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CONTEMPORARY ECONOMIC EVALUATION: A CONCISE DISCUSSION

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Abstract: Starting from a concise overview of the state of the art and ongoing debate on economic evaluation, a main though partial conclusion, of current thinking on the topic is that any evaluation exercise should always incorporate a plurality of perspectives on what constitutes value. The main reason is the existence of a plurality of social actors with interest in the good being assessed. Such a conclusion is corroborated by referring to concepts coming from complexity theory and philosophy. Practical conclusions for public policy analysis are derived too.

Keywords: *Value Theory, Evaluations, Multiple Criteria Decision Analysis, Epistemological, Scientific and Technical Uncertainties, Complexity Theory*

JEL Classification: *A13, D46, D61, Q01*

1. The rationale for the use of money values in public policy analysis

My main assumption here is the impossibility to deal with the concept of *economic value* (and connected economic policy instruments) as an objective value free category. Indeed, the key question is *value for what and for whom?* Economic development implies the creation of new assets in terms of physical, social and economic structures. Within a process of *creative destruction* traditional environmental, social, and cultural assets derived from a society's common heritage may disappear. For example, if the objective is to reduce the tourist pressure on Venice, one may think of limiting the number of visitors by imposing the payment of an entry ticket and to use the money collected to maintain the city's cultural heritage. However, one could argue that due to the *relative scarcity* of a peculiar economic good as Venice, people will be willing to pay the price of the ticket anyway. Thus, the economic instrument *entry ticket* will be useful for collecting money, but not for reducing the tourist pressure (by the way in Venice the problem of overcrowding is still unresolved...).

Moreover, can we use money values as a social decision tool for policy evaluation? If the answer is positive a measurement of social costs and benefits should be made on the basis of the so called *compensation principle* (usually associated with the names of Hicks

and Kaldor). According to this principle, the social cost of a given event is defined as the sum of money paid as compensation to those who have been suffered damage. The level of utility that the damaged had before the event took place should determine the amount of compensation to pay.

Social policies based on principles of compensation and substitution sometimes might be operative, but one should be very cautious in applying such principles as a general guideline. There are allocations without any possibility of transactions in actual or fictitious markets. Who would be willing to accept compensation for the destruction of the Sagrada Familia, the Statue of Liberty or the Coliseum? We could argue that, the presence of irreversibility and uncertainty urges us to abandon the compensation principle in favour of the *precautionary principle* (it is more prudent a social conservationist attitude). The application of the precautionary principle introduces some elevated costs surely, but how much would the non-application cost? The burden could be enormous, as admitted by the European Environment Agency (see Late lessons from early warnings: the precautionary principle 1896-2000, European Environment Agency, Environmental issue report, No.22, 2001) The Economist (a magazine distant from radical environmentalism surely) has recently suggested as a possible *positive* consequence of the accident of the Prestige (a ship which heavily contaminated the coasts of Galicia in northwest Spain) a stiffening of the European legislation on the subject of maritime transports (The Economist, November 23-29, 2002, page 79). There is no doubt that from the viewpoint of society it is ecologically and economically more convenient the application of the precaution principle than a series of disastrous accidents. Of course, this principle implies that the majority of the society (mainly the non-experts), outside the economic system (i.e. outside the market mechanisms), would decide the *amount* of e.g. cultural or natural capital to be protected. Thus, in the Venice example, the *maximum number of visitors* allowed per day should be clarified, and this can only be done on heuristic grounds since tourist carrying capacity can hardly be computed precisely.

In this context, from an economic point of view, the only instrument left is *cost-effectiveness*; that is given a certain *physical* target (e.g. the amount of cultural heritage to be preserved or the amount of contamination to be accepted), it is rational to try to get it by means of the lowest possible use of resources (i.e. at the minimum social cost). Obviously there are several targets possible. In general two rankings are possible:

1. According to the lowest cost.
2. According to the physical target (e.g., the more monuments preserved, the better).

Perhaps a discussion would lead to the judgment that the improvement of a physical target to a better one is worth the extra economic cost, or perhaps the opposite judgment will be reached. In both cases we would have an ordinal ranking of alternatives and "cost-effectiveness" would "fall down" into *multi-criteria evaluation*, i.e. two criteria and two different rankings must be explicitly dealt with.

From the above discussion the following conclusion can be drawn: *To attach prices to non-market assets (such as most of environmental and cultural ones), gives a positive*

signal to society and *may* contribute to a more rational use increasing the chances for a better conservation. When one wishes to preserve a monument or a natural area, a fundamental question is: *is there any resource, which society is willing to assign to this objective?* To answer this question the concept of “total economic value” becomes immediately relevant. To attribute monetary values to e.g. historical heritage implies to capture *user* (actual, option and bequest) and *non-user* (existential, symbolic, etc.) values. Of course, to compute total economic values has nothing to do with the “true” or “correct” value. All monetary valuation attempts will suffer deep technical uncertainties such as:

- *Which monetary valuation technique has to be used?*
- *Which time horizon has to be considered?*
- *Which social discount rate?*

Moreover, one should remember that the market alone may be successful in efficient allocation of resources, but does not give any guarantee for preservation of the cultural or natural heritage at all. Once something is on the market, it can be bought or sold and so the willingness to accept and the compensation principle may easily cause the destruction of any asset.

As a first conclusion, we could state that *monetary compensation is with no doubt the only possible tool when an irreparable and irreversible damage has already occurred.* This way, if an accident with serious contamination occurs - as in the case of Seveso in Italy (1976), of Bhopal in India (1984), of the Exxon Valdez in Alaska (1989), or more recently of the oil-tanker Prestige offshore the coasts of Galicia (2002) - it seems correct and opportune to indemnify the victims of such contamination. *But it stays to verify if, in the long run, compensation is an effective tool to prevent the appearance of enormous social costs, given that it doesn't guarantee the preservation of natural or cultural goods and services.* The economic value is different from the environmental or artistic-cultural value. If we had to decide whether to save the Galapagos Islands or the inside sea in Holland, which value one should use? The economic one would favour the inside sea, which, since totally eutrophised, offers an important economic service receiving all the nutrients coming from human activity. The ecological one would obviously point out instead the Galapagos Islands. *The choice of the values to be considered as socially predominant is a scientific or socio-political issue?*

2. The distributional issue and the existence of multiple social values

In many real-world applications it is necessary to place monetary values on non-market goods. Several methodologies have been developed to cope with such estimation requirements, as it is well known, the principal ones are contingent valuation, the travel cost method, hedonic pricing, and the shadow project approach. Among these only *contingent valuation* is universally applicable. The aim of contingent valuation is to elicit valuations (or “bids”) which are close to those that would be revealed if an actual market existed. Respondents say that they would be willing to pay or willing to accept if a market existed for the good in question. In order to determine the value of intangible goods and services, economists try to identify how much people would be willing to pay (willingness to pay (WTP)) for these goods in artificial markets. Alternatively, the

respondents could be asked to express their willingness to accept (WTA) compensation.

The quality of results in this method depends on how well informed people are, moreover, the problem with these techniques is that respondents may answer 'strategically'. For example, if they think their response may increase the probability of implementing a project they desire, they may state a value higher than their true value (*free rider problem*). In order to avoid free rider behaviour people should really pay the amount of money they indicate; unfortunately in this case, WTP depends upon the *ability to pay*, thus projects which benefit higher income groups would generally considered to be the best. Furthermore, society as a whole may have values that deviate from aggregated individual values. Society has a much longer life expectancy than individuals, thus the value society attaches to e.g. natural resources is likely to deviate from individual values, since the simple summation of individual preferences may imply the extinction of species and ecosystems. This implies that public policy *cannot be merely based upon the aggregation of individual values, and estimation of willingness to pay at any particular point of time*. Thus, it is worthy to remember how economic values depend on inter- and intra-generational inequalities in the distribution of the burdens of social costs (e.g. pollution) and in the access to useful resources.

Externalities can then be seen as "*cost-shifting*". In general, if the damaged people are poor (or even not yet been born), the cost of the internalization of the externality will be low. This is why a lot of multinationals locate particularly dangerous production plants in the developing countries where, in case of accidents, they are generally forced to pay monetary compensations much lower than in the western countries. The accident of the chemical plant of the Union Carbide in Bhopal, India, in 1984, is a sad example. Obviously, the institutional and juridical context is fundamental. In the case of oil contamination provoked by Texaco in Ecuador (with serious consequences on the human health) the fundamental point of the trial was deciding whether the competent court should have been in USA or in Ecuador. The Texaco insisted on the fact that it had to be in Ecuador...

Accepting low values for a negative externality that provokes an impact on poor community is a "political decision", far from being ethically neutral. Some years ago, an internal document of the World Bank, subsequently made public, suggested that toxic waste should be located in Africa, since the cost of the compensation was extremely low and therefore such solution has to be considered as the most efficient one. One should note that the issue of *value free Science* is a *key* issue for real-world policy and not just a philosophical debate. For example, David Pearce claimed that his work for the intergovernmental Panel on Climate Change (IPCC), where lives of people in rich countries are valued up to fifteen times higher than those in poor countries, is a matter of scientific correctness versus political correctness. (New Scientist, 19 August, 1995). Is it really a matter of value free scientific correctness to use valuations based on assessments of a community's *willingness and ability to pay* to avoid risks of death?

One has to note that the issue is not maintaining that a human life has infinite value; for example, a reduction in road accidents can be secured at some cost, but society

is unlikely to devote the whole of the national income to this end. The point is that often this valuation is made *implicitly* and stating that is a technical issue, when it is a political one instead. Monetary valuation methods are based on phenomena such as consumer's surpluses, market failures, demand curves which are just a partial point of view, since connected with one institution only: *markets*. From a social point of view, issues connected with actions outside of markets and behaviour of people different from the class of consumers should also be taken into account. *The European Commission White Paper on Governance* (where principles such as *transparency*, *participation* and *accountability* are emphasized) goes in this direction.

It has to be reiterated that the point is not to be against giving economic value to natural resources, to environmental sinks, to natural spaces or to cultural heritage. A location may be valuable for its biodiversity (measured in richness of species or genetic variety), and also as a landscape, and have also economic value (measured by differential rent, and also by the travel cost method, or contingent valuation). These are different types of value. *The point is that it is misleading to take social decisions based on only one type of value.*

3. Implication for public policy analysis

The world is characterised by deep *complexity*. This obvious observation has important implications on the manner in which policy problems are represented and decision-making is framed. Each representation of a complex system is reflecting only a sub-set of the possible representations of it. A consequence of these deep indeterminacies is that in any policy problem, one has to choose an operational definition of “*value*” in spite of the fact that social actors with different interests, cultural identities and goals have different definitions of “*value*”. That is, to reach a ranking of policy options, there is a previous need for deciding about *what is important* for different social actors as well as *what is relevant* for the representation of the real-world entity described in the model. It may well be that in the process of assessing the cost of cross border transaction in securities, and the possible benefit from regulating these ones, the relevant actors may accept that an increased volume of transactions, and an associated medium term GDP increase, constitute 'value'. What constitute 'value' and who the stakeholders are in the case of Venice -mentioned at the beginning of this brief note - is more difficult to chart. In particular the assessors should consider to what extent the proposed values correspond to the relevant constituency and try to avoid that the omission of relevant values might lead to a polarization of the debate.

One should note that the representation of a real-world system depends on very strong assumptions about (1) the *purpose* of this construction, e.g. to evaluate the sustainability of a given city, (2) the *scale* of analysis, e.g. a block inside a city, the administrative unit constituting a municipality or the whole metropolitan area and (3) the set of dimensions, objectives and criteria used for the evaluation process. A reductionist approach for building a descriptive model can be defined as the use of just *one measurable indicator* (e.g. the monetary city product per person), *one dimension* (e.g. economic), *one scale of analysis* (e.g. the Commune), *one objective* (e.g. the maximisation of economic efficiency) and *one time horizon*.

Thus, instead of focusing on "missing markets" as causes of allocative disgraces, or trying to explain economic values by means of energy or other common rod measures (clearly a non-sense from an economic point of view) we should focus on the creative power that missing markets have, because they push us away from commensurability (i.e. a reductionist approach), towards a social multi-criteria evaluation of evolving realities¹.

Public policy analysis should deal with not only the merely measurable and contrastable dimensions of the simple parts of the system under study, that even if complicated may be technically simulated; it should also deal with the higher dimensions of the system. Those dimensions in which power relations, hidden interests, social participation, cultural constraints, and other "soft" values, become relevant, and unavoidable variables that heavily, but not deterministically, affect the possible outcomes of the strategies to be adopted.

Any mathematical model, although legitimate in its own terms, cannot be sufficient for a complete analysis of the reflexive properties of a real-world problem. These reflexive properties include the human dimensions of e.g. the ecological change and the transformations of human perceptions along the way. The *learning process* that takes place while analysing the issue and defining policies will itself influence perceptions and alter significantly the decisional space in which alternative strategies are chosen. At the other end, *institutional and cultural representations* of the same system, also legitimate, are on their own insufficient for specifying what should be done in practice in any particular case.

The various dimensions are not totally disjointed; thus the institutional perspective can be a basis for the study of the social relations of the scientific processes. To take any particular dimension as the true, real or total picture amounts to *reductionism*, whether physical or sociological. As a consequence, any attempt to fit the real world in a closed model leads to a simplification, which is violence to the description of reality. In most cases the sacrificed dimensions are precisely the reflexive properties of the systems. These characterise the problem in a fundamental way but are hardly identifiable and measurable.

In general, these concerns have not been considered very relevant by scientific research in the past, where time was considered an infinite resource. On the other hand,

¹ "There is great pressure for research into techniques to make larger ranges of social value commensurable. Some of the effort should rather be devoted to learning - or learning again, perhaps - how to think intelligently about conflicts of value which are incommensurable" (Williams (1972) - *Morality*, Cambridge University Press, Cambridge, p. 103). A call for dealing explicitly with incommensurability can also be found in Arrow (1997) - *Invaluable Goods*, *Journal of Economic Literature*, Vol. 35, No. 2, pp. 757- 763 and in Martinez-Alier J., Munda G., O'Neill J. (1998) – *Weak comparability of values as a foundation for ecological economics*, *Ecological Economics*, 26, pp. 277-286.

the new nature of the problems faced in this third millennium (e.g., mad cow, genetic modified organisms, ...), implies that very often when deciding on problems that may have long term consequences we are confronting issues “*where facts are uncertain, values in dispute, stakes high and decisions urgent*” (Funtowicz and Ravetz, 1991, 1994).

In this case, scientists cannot provide any useful input without interacting with the rest of society and the rest of the society cannot perform any sound decision making without interacting with the scientists. That is, the question of “how to improve the quality of a policy process” must be put, quite quickly, on the agenda of “scientists”, “decision makers” and indeed the whole society. This extension of the “peer community” is essential for maintaining the quality of the process of decision making when dealing with reflexive complex systems.

4. Conclusion

Various authors claim that modern public economic policy needs to expand its empirical relevance by introducing more and more realistic (and of course more complex) assumptions in its models. According to complexity theory at least, three different types of uncertainty exist: the epistemological, scientific and technical ones (Giampietro, 2003; Munda, 2004).

In synthesis, a system is complex when the relevant aspects of a particular problem cannot be captured when using a single perspective. To make things more difficult, human systems are *reflexive* complex systems. Reflexive systems have two peculiar properties: “*awareness*” and “*purpose*”, which imply an additional “jump” in describing complexity. In fact, the presence of self-consciousness and purposes (*reflexivity*) means that these systems can continuously add new relevant qualities/attributes that should be considered when explaining and describing their behaviour (i.e. human systems are learning systems). One important feature of reflexivity is that the human representation of a given *policy problem* necessarily reflects perceptions, values and interests of those structuring the problem. Since in this case, the source of uncertainty is mainly social in nature, we can call it *epistemological uncertainty*. Monetary valuation methods are based on phenomena such as consumer's surpluses, market failures, demand curves which are just a partial point of view, since connected with one institution only: *markets*. From a social point of view, issues connected with actions outside of markets and behaviour of people different from the class of consumers should also be taken into account. In this context, one of the most interesting research directions in contemporary economics, is the attempt of taking into account political constraints, interest groups and collusion effects explicitly (see e.g. Laffont, 2000, 2002; van Winden, 1999), as a consequence, transparency becomes an essential feature of public policies (Stiglitz, 2002).

The existence of *different levels and scales* at which a hierarchical system can be analyzed implies the unavoidable existence of non-equivalent descriptions of it. As discussed by Giampietro (2003) even a simple “objective” description of a geographical orientation is impossible without taking an arbitrary subjective decision on the system scale considered relevant. In fact the same geographical place, e.g., in the USA, may be

considered to be in the north, south, east or west according to the scale chosen as a reference point (the whole USA, a single state and so on)². Since in this case, the source of uncertainty is “more objective” in nature, we can call it *scientific uncertainty*. A well-known approach for dealing with this type of uncertainty in policy-making is the precautionary principle (see e.g. Gollier and Treich, 2003).

A consequence of these deep uncertainties and indeterminacies is that in any policy problem, one has to choose an operational definition of “*value*” in spite of the fact that social actors with different interests, cultural identities and goals have different definitions of “*value*”. In empirical evaluations of public projects and public provided goods, multi-criteria decision theory seems to be an adequate policy tool since it allows taking into account a wide variety of evaluation criteria (e.g. environmental impact, distributional equity, and so on) and not simply profit maximisation, as a private economic agent would mainly do. This implies that to reach a ranking of policy options, there is a previous need for deciding about *what is important* for different social actors as well as *what is relevant* for the representation of the real-world entity described in the model. Social Multi-Criteria Evaluation (SMCE) has been explicitly developed for tackling such epistemological and scientific uncertainties (Munda, 2004). SMCE puts its emphasis on the transparency issue; the main idea being that results of an evaluation exercise depends on the way a given policy problem is structured and thus the assumptions used, the ethical positions taken, and the interests and values considered have to be made clear. In this framework, mathematical models still play a very important role: the one of guaranteeing consistency between assumptions used and results obtained. This implies to take into account the *technical uncertainties* properly. (i.e. those ones that can be simulated by means of mathematical tools such as probabilities, fuzzy sets, sensitivity analysis and so on³).

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² These multiple-identity/multiple-scale systems can be defined as “*Learning Holarchies*”. A “*holon*” is a whole made of smaller parts (e.g. a human being made of organs, tissues, cells, atoms) and at the same time it forms a part of a larger whole (an individual human being is a part of a household, a community, a country, the global economy), see Koestler (1969) – Beyond atomism and holism: the concept of the holon, in A. Koestler and J.R. Smythies (eds.) – *Beyond reductionism*, Hutchinson, London, pp. 192-232.

³ See for example, Dubois D., Prade H. and Sabbadin R. (2001) – Decision-theoretic foundations of qualitative possibility theory, *European Journal of Operational Research*, 128(3), pp. 459-478, Markowitz H.M. (1989) – *Mean-variance analysis in portfolio choice and capital markets*, Basil-Blackwell, Oxford, Saltelli A. Tarantola S., Campolongo, F. and Ratto, M. (2004) - *Sensitivity Analysis in Practice. A Guide to Assessing Scientific Models*, John Wiley & Sons publishers, New York.

References

- Funtowicz S.O., Ravetz J. R.** (1991) - A new scientific methodology for global environmental issues, in R. Costanza (ed.)- *Ecological Economics*, New York, Columbia, pp. 137-152.
- Funtowicz S.O., Ravetz J. R.** (1994) - The worth of a songbird: ecological economics as a post-normal science, *Ecological Economics*, 10, pp.197-207.
- Giampietro, M.** (2003) - *Multi-Scale Integrated Analysis of Agroecosystems*, CRC Press, New York.
- Gollier C., Treich N.** (2003) – Decision-making under scientific uncertainty: the economics of the precautionary principle, *The Journal of Risk and Uncertainty*, 27: 1, 77-103.
- Laffont J.J.** (2000) – *Incentives and political economy*, Oxford University Press, Oxford.
- Laffont J.J.** (2002) – Public economics yesterday, today and tomorrow, *Journal of Public Economics*, 86, pp. 327-334.
- Munda G.** (2004) – “Social multi-criteria evaluation (SMCE)”: methodological foundations and operational consequences, *European Journal of Operational Research* Vol. 158, Issue 3: 662- 677.
- Stiglitz J. E.** (2002) – New Perspectives on public finance: recent achievements and future challenges, *Journal of Public Economics*, 86, pp. 341-360.
- van Winden F.** (1999) – On the economic theory of interest groups: towards a group frame of reference in political economics, *Public Choice*, 100, pp. 1-29.

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Abstract

Starting from a concise overview of the state of the art and ongoing debate on economic evaluation, a main though partial conclusion, of current thinking on the topic is that any evaluation exercise should always incorporate a plurality of perspectives on what constitutes value. The main reason is the existence of a plurality of social actors with interest in the good being assessed. Such a conclusion is corroborated by referring to concepts coming from complexity theory and philosophy. Practical conclusions for public policy analysis are derived too.

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