Appraisal Parameters, Selection Criteria and Regulations for Long-Term Investment in Europe: Issues and Possible Solutions

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Abstract: This paper reviews the main issues confronting appraisal of Long Term Investments (LTIs) on the basis of recent literature and experience (such as airport planning in Northern Europe, substitution of analogical television with Digital video Broadcasting – Terrestrial (DvB-T) in Italy, regional planning in several European countries) and proposes the following conclusions for consideration by the Long Term Investment Club (LTIC) as wel as by the European Commission (EC):

- For LTIs. a clear cut choice of numeraire (and relevant discount rate) would clear up the ambiguity now prevailing in many OECD countries and in the current EU guidelines.
- LTIs quite often have inter-generational implication. The Modified Discount Method, MDM, appears to be the most suitable and easiest methodology to experiment with in a limited number of cases and eventually, if found to be feasible at a reasonable cost, to be incorporated in guidelines.
- Uncertainty is a characteristics of most LTIs due to their long "project life". The real options approach is a suitable way to address it; but the additional information it provides may have a comparatively high cost. Thus, it is worthwhile to experiment using it in a selected number of LTIs as a preliminary step for eventual incorporation in general guidelines.
- LTIs are a powerful tool to deregulate and/or reregulate key sectors of the economy and should be exploited to the fullest extent.

A research agenda may be useful in leading to more consistency in LTIC practices. This agenda would include: a) a review of existing manuals and guidelines, and more fundamentaly, of actual practices used; b) a discussions of the points raised In this paper, c) the possible development of general guidelines.

Summary: 1. Introduction. - 2. The long implementation and gestation period. - 3. Risk and Uncertainty. - 4. LTI Lumpiness and the "new rules" issue. - 5. Conclusions: A Possible Research Agenda.

1. Introduction.

A recent World Bank Policy Research Working Paper (Yifu Lin, Doemeland, 2012) does emphasizes that Long Term Investments (LTIs) are the necessary

tool for an exit strategy from the crisis that has plagued the world economy since 1997. LTIs have distinct and special features as compared with short and medium terms investments (Clements, 2011). These features occur especially in the infrastructure sector: the planning and construction of a major transport network, involving both highways and railways (and even including airways and waterways), is vastly different from a road maintenance program. (Briceno Garmedia, Sarkodie 2012). This is even more apparent when LTIs deal with research and innovation, human capital, energy, environment, and the like (Edler, Berger M., Dinges M., Gok A. 2011).. Their main characteristics are as follows.

- A long physical implementation and gestation period before financial returns and economic and social benefits provide a positive long lasting net cash flow.
- A long temporal distance between the decision of financing a project and its "physical implementation": within such a temporal lag, the major strategic variables can change their trend especially in presence of fast social and technological changes as it is now and will hopefully stronger in the future. This requires a high capability of reading a large number of variables simultaneously.
- Serious intergenerational issues because financial and economic costs fall principally on the generation designing the investment and deciding to go ahead with it, as well as using the required resources, while financial and economic benefits typically accrue to the next generation(s); the calculation of their discounted present values present theoretical issues as well as policy, technical and operational ones.
- Uncertainties as opposed to risks in estimating financial and economic costs and benefits and their flows because of the long time-span involved. Attempts to use "averages" or to "shadow price" for future long-term costs and benefits have often proven unsatisfactory, especially from the operational and practical standpoints.
- "Lumpiness" of the LTIs; whereas for physical implementation and contracting purposes, any LTI can be, and often need to be, divided in temporal stages or phases and in specific "technical packages" for bidding and contracting purposes (Dimitri, Piga, Spagnolo 2006), their conceptual integrity is such that the various stages/phases and/or "packages" cannot have financial and economic costs and benefits distinct from those of the overall LTI. This has implications for both the use of resources and the feasibility of interrupting the investment or of changing its content and components, during its implementation., or modifying its objectives, contents and phasing (Sunstein, 2011)
- There are significant differences in outlook between private and public partners. Normally, the former are interested in not overly deferred financial returns for their stakeholders and shareholders. The latter are generally interested in promoting improved welfare and living standards of future generation(s) not solely of the present decision makers and their constituents (Magni, 2011).

These issues are well known to the literature (Adler, Posner 2006; Ferrara, 2010; Pennisi, Scandizzo 2003; Glachant, Lorenzi, Quinet, Trainar, 2010) and have often been resolved with elegant economic and mathematical modeling. There is no consensus, however, on a generally accepted methodology and on a set of techniques to apply operationally. Briefly, there has been no roll-out from Academia or adoption by practitioners among LTIs, such as development banks and funds, private equity funds, and the like.

The purpose of this paper is to take some steps along the path leading to the use of some methodological and operational advances in appraising LTIs. If there is a general consensus, the next step could be to develop technical guidelines to be used consistently with a view of developing a joint approach and terminology and, as a consequence, facilitating dialogue and discussion among interested scholars and practitioners as well as their decisions on specific LTIs.

2. The long implementation and gestation period.

The long implementation and gestation period is a standard characteristic of most LTIs. When dealing with infrastructure networks or with human capital formation or with protection and/or promotion of the environment, the "physical implementation" period could last well over ten years and it is often followed by a "gestation phase" of a number of years before financial returns and economic benefits reach significant or adequate levels. This raises numerous financial, economic and juridical problems. Often, the financial issues can be solved with long term licenses or lease contracts that provide incentives to (or persuade) private investors to await their share of the returns of the LTI as and when they do materialize. This has been the case, for instance, of many 19th century railway programs in both the USA and Europe. A forerunner was the Napoli-Portici Railway built with Belgian private equity project financing and inaugurated in 1839 (Minard 1840). Even this early juridical treatment of LTI suggests that proper appraisal could be a useful and effective trigger to European regulation and/or re-regulation in several fields (Moszoro 2010; Moszoro and Krzyzanowska 2010).

The key issue, however, is the discount rate to apply to financial and economic costs, on the one hand, and to financial returns and economic benefits, on the other. For private investors, the issue is quite straightforward: the pertinent rate is the financial opportunity cost of capital (e. g. the risk-free alternative use of resources). If this return cannot be obtained in the short or medium term, appropriately designed contracts, lease, regulation(s) can serve as a vehicle to make this financial objectives achievable (and capture satisfactory returns) in the longer term. For several years, this vehicle has consisted of straightforward State and/or Regional subsidies often labeled "industrial policy incentives". Both European Union (EU) rules on competition and the severe financial stringency in most EU public funding make this approach useless.

The issue is more complex for economic analysis. Methodologically, since the early 1970s two schools of thought have had a long and unresolved confrontation about the appropriate numeraire (viz. the economic unit of account) to be used for economic analysis of projects and programs. In short, they are the OECD/World Bank and the UNIDO school and both are based on now iconic manuals (Little, Mirlees, 1974; Squire, van der Tak, 1992; Dasgupta, Margling, Sen, 1972), respectively produced by the OECD (and reformulated by the Word Bank) and by UNIDO. In short, the OECD/World Bank approach takes as numeraire the constraint to LTI: availability of freely convertible funds under the control of the investment planner (and thus freely deployable for other purposes), whilst the UNIDO approach takes as numeraire a growth –cum- welfare objective: the growth of per capita consumption of those at the "critical level of consumption" – viz. the level of consumption at which no subsidies are received and no taxes are levied.

In the last 40 years, there has been a vast literature confronting the merits and the disadvantages of the two schools. Specifically, the OECD/World Bank approach has the advantage of providing a close link between the appraisal of LTIs and macro-economic and monetary policy in that the value of freely convertible funds is, to a large extent, a function of fiscal and monetary policy as well as of the exchange control measures applied in support of them. Whatever approach is chosen, the results of appraisal/rejection test of a LTI do not change. This means that, if the analysis is properly carried out, a LTI is or is not worth financing regardless of the approach (OECD/World Bank or the UNIDO) followed (Dasgupta, Mäler, Barnett 2000; Berlage, Renard, 1985). Further, it is only for matter of operational convenience, that, generally a single discount rate is applied during the life of the LTI. As Dasgupta, Mäler and Barnett (2000) correctly point out, "tnear-universal practice of using a constant discount rate in project evaluation (e. g. 5 percent per year applied to the net income of a project over its entire life) has grown out of a need for practical convenience, it is not a theoretical prescription". However, the numeraire and the relevant discount rate(s) are the items on which the LTI economic analysts (as well as, occasionally, the policy makers as and the decision makers) do focus attention on.

Furthermore, as recently documented (Beraldo S., Caruso R., Turati G. 2011; European Commission, 2009; Ferrara, 2010; Florio 2006, Gollier C., Koundouri Ph, Pantelidis Th. 2008; Hardisty D. J., Thompson K., Krantz D., Weber E. 2011, Wang, Rieger, Hens 2009,), public agencies in the USA and in Europe have followed a mix of both schools in setting their normative discount rates for economic analysis of LTIs by Government Departments, States of a Union and Regional as well as other local authorities. In certain cases – most notably the European Commission in dealing with European structural funds-, they have initially followed the OECD/World Bank approach, but more recently adopted a blend of the OECD/World approach and the UNIDO approach. Most often, the underlying methodological approach is not spelled out in the handbooks but merely embodied in bureaucratic procedural guidelines of administrative nature.

The author of this paper has adopted the OECD/World Bank numeraire in two manuals (Pennisi, Scandizzo, 1985, 1991) when in Italy the central policy issue seemed to be the constraint on funding but the UNIDO approach (Fanciullacci, Guelfi, Pennisi 1991) when requested to prepare a manual for Italian development aid. Two of the manuals were prepared in parallel, almost simultaneously. However, the objective of one was to provide guidelines for public investment financing in Italy (thus, the link with fiscal and monetary policy was essential) while the other had to take into account that Italian development aid legislation forbade interference with general macro-economic policy of the beneficiary countries. As the analyst's attention focuses on the numeraire (and the discount rate is the decline of numeraire value over time), it seemed reasonable to use the OECD/World Bank approach to appraise domestic public investment in the 1980s and 1990s and the UNIDO approach to assess the investment part of the development aid program.

The main problem in dealing with LTIs is that, generally, the OECD/World Bank numeraire yields a much higher economic discount rate than the UNIDO's. Empirical analysis carried out around 2000 in many OECD countries yielded an OECD/World Bank numeraire of about 8-10% whilst the UNIDO numeraire settled at about 2. 5-3%. At a 10% discount rate, after 30 years the Present Value of either a cost or a benefit is almost nil (discounted at the factor 0. 0573, OECD/World Bank approach), whilst at a 2. 5-3% discount rate, the same cost and/or benefit can still be significant (derived by discounting at 0. 47-0. 411, UNIDO approach). Generally, any public investment numeraire is likely to be associated with a higher discount rate than a consumption numeraire but over time this difference will be neutralized because shadow prices of costs and benefits are likely to be also higher (with an investment numeraire rather than with a consumption numeraire) due to higher depreciation, over time, of investment than consumption. Again, if the economic analysis is properly done in terms of the derivation of shadow prices and of estimation of externalities and forward and backward linkages, it should not matter which numeraire and discount rate is applied: the test of acceptance/rejection of a LTI will have the same outcome whichever numeraire (and implicit discount rate) is applied. Nonetheless, the attention of the analyst (and the policy/decision maker) will be on the costs and benefits most easily "captured" and quantified (Xia, 2011).

In my view, for economic analysis of LTIs, the UNIDO approach is to be preferred to the OECD/World Bank approach for practical operational reasons:

- One of the outcomes of world financial and economic integration is the end of controls on capital movements and exchange controls that made the availability of freely convertible funds a more telling indicator of policy and program flexibility (and hence, constraint on LTIs) in the 1970's and 1980's than it is now.
- Due to their characteristics, LTIs have economic costs and benefits that, for a proper appraisal, need to be quantified even if they appear after

several years from the start of the implementation period of the pertinent investment (Gollier, Weitzman 2008; Knowles, Shaw, 2008). Many USA and EU agencies are, implicitly more often than explicitly, moving towards the UNIDO approach.

As outlined above, a feature of LTIs is that costs fall on generation n but benefits often are captured by generations n+1, n+2, n+x. Intergenerational issues are well-known to students of tax theory and policy as well as of generational growth accounting and are often blended with moral philosophy theory and policy. In this paper, for the sake of simplicity, it assumed that the most relevant literature in these fields is generally known to the readers. This will allow me, therefore, to deal only with the operational applications to LTIs.

Analytically, the subject should be kept distinct from that of the discount rate relevant to long term implementation and gestation investments. Actuarially, even a very low economic discount rate (say 1. 5%) costs and benefits for the next generations – after 50 years- hardly matter. Methodologically and operationally, the subject attracted considerable interest from economists and practitioners in the late 1980s-ealy 1990s in parallel with the development of LTIs in promotion and protection of the environment. It was delved into especially by economists with interest in non-renewable resources (; Bateman 1989; Kula 1988 and 1989; Livingston, Tribe 1995; Pennisi 1998; Thompson, 1991).

The British quarterly, Project Appraisal, now renamed Impact Assessment and Project Appraisal, had a major role in encouraging a policy and technical debate on the issue. More recently, the topic has been examined by American economists (Boardman, Greenberg, 1998; Dinwiddy, Teal 2006; Zerbe, Diley, 1994; Porney, Weyant, 1999); Scarborough H. 2011; Schwindt, Vining, Globerman, 2000;). It has also attracted the interest of USA public long-term investment authorities in setting guidelines and even outright rules (US Office of Management and Budget 1992; for recent developments, see Ferrara 2010). Also, regulatory agency lawyers have worked on the issue in attempting to link economic analysis of LTIs with re-regulation (Adler, Posner, 2006). The subject is thus, now central to the evaluation of LTIs. Recently, for instance, intergenerational discounting has been successfully applied for a non renewable resource (land for real estate) in Honk –Kong (Wong. Wing-Chau, Edward Yu, Yu, 2008) and is being proposed in the USA for LTI with strong environmental impacts (Marks 2012).

Similarly to the issue concerning the discount rate, there are two schools of thought in the treatment of intergenerational issues. The difference centers more on the underlying assumptions than on methodological and operational practice. As shown by Pennisi (1989) and Zamagni (2007), the Modified Discount Method (MDM), originally developed by an agricultural economist, Erhun Kula, has its roots in moral philosophy, in particular in John Rawls'theory of justice (Rawls, 1971) – most notably on the rawlsian "second principle of justice". The Multigenerational Value (MV) is based on the development of altruist utilitarianism in the late 1980s- early 1990s (Stark,

1995). Whilst the MDM conceptual roots have been explicit since the writing of the fundamental texts of the school of thought, the foundations of MV became apparent only after the detailed analysis of a fully formalized proposal (Yaffey, 1997).

The choice between the schools thus, partly rests on philosophical assumptions and/or preferences. In short, theoretically the MDM shares the mathematical difficulties of Rawls "second principle of justice" (Pennisi, 1989), but methodologically, it stands well with the UNIDO aggregate consumption numeraire indicated as the way to derive a coherent and consistent economic discount rate for LTIs. Also, its computation is comparatively easy as the "positive parameter" of the pertinent equation is "life expectancy at birth", a statistic that is readily available from any Central Statistical Office.

The MV is closely linked to the OECD-World Bank numeraire and entails a "normative parameter" loaded with implicit policy judgments: "the discount rate that present society imputes to per-capita benefits of future generations". Logically, if chosen, it should be applied also to pension and health policies and related investments.

In short, both the MDM and the MV have advantages and disadvantages. In line with the earlier proposal about the use of the numeraire and the discount rate, I would propose to use the MDM also for two practical reasons: a) the MV is discriminatory (because it is based on value judgments) and decision-makers can be, rightly or wrongly, accused of being influenced by personal preference in their judgments (if these judgments are made explicit); b) in my teaching experience, I came to the conclusion that the MDM is easier to teach and to learn than the MV, especially when the students are public servants and may not have a strong mathematical background because they have been trained mostly in institutional and juridical subjects.

3. Risk and Uncertainty.

Because of the length of their implementation and gestation period and the long, often multi-generational, time-span for accrual of their economic costs and benefits, LTIs entail uncertainty rather than risks. The difference between the former and the later is profound: risks can be estimated, through either simple or complicated (e. g. Montecarlo Simulations) techniques based on a probability calculus, whereas uncertainty concerns unforeseen and unexpected changes of the overall situation, including the socio-economic and political context (states of nature). Probability calculus is of little help in getting a handle on uncertainty. Dealing with it requires the derivation of real option values, a field little explored until the mid 1990s and then only by a few investment planners and appraisers such as those dealing with environment, culture, art and the value of life and limbs.

In the last 15 years, considerable work has been done to estimate the value of investment, under uncertainty (esp. LITs) starting with a seminal study by

Dixit and Pindyck (Dixit, Pindyck 1994), based, to a certain extent, on a 1921 study by Frank Knight recently re-published (Knight, 2002) as well by epistemological research (Nassim, 2007). A summary of recent developments in this thinking has been published in a paper by Pennisi and Scandizzo (Pennisi, Scandizzo, 2006). In short, following Pennisi/Scandizzo (2006), the most recent evolution of economic thinking has brought about a revision of the concept of economic value, which appears far reaching in both its theoretical and practical implications. From the point of view of the theory, value appears to be a feature that is directly related to institutions and assignment of "rights" in an organized society (Akermman, Alstott, 1999; Arlsson I. 2007)). From the practical and, thus, operational point of view, therefore, neither the estimate nor the creation of value can be properly understood, unless sufficient attention is paid to the contractual nature of the act of exchange and the institutional substance of markets, enterprises, and organizations. This marries law with economics and, as a consequence it links the appraisal of LTIs with regulation and re-regulation.

Within this context "uncertainty" is seen a "window of opportunity" to create "contingent wealth" through "real options". In a book of some ten years ago (Pennisi, Scandizzo, 2003), Scandizzo and I provide a new definition of policies, programs and projects. In this approach, a project, and in particular a LIT, is seen as "an economic policy opportunity" which may create or destroy other "opportunities" for various groups of the society all legitimately involved in, or concerned with, the project – the stakeholders. Financial markets theory and practice deal extensively with the evaluation of "opportunities" and of "opportunistic behavior", mostly through "options" theory and practice. By borrowing heavily from financial markets theory and practices as well as from the new frontier of law and economics, a tool kit for the evaluation of policies, programs and projects could be built. Hopefully, this tool kit would be especially apt for policies, programs, and project evaluation in an age of uncertainty(Chen, 2010).

The beginning of the 21st century is named the age of uncertainty because uncertainty arises not only from the need to make long-term projections but also from the new and, to a large extent, yet unexplored paradigms of the virtual, or web economy, and of the many yet unknown ramifications of international integration of economic policies, programs, projects, and governance (De Filippi, Pennisi, 2003). Thus policy, programs, and project planning and evaluation require a great deal of serendipity (Merton and Barber, 2003; He, Li, Wei, Yu 2012) – viz. possible policy, programs and project combinations are discovered even when searching in different directions or pursuing different objectives. On its part, serendipity focuses on "opportunities" and on the value of "rights" and "entitlements" in an uncertain context. Opportunity, it may be useful to recall, is central to the new welfare economics theory mostly due to the contribution made by Amartya Sen (e. g. Sen 1997a, 1997b).

It ought to be clearly understood that real options analysis is not an accounting device to attempt to quantify uncertainty always implicit in LTIs but an instrument to shed light on political economy surrounding LTIs with a

view of better capturing opportunities for all the stakeholders involved (Masci, 1999). A key implication of this approach is the central role of stakeholder analysis and, hence, of decentralized decision-making as well of the use of sociological and political science disciplines- in addition to the legal one. For many years, stakeholder analysis has been a key feature of non-economic approaches to evaluation, especially in the organizational and sociological disciplines (Bezzi, 2003, Stame 1998). Attempts have been made to draw a converging path towards sociological and economic evaluation by placing emphasis on the centrality of stakeholders as well as on the role of evaluation in fostering communication, both vertically and horizontally, among concerned parties (e. g. Picciotto, 1999, De Filippi, 2005). These attempts, however, have rested mostly, if not solely, on qualitative considerations and have not brought about a new economic methodology for the appraisal of investments.

A promising feature of the new approach is that stakeholder analysis is not intended to explore only the stakeholder viewpoint and/or preference ranking (as generally done in organizational and sociological analysis) of the proposed policy or investment. Rather, it aims to identify a corporate structure of the project where the assets and liabilities of its stakeholders'are the opportunities created by the project (the "options", including the "liability options") as a form of "contingent wealth. It is useful to make a distinction between stakeholders with public policy responsibilities and private stakeholder. For the former, "options" are political economy opportunities – e. g. to seize this or that political economy path. For the latter, options are opportunities to capture (or to incur) originally unforeseen gains or losses.

Methodologically, this calls for a strengthened financial analysis, not only in the sense that more attention is paid to the financial returns and costs accruing to the different stakeholders often in different periods, but also, and more cogently, because option theory provides an integrating framework to appraise the "contingent wealth" of the subjects involved. The fact that the project creates and destroys "options" for different parties, in fact, provides a way to account for benefits and costs based on the gains and losses accruing to the subjects involved. In this context, even a straight public infrastructure project, such as a bridge or a highway, can be entirely evaluated through the opportunities that it creates (or destroys) for a class of stakeholders whose entitlements are directly or indirectly affected by the project.

An "options"- based analysis expands significantly on traditional practices because it entails building quantitative and qualitative scenarios, including "counterfactual scenarios" (North, 1990, Heckman 2010), to assess value creation", on the basis of explicit and implied contracts and related "capital lock-in", in legal jargon (Stout, 2004), and through the change in rights and opportunities for a set of interested parties. This entails the evaluation of possible alternative or complementary courses of action, such as: delaying decision and action with a view to acquiring more and better information, building-in the possibility of expansion or reduction of scope, as well as promoting dynamic "value creation".

While financial analysis will tend to become more complex, it will also be more informative and will feed more easily into the economic analysis, especially into the shadow-pricing process, often a rather difficult aspect of project analysis. Furthermore, the consideration of dynamic uncertainty and option values, which can be handled by very efficient software, will accentuate the simulative aspects of project evaluation, thereby providing a better appraisal of its strengths and weaknesses and, more significantly, useful information for the improvement of project design. The increased complexity of option analysis, finally, may be compensated by simpler cash flow models of the stakeholders'budgets. Their details become in fact less important, as the focus of the analysis shifts from the determination of the cash flows to the options that the projects generate for the stakeholders. Altogether, however, the real options approach is likely to increase the cost of cost benefit analysis (Chichilnsky, 2010), but it will provide a more complete analysis to LTI decision makers, both public and private (albeit with different slants, as mentioned above).

It is important to admit that, while this approach has not yet become standard practice neither of international organizations nor of Treasuries of major OECD countries, we are no longer at the pioneering stage and several interesting case studies have been conducted. The World Bank has carried out a multi-year empirical research with special focus on LTIs dealing with environment protection and promotion (Knudsen, Scandizzo, 2005) and the final results, in the form of a book, are expected to be published any day. In Italy, the Ministry of Communication has carried out a real options based assessment of the replacement of analogical television with Digital Video Broadcasting- Terrestrial, DVB-T; the findings are readily available in a book (Cioffi, Palombini, Pennisi. 2006). The Ministry of Economics and Finance (MEF) and the Scuola Superiore della Pubblica Amministrazione (Sspa) have experimented with transport and tourism programs: the related documentation has been presented in seminars and is available in the Evaluation Unit of the Italian Economic Development Ministry. Also the suitability of using the real options approach in LTIs for human capital is explored in two recent papers (Pennisi, 2006, 2008, 2010). Considerable work has been done to use the approach for railways development (Centra, 2005) and, more recently, for health investment planning (Pertile, 2009). In several other countries, a number of similar exercises have been carried out in the last few years (e. g. for airport planning in Europe, Smit 2003 and most recently for access to networks in Spain, Gallardo, Amaral 2010). Thus some broad operational conclusions can be drawn:

- A real options analysis for LTIs will tend to be more elaborate and costly than standard practices in terms of information and related resources requirements. It would be advisable to carry it out early in LTIs development in order to have at least a preliminary assessment of its potential as a "window of opportunities" for both policy makers and private project stakeholders.
- The drawing of the 'boundaries'to identify stakeholders and to select the key subset. This calls for a full 'option-based'financial analysis.

- The need for a rigorous and, at the same time, sufficiently simple approach to the construction of alternative scenarios and related options.

The Government may wish to decide to experiment with real options analysis by selecting a limited number of particularly complex operations and to review the experience, including the costs and the benefits of the analysis, in pertinent national and international seminars).

4. LTI Lumpiness and the "new rules" issue.

The last distinctive feature of LITs is that they are "lumpy", i. e. very large and very costly, in addition to having a long implementation gestation phase and an even longer, often inter-generational, time span to capture their costs and their returns and benefits. This has several implications.
1. The need for one of the various forms of project financing with several financing partners, each with its own "culture", aims, constraints, (Esty, Sesia, 2010).
2. The need for dividing most LTI in several "technical" stages or phases, at least for bidding and contracting, and the difficulty of dividing it in "functional sub-projects" (each one of its own stream of cost and return/benefit flows) suitable to individual financial and economic analysis.
3. The need for adopting more elaborate techniques of analysis (such as Social Accounting Matrixes, SAMs and Computable General Economic Equilibrium Models, CGEEM) if and when the LTI is not "marginal" and generate structural change in the relevant socio-economic area or areas.
4. The need to back the LTI, with improved, modernized regulations for the sector(s) concerned, especially when several countries with different regulations are involved and/or when the "cultures", aims, constraints of the financial partners are quite different. An implication of this point is that LTIs may become the trigger or the "creator of an opportunity" for the development of "new rules" in several sectors (transport, telecommunication, health, human capital formation, even banking) if their main area of operation is the European Union (EU) or the Mediterranean Basin (MB).

Each of these points would require an extensive treatment, but I will focus on only on certain salient points, notably a) the need for in-depth financial analysis, b) the integration of standard cost/benefit analysis with the "méthode des effets" applied in France for several decades, and c) the "window of opportunity" offered by LTIs in the EU and in MB to elicit those "new rules" that, although announced and even advocated by several Governments, seem to be unforthcoming.
Although project financing as a very long history (Sammut, 2011), in the last 20 years, project financing of "lumpy" LTIs has spurred a little industry of developing, writing, and publishing books, guidelines and essays. The professional website www. oppaper. com lists over 1000 titles published only

in the last five years. Within this deluge of writings, two points, very relevant to LTIs, are often overlooked: a) the link between Law, on the one hand, and Economics & Finance, on the other in that project financing is in its essence a complex of explicit and implicit network of contractual arrangements among the stakeholders; b) the dominant, decisive role of financial analysis, mainly for private stakeholders (and, logically, consequentially often underestimated by national Government agencies as well as international financial institutions, as they do tend to place emphasis primarily on economic analysis).

The link between Law, on the one hand, and Economics and Finance, on the other, is an essential feature of any project, not solely for LITs. As seen in the previous section, it becomes the cornerstone of any LTI analysis which intends to deal with uncertainty so that goods and services, underlying costs and returns/benefits are valued as "rights" and "entitlements" (Sen 1997a, 1997b) stemming from contracts - nearly always incomplete contracts, thus open to many interpretations (Williamson, 2000). Therefore, the set, and quite often the network of (incomplete) contracts of project financing for a LTI is also a tool to see the investment as a "window of opportunity" and to explore "options" and "liability options" for the most significant stakeholders. It is finally a means to identify contradictory, inconsistent, and obsolete regulations and to orient further analysis with a view to reregulation.

As is well-known from any finance handbook, financial analysis of any investment has the purpose to assess if all the parties involved can reach "profitability" in participating in the investment as well as in molding their behavior so that the investment's objectives are achieved. This is especially critical if, as in project financing of "lumpy" LTIs, the financial partners (let alone the other stakeholders) have different "cultures", financial aims and constraints. The "profitability" indicators – e. g. the Financial Internal Rate of Return (FIRR) – may very offer differ and even diverge for the different parties involved (Pennisi, 1991) even in the case of comparatively simple investments such as those for education and training projects. They do differ and diverge significantly in many LTIs, as seen since the seminal World Bank study on the Indus River Basin water and power resources (Leiftinck, Sadove, Creyke, 1968-69). What matters is that, in spite diverging FIRRs (and/ or other pertinent indicators of financial profitability), the overall results do show that each participant has sufficient interest in behaving so as to reach the common LTI objective. Briefly, the FIRRs, or other financial profitability indicators, for each and all the parties should be above what each of them consider the "threshold rate" for its investment opportunity costs based on its own culture, financial aims, and constraints (World Bank, 2005, World Bank IEG, 2010).

In LTIs, there may very well occur serious differences among the partners about aims and constraints, namely on "threshold rates" considered by each party to be acceptable. Generally, while private partners aim at returns that are not too distant in time, development banks and public agencies give priority to long-term benefits for the society as a whole, including future generation(s). This is apparent in the fundamental three volumes on the

Indus River Basin development mentioned above as well as in several other instances, including specific Italian case studies (Cervigni, Rubino, Savastano, 2006).

Roughly at the same time, at the beginning of my World Bank career, I happened to work on a major multipurpose power, water and agricultural development long-term scheme (the El Chocón program in Argentina) financed by private investors, suppliers'credits, local financial intermediary, the Inter American Development Bank (AIDB), and the International Bank for Reconstruction and Development (IBRD). The main purpose of AIDB and IBRD was to provide concessionary financing which lightened the burden on private investors and thus made it easier to reach their specific, required, financial returns. In addition, concessionary financing by the international financial institutions (AIDB and IBRD) was instrumental in re-regulating Argentina's water and power sector. I understand that the international financial institutions have continued to follow this program very closely: in 2006, 40 years after the first project financing operation for Chocón, new lending was made available, conditional to an updating of the relevant regulations (World Bank, 1997; Bartolome, Danklmaier, 2000, Ennis, Ghosal, 2010).

Thousands of similar instances of LTIs whose financial packages gave the impetus for for new rules can be found, mainly in the those sectors mentioned earlier, but also more broadly in key elements of the economy such as finance. For example, in the previous section of this presentation, reference was made to the financial and economic "real option" assessment of the replacement, in Italy, of analogical television with DVB-T. As documented (Cioffi, Palombini, Pennisi. 2006), the financial analysis showed that FIRRs to the main private operators, most notably the "content providers", appeared high in the "base case" but could easily drop, due to any mild change in assumptions or to an increase in volatility (as against the "base case" estimate), way below any "threshold rate" representative of the opportunity cost of capital for these operators. This consideration was the basis for a policy recommendation accepted by the Government, even though it entailed a politically not very easy measure: to postpone from 2006 to 2012 the switch from Nationwide analogical television to DVD-T. The additional six years were to be used to further analyze the issue and to revamp the regulation. Also, the comparatively recent DVD-T analysis in Italy shows another policy and regulatory aspect of a good appraisal of a LTI: the study of the effects of the investment on the main aggregate macro-indicators (capacity utilization in the relevant manufacturing industries, employment, output, expected inflation) was instrumental to the Government's decision (with UE approval) to subsidize, in the initial phase, the prices of decoders so as to jump start the new technology thanks to an assured ready acceptance by consumers.

I suggest that Governments and EU institutions should fully exploit the potential to use LTIs as a fast track to reregulate sectors such as telecommunication, transport, power, and banking and finance. It would be a gradual approach to the development of "new rules" but it may very well

overcome the explicit and implicit road blocks that seem on the way to modernization of regulations. Now this more important than it used to be in the past, when subsidies, incentives, or other forms of State aid could be used to fill the lacunae in FIRR to the different parties: EU regulations, and more significantly, budgetary stringencies prevent the use of these instruments. As a result, reregulation is very often becoming the tool of choice (Hahn, Tetlock, 2008).

In closing, it might be useful to make a short reference to two issues relevant to the "lumpiness" of LTIs: a) the possible use of structural and program evaluation approaches in their appraisal; b) the need for integrating", when feasible, financial and economic cost/benefit analysis with the "méthode des effets".

On the first point, there is an interesting debate about the two approaches. The debate was reviewed recently by Heckman (Heckman, 2010). From Heckman's own extensive bibliography (over 300 titles of books and papers), it appears the discussion is mostly within the academic world and there is not yet sufficient experience with the specific appraisal of LTIs. Also, there appears to be no substantive cases of change in regulations brought about by one of these two approaches.

More intriguing is the combined application of financial and economic cost/benefit analysis with the "méthode des effets" that has been applied in France and French- speaking countries for decades as an alternative to cost/benefit analysis (Chervel, 1995) After a long debate in the late 1970s (Balassa, Chervel, Prou, 1977) this method was generally accepted as effective analytical tool. It was included in the first Italian official manual of public investment analysis in a section where a number of mostly French actual case studies were summarized (Pennisi, Scandizzo, 1985). Also, a simplified form of the méthode des effets was incorporated for years in EU guidelines and in the practices of the European Development Fund, and then, of other Structural Funds. More significantly, in the last 30 years, with the development of SAMs (King. 1982, Pyatt, Round 1988; Mitra Kahn, 2008) in several OECD, transition and developing countries, and with the refining of CGEEMs, the méthode des effets, has become a powerful tool for Regional planning and appraisal of non-marginal (lumpy) investments. In Italy, for instance, it has been frequently used for the five-year regional planning exercises in Regions such as Tuscany and Sicily. Also, the méthode des effets yields important information to help re-regulation: for instance, in the Italian DVD-T experience, the proposal and the decision to subsidize decoders stemmed from the joint use of real options financial and economic cost benefit analysis and the méthode des effets through a SAM and a CGEEM. However, caution is to be advised because SAMs are often obsolete – e. g. the Italian SAM is based on 1994 data (though for the DVD-T analysis only a few items were used, they were appropriately updated). This may lead to unreliable results in terms of both LTI appraisal and reregulation. For this reason, e. g., this approach has not been used in Southern Italy developing 2007-2013 development planning exercise (Bianchi, Casavola, 2008; Comitato di Amministrazioni Centrali per la Politica di Coesione, 2005).

Nonetheless, useful steps in this direction have been recently taken by the EU (European Union- Regional Policy, 2010) also as a result of research of LITs dynamic effects on Regional economies (Di Giacinto, Micucci, Montanaro 2009) and especially of the report charting a new avenue for EU Regional policies (Barca, 2009); they deserve to be supported and followed very closely.

5. Conclusions: A Possible Research Agenda.

The main conclusions from this paper are as follows:
1.   For LTIs. a clear cut choice of numeraire (and relevant discount rate) would clear up the ambiguity now prevailing in many countries and in the current EU guidelines.
2.   LTIs quite often have inter-generational implication. The MDM appears to be the most suitable and easiest methodology to experiment with in a limited number of cases and eventually, if found to be feasible at a reasonable cost, to be incorporated in guidelines.
3.   Uncertainty is a characteristics of most LTIs due to their long "project life". The real options approach is a suitable way to address it; but the additional information it provides may have a comparatively high cost. Thus, it is worthwhile to experiment using it in a selected number of LTIs as a preliminary step for eventual incorporation in general guidelines.
4.   LTIs are a powerful tool to deregulate and/or reregulate key sectors of the economy and should be exploited to the fullest extent.

A research agenda may be useful in possibly leading to more consistency in LTIC practices. This agenda would include: a) a review of existing manuals and guidelines, and more fundamentally, of actual practices used in Europe; b) a discussions of the points raised In this paper, c) the possible development of general guidelines for the EU.

Adler M. D., Posner E. (2006), "New Foundations of Cost Benefit Analysis", Harvard University Press, Cambridge (MA).

Akerman B, Alstott A (1999), "The Stakeholder Society", Yale University Press, New Haven.

Arlsson I. (2007) "Investment and Uncertainty. A Theory-Based Empirical Approach" Oxford Bullettin of Economics and Statistics Vol. 69, Issue 5.

Balassa B., Chervel M., Prou C (1977), "L'Evaluation des Projets par la Mhéthode des Effets", Oxforf Bullettin, November.

Bartolome L., Danklmaeir C. (2000), "The Experience with Dams and Resettlement in Argentina, National University of Misiones", paper prepared for the World Dam Commission, Capetown.

Barca F. (2009) "Un'agenda per la riforma della politica di coesione", Ministero dello Sviluppo Economico, Roma

Berlage L, Renard L. (1985), "The Discount Rate in Cost Benefit Analysis", Oxford Economic Papers, v. 37, n. 4.

Bateman I (1989), "Modified Discount Method: Some Comments Project Appraisal", v. 6, n. 2.

Bellinger W. K. (1991), "Multigenerational Value; Modifying the Modified Discount Method Project Appraisal", v. 6 n. 2.

Beraldo S:, Caruso R, Turati G. (2011) "Life is Now! Time Discounting and Crime. Evidence from the Italian Regions 2002-2007), ICER Working Paper n. 18/2011

Bezzi C. (2003), "Il disegno della ricerca valutativa", Franco Angeli, Milano.

Bianchi T., Casavola P. (2008), "I Progetti Integrati Territoriali del QCS Obiettivo 1 2000-2006. Teorie, Fatti e Riflessioni sulla Policy per lo Sviluppo Locale Ministero per lo Sviluppo Economico", Dipartimento per le Politiche di Sviluppo.

Boardman A. E., Greenberg D. H. (1998), "Discounting Factor and the Social Discount Rate", in Thomson F., Green M. T. Handbook of Public Finance, Marcel Drekker, New York.

Bricenio-Garmendia C., Sarkodie A. (2012) "Spending on Public Infrastructure. A Practitctionr's Guide" World Bank Policy Research Working Paper No. 5905

Centra M. (2005), "Analisi Costi Benefici con Opzioni Reali: Un'Applicazione al Settore dei Trasporti Ferroviari", Rassegna Italiana di Valutazione, v. 9, n. 32.

Cervigni R., Rubino S., Savastano S. (2006), "Analisi Finanziaria e Grandi Opere: lo Schema Tipo di Piano Economico-Finanziario per l'Attuazione della Legge Obiettivo", Materiali UVAL- Ministero dell'Economia e delle Finanze – Dipartimento per le Politiche di Sviluppo – Unità di Valutazione degli Investimenti Pubblici, Roma.

Cioffi S., Palombini I, Pennisi G. (2006), "La Valutazione della Transizione da Televisione Analogica a Digitale Terrestre: Lezioni dell'Esperienza", in Bezzi ed altri, Valutazione in Azione, F. Angeli, Milano.

Chen J. (2010) "An Intuitive Understanding of the Black-Scholes Formulas" Working Paper Series, Social Science Research Network.

Chervel M. (1995), "L'Evaluation Economique des Projets: Calcul Economique Publics et Planification", Publisud, Paris.

Chichilnisky G. (2010), "The Costs and Benefits of Benefit-Cost Analysis", Working Paper, Department of Economics, New York.

Clements K. W (2011) "The Investment Project Pipeline- Cost Escalation, Lead Time, Success, Failure and Speed " Australian Journal of Management Vol 36 No. 3

Comitato di Amministrazioni Centrali per la Politica di Coesione (2005), "Documento Strategico Preliminare Nazionale: Continuità, Discontinuità, Priorità per la Politica Regionale 2007-2013", Roma.

Dasgupta P, Margling S, Sen A. (1972), "Guidelines of Project Evaluation", Unido, Vienna.

Dasgupta O., Mäler K-G, Barret S. (2000), "Intergenerational Equity, Social Discount Rates and Global Warming", revised version a paper with the same title in Portney P, Weyant J (eds)., Discounting and Intergenerational Equity Resources for the Future, Washington.

De Filippi GH. (2005), "Informazioni, news e valutazione", Rassegna Italiana di Valutazione, v. 9, n. 32.

De Filippi G., Pennisi G. (2003), "Etat et Nouvelles Responsavilité Sociales dans un Monde Global Editions du Conseil de l'Europe", Strasbourg.

Di Giacinto V., Micucci G, Montanaro P. (2009), "Dynamic Macroeconomic Effects on Public Capital: Evidence from Regional Italian Data", Temi di Discussione, Banca d'Italia, n. 733.

Dimitri N. Piga G., Spagnolo G. (2006) "Procurement" Cambridge University Press, London

Dinwiddy C., Teal F. (1996), "Principles of Cost Benefit Analysis for Developing Countries", Cambridge University Press, Cambridge (MA).

Dixit A. K., Pindyck R. S. (1994), "Investment Under Uncertainty", Princeton University Press, Princeton (NJ).

Edler J., Berger M., Dinges M., Gok A. (2011) "The Practice of Evaluation in Innovation Policy in Europe" Manchester Business School Research Paper No. 626

Ennis S. F, Ghosal V. (2010), "Global initiatives in Reforming Rules and Regulations Paris", OECD (processed- about to be published).

European Commission (2009), "Impact Assessment Guidelines" (SEC (2009)92).

European Union Regional Policy (2010), "Modeling the Policy Instruments by the EU Cohesion Policy", European Commission, Bruxelles

Esty B, Sesia A. (2010), "An Overview of Project Finance and Infrastructure Finance", Harvard Business School Finance Unit, HBS Case n. 210-061.

Fanciullacci D., Guelfi C., Pennisi G. (1991), "Valutare lo Sviluppo", F. Angeli, Milano.

Ferrara A. (2010), "Cost Benefit Analysis of Multi-Level Government. The Case of EU Cohesion Policy and of the US Federal Investment Policies", Routledge, London.

Florio M. (2006), "Cost-Benefit Analysis and the European Union Cohesion Fund: On the Social Cost of Capital and Labour", Regional Studies, v. 40.

Galllardo F., Amaral T. Perez (2010), "Business Regulation on New Access Generation Networks: An Approach to the Spanish Case using Real Options",

Facultad de Economicas Y Empresariales Computenses, University of Madrid, Working Paper, Madrid.

Glachant J., Lorenzi J-H., Quinet A., Trainar P. (2010), "Investissements et Investissements de long terme", Conseil de'Analyse Economique, La Documentation Française.

Gollier C., Weitzman M. (2008), "How Should Distant Future Be Discounted When Discount Rates are Uncertain", CESifo Woking Paper, n. 2868.

Gollier C., Koundouri Ph, Pantelidis Th. (2008)"Declining Discount Rates: Economic Justification and Implication for Long-Run Policy" Economic Policy Vol. 23, Issue 56

Leitfinck P, Sadove P., Creyke T. (1968-69), "Water and Power Resources in West Pakistan- A Study in Sector Planning", Johns Hopkins University Press, Baltimore.

Little I. M. D, Mirlees J (1974), "Project Appraisal and Planning for Developing Countries", Heinemann, London.

Livingstone I, Tribe M. A. (1995), "Projects with Long Time Horizons: Their Economic Appraisal and the Discount Rate", Project Appraisal, v. 10, n. 2.

Hahn R, Tetlock P. (2008), "Has Economic Analysis Improved Regulatory Decisions?", Working Paper, AEI-Brookings Joint Center, n. 07-08.

Hardisty D. J., Thompson K., Krantz D., Weber E. (2011) "How to Measure Discount Rates? An Experimental Comparison of Three Methods", Columbia Business School.

He Zh, Li S., Wei B., Yu J (2012) "Uncertainty, Risk, and Incentives: Theory and Evidence" Federal Reserve System.

Heckman J. J. (2010), "Building Bridges between Structural and Program Evaluation Approaches to Evaluating Policy", Journal of Economic Literature, v. XLVIII, n. 2.

King B. (1982), "What is a SAM; a Layman's Guide to Social Accounting Matrixes", The World Bank, Washington D. C.

Knight, F. (2002), "Risk, Uncertainty and Profit", Beard Books Washington D. C.

Knowles, R., Shaw, J., Docherty, I. (2008), "Transport Geographies. Mobilities, Flowsand Spaces", Blackwell Publishing.

Kula E. (1988), "Future Generations: the Modified Discount Factor", Project Appraisal, v. 3, n. 2.

Kula E. (1989), "Modified Discounting Method: Erhon Kula's Rejoinder", Project Appraisal, v. 4, n. 2.

Knudsen O. K., Scandizzo L. P. (2005), "The Artful Face of Uncertainty:; How to Manage Oppprtunities and Threats", World Bank EDS Reseacrh Working Paper, Washington D. C.

Magni C. A. (2011) "A Sum & Discount Method of Appraising Firms- An Illustrative Example" University of Modena and Reggio Emilia Working Papers

Marks S. G. (2012) "Valuing the Future: Intergenerational Discounting, its problems and a modest proposal" Boston University School of Law Working Paper No. 11-12

Masci P. (1999), "Quantifying the Value of Flexibility", IFM Bullettin, Inter-American Development Bank, Washington D. C., v. 5, n. 1.

Minard C. -J. (1840), "Lezioni fatte sulle strade di ferro nel 1833-1834 alla Scuola di ponti e strade. Prima versione italiana, corredata di note ed aggiunte, e di un appendice Sulla strada di ferro da Napoli a Nocera e Castellammare", Stefano Mililotti, Napoli, dalla Stamperia e cartiera del Fibreno.

Mitra-Kahn B. H. (2008), "Debunking the Myths of Computable General Equilibrium Models", SCEPA Working Paper, v. 1.

Merton R. K., Barber E (2003), "The Travels and Adventures of Serendipity: A Study in Sociological Semantics and the Sociology of Science", Princeton University Press, Princeton (NJ).

Moszoro M. (2010), "Efficient Public-Private Partnerships", Berkely, IESE Business School (processed, being published).

Moszoro, M; Krzyzanowska M. (2010), "Implementing Public-Private Partnerships in Municipalities", Berkely, IESE Business School (processed, being published).

Nassim, N. T., (2007), "The Black Swan: The Impact of the Highly Improbable", New York Random House.

North D (1990), "Istituzioni, Cambiamento Istituzionale, Evoluzione dell'Economia", Il Mulino, Bologna.

Pennisi G. (1989), "Economic Appraisal of Environment Projects. Many Certainties and a Few Uncertainties", Economia delle Scelte Pubbliche – Journal of Public Finanxe and Public Choice, n. 1.

Pennisi G. (1991), "Economic Analysis of Vocational Training in a Decentralized Setting", International Labor Office, Geneva-Turin.

Pennisi G. (2006), « Analyse Economique de la Formation en Gestion Publique: Approcche Basée sur les Options Réelles", Revue Internationale des Sciences Administratives, v. 72, n. 3.

Pennisi G. (2008), "Quaranta Anni di Valutazione delle politiche e degli Investimenti Pubblici: Lezione dell'Esperienza", Rassegna Italiana di Valutazione, v. XII, n. 40.

Pennisi G. (2010), "La Valutazione Economica dei Sistemi Educativi e Formativi", Rassegna Italiana di Valutazione, v. XIV, n. 46.

Pennisi G, Scandizzo P. L. (1985, 1991), "Tecniche di Valutazione degli Investimenti Pubblici", Ministero del Bilancio e della Programmazione Economica, Zecca e Poligrafico dello Stato, Roma.

Pennisi G., Scandizzo P. L. (2003), "Valutare l'Incertezza- L'analisi costi benefici nel XXI secolo", Giappichelli, Torino.

Pennisi G. Scandizzo P. L. (2006), "Economic Evaluation in an Age of Uncertainty Evaluation", v. 12, n. 1.

Pertile P. (2009), An Extension of the Real Option Approach to the Evaluation of Health Care Technologies; the Case of Position Emission Tomography IHAA 2007 6th World Congress. Exploration in Health Economics Papers, University of Verona.

Picciotto R. (1999), "Towards an Economics of Evaluation", Evaluation, v. 5, n. 1.

Portney P, Weyant J (eds)., "Discounting and Intergenerational Equity Resources for the Future", Washington, D. C.

Pyatt G, Round J. I (1988), "Social Accounting Matrix. a Basis for Planning", The World Bank, Washington D. C.

Rawls J. (1971), "A Theory of Justice", Harvard University Press, Cambridge (MA).

Sammut J."Project Finance: Fundamental Elements and Critical Issues" (2011) Swiss Management Center University, Social Science Researc Network.

Scarborough H. (2011) "Intergenerational Equity and the Social Discount Rate", Australian Journal of Agricultural and Resource Economics Vol. 55 No. 2

Schwindt R., Vining A, Globerman S. (2001), "Net Loss: a Cost Benefit Analysis of the Canadian Pacific Salmon Fishery", Journal of Analysis and Management, V. 3, n. 3.

Sen A. (1997a), "Choice, Welfare and Measurament", Harvard University Press, Cambridge (MA).

Sen A. (1977b), "The Discipline of Cost Benefit Analysis", Journal of Legal Studies, v. 29, n. 2.

Smit H. T. J. (2003), Infrastructure Investment as a Real Option Game: the Case of European Airport Expansion, Financial Management (Winter).

Sunstein C. S. (2011) "Irreversibility" Oxford University Press, London

Squire L., Van der Tak H. (1992), "Economic Analysis of Projects", Johns Hopkins University Press, Baltimore.

Stame N. (1998), "L'Esperienza della Valutazione", Rome, Seam.

Stark O. (1995), "Altruism and Beyond: An Economic Analysis of Transfers and Exchanges Between Families and Groups", Cambridge University Press, Cambridge (MA).

Stout L. (2004), "On the Nature of Corporations", Law-Economic Research Paper 13, UCLA School of Law Los Angeles

Thompson K. J. (1991), "Future Generations: the Modified Discount Method Revised", Project Appraisal, v. 3, n. 3.

Yaffey M (1997), "Modified Discount Method Revised", Project Appraisal, v. 12, n. 2.

Yifu Lin J. Doemeland D. (2012) "Beyond Keynasianism: Global Infrastructure Investment in Time of Crisis", World Bank Policy Research Working Paper No. 5940

US Office of Management and Budget (1992), "Guidelines and Discount Rate for Benefit Cost Analysis of Federal Programs" – Circular A 94 Washington D. C.

Wang M., Rieger M. O., Hens Th (2009), "How Time Preference Differ: Evidence from 45 Countries", Swiss Finance Institute Research Paper, n. 09-47.

Williamson O. E. (2000), "The New Institutional Economics: Taking Stock, Looking Ahead", Journal of Economic Literature, v. 38, n. 3.

Wong S-K,. Wing-Chau K, C-Y Edward Yiu, M. K. W. Yu, (2008), "International Discounting: a Case from Hong Kong", Habitat International, v. 32, n. 3.

World Bank (1997), "Large Dams: Learning from the Past, Looking at the Future", Washington D. C.

World Bank (2005), Influential Evaluation Detailed Case Studies Operation Evaluation Department, Washington D. C.
World Bank-IEG (2010), "Cost Benefit Analysis in World Bank Projects", Washington D. C.
Zamagni S (2007), "L'economia del bene comune", Città Nuova, Roma
Xia B. (2011) "A Simple Explanation of Some Key Time Preference Anomalies", Canadian Journal of Economics Vol. 44 Issue 2

Abbreviations
CDC Cassa Depositi e Prestiti
CGEEM Computable General Economic Equilibrium Model
DVB-T Digital Video Broadcasting
EU European Union
EC European Commission
FIIR Financial Internal Rate of Return
LTIs Long-Term Investments
LTIC Long Term Investments Club
MB Mediterranean Basin
MV Multigenerational Value
MDM Modified Discount Method
OECD Organization for Economic Cooperation and Development
SAM Social Accounting Matrix
UNIDO United Nations Industrial Development Organisation