energy sectors) some specific rules should be explored for the assessment of climate-related effects. The discount rate is crucial for estimating the social cost of carbon, a typical indicator for the desirable level of climate policy, and a case has been made for the use of a long term, declining SDR. The rationale is the increasing uncertainty about the future when long-term effects are considered¹⁵. This is something the Green Book clearly put forward, by suggesting that, for

¹³ Developing Harmonised European Approaches for Transport Costing and Project Assessment, <http://heatco.ier.uni-stuttgart.de/>

¹⁴ Art.40 of Reg. 1083/2006 simply says that *the Commission shall provide indicative guidance on the methodology to be used in carrying out the cost-benefit analysis*. This was done by the Guide and a previous working document (Working Document n.4, European Commission, 2006).

¹⁵ Recent literature propose as an alternative method to adjust instead future environmental benefits for rising willingness to pay (the theoretical foundation for lower environmental discount rate) for environmental benefits and to discount those benefits at the consumption discount rate. (See Kögel T., 2009)

costs and benefits accruing more than 30 years into the future, discount rates to be used ranges from 3.5% (in a 0-30 years horizon) to 3.0% (for 31-75 years horizon) until 1% (in case of 301+ years horizon)¹⁶. In the same vein, recent literature discusses the role of aversion to risk and to income inequality as determinants of the discount rate¹⁷ when analysing climate change (see for example Atkinson et al. 2009). Interestingly, the authors find that individual preferences over these dimensions are weakly correlated in the context of climate change, with large heterogeneity over preferences. In the light of these findings, modellers are suggested to present policymakers with a range of optimal policies corresponding to different degrees of risk aversion, spatial inequality aversion and temporal inequality aversion, since a single value for each would conceal important ethical disagreement.

Third, open issues remains on the complex subject of the marginal cost of public fund in a multi-country framework. Different fiscal systems and the application of the additionality principle (which in fact calls for the EU public money rather than the national public one to be considered) not only make the calculation of an appropriate value difficult from a practical point of view, but also raises challenging theoretical issues.

Lastly, the right incentives are needed to implement a good CBA, which requires time, effort and adequate human capital. Linking CBA and incentive theory¹⁸ is an important task for the future. These issues are relevant for developed and developing economies, and a unique general frame is needed.

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¹⁶ See the Green Book, Annex 6, pag.99. The Stern Review (HM Treasury, 2006) suggests a 0.1% discount rate.

¹⁷ Under the assumption of a utilitarian social welfare function the discount rate is a function of the elasticity of marginal utility, which reflects not only preferences for intertemporal substitution, but also aversion to risk, and aversion to inequality (spatial disparities are especially of interest with relation to climate change).

¹⁸ See Cella and Florio (2007) for a discussion and an example

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