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14 Perspectives of Macroeconomic Conflict Analysis

P. NIJKAMP and J. SPRONK

1. INTRODUCTION

The main intention of this volume has been to advocate and to illustrate the usefulness of multiple criteria decision methods in macroeconomic planning with conflicting goals. At this point, we do not want to summarise or to evaluate the separate contributions to this volume. Instead, in this chapter, we will formulate a series of important general ideas and lessons concerning the use and operationalisation of multiple criteria decision methods in macro-economic planning. In addition, more explicit attention will be devoted to a brief listing of potentially rewarding research areas, with an emphasis on problems concerning the operationalisation of multiple criteria decision methods.

2. GENERAL IDEAS AND LESSONS

The use of multiple criteria decision methods in macro-economic planning as opposed to the use of single criteria decision methods sheds both new light on old problems and uncovers a series of new problems. In this section, we summarise a series of insights with respect to the problem of optimality, the problem of expressing and modelling preferences and the problem of selecting an appropriate multiple criteria decision method.

a) Optimality is often far away

Many analytical approaches aim at providing optimal solutions. In order to reach this target, these approaches should be able to indicate the boundaries within which policy decisions can be made, the tradeoffs inherent in choosing alternative solutions, the impacts of policy measures on a set of relevant policy objectives, the possibilities for a communication between experts or planners and decision

makers, and the sensitivity for changes in the spatial scale, the time horizon, or the level of measurement of variables. Such methodological conditions are, however, hardly fulfilled in practice, so that the determination and the judgement of the optimal state of the system is often an illusion. Consequently, many programming approaches have only a limited validity in policy analysis. That also explains why - instead of optimality analysis - impact analyses, effectiveness analyses, and strategic choice analyses have increasingly received much attention. In such analyses, much more emphasis is placed on policy objectives, policy instruments, conflict management and compromise principles. Likewise, multiple criteria decision methods generally take for granted that modern approaches to planning and policy analysis do not necessarily require an unambiguous solution that represents once and for all the optimal state of the system concerned, but rather is directed towards the process character of planning. The primary purpose of multiple criteria decision methods is not to provide 'best' or 'optimal' solutions (although formally speaking, such solutions can be provided by these models); the major advantage of these models is that they help to structure and systematise the planning process. Multiple criteria decision analysis helps to investigate what is wanted (the preferences) and what is possible (the policy alternatives), and their mutual relationships. As such, these methods provide an important learning tool, both for policy makers and analysts. Furthermore, these methods help to investigate conflicts of interest between different policy makers and possible others involved, thus serving as a flexible means of communication and as a tool for conflict analysis and negotiation.

b) Objectives are hard to catch

Many multiple criteria decision methods are based on the assumption that a set of well-specified objectives is given. However, in most - if not all - practical applications, it turns out that no precise definitions of the objectives exist. First of all, it is not always easy to identify the policy maker(s) and all other parties and interest groups involved. And even if they can be identified, the objectives and policy constraints can still not easily be identified - and certainly not at the beginning of the planning process. Of course, notably in macro-economic planning, official reports and documents do exist which may give some indications but these are often defined in a fuzzy way and leave room for different and possibly conflicting interpretations when operational objectives and policy constraints have to

be specified. Therefore, it is necessary to devote sufficient time to the specification of objectives at the beginning of the planning process, while taking account of the possibility (which is not unlikely), that objectives or their specification may change during the planning process. Note that multiple criteria decision methods can play an important role in the definition of the objectives. That is, by treating alternative specifications of the same objective as separate and conflicting objectives, the effects of these different specifications can be visualised and evaluated. In that way, these methods urge the policy makers to be more explicit and precise while creating an awareness of the interdependencies in the, generally complex, systems at hand.

c) Objectives are often concealed

'Political choices should be made by politicians and not by their model builders or other advisors.' This is a principle which sounds reasonably. Therefore, one would expect it to be respected by most model builders. Unfortunately, the practice of model building is often in conflict with this simple principle. Many models include political constraints, targets and weighting factors which are not explicitly defined by the policy makers but - at best - the model builders' estimate of politicians' desires. Of course, there are some quite natural reasons for model builders 'playing politician'. First, as mentioned already, it is often hard to identify who is the policy makers and/or whose interests should be taken into account. Second, policy makers are often reluctant to express explicitly and precisely what they want. That is, by defining explicit objectives and targets politicians would provide a standard by means of which their own performance could be evaluated. Third, it is still common practice to use single criterion optimisation (e.g. with programming techniques) in macro-economic planning with conflicting goals. That means that a priori weights and policy constraints have to be used to find a solution. However, it is very hard, also for politicians, to define a priori weighting factors and political constraints without knowing the implications of these weights and constraints in terms of the attainable solution. That is another reason why the politician will be reluctant to define his precise aims. If so, the model builder is generally quite willing to set the weights and constraints in such a way - possibly after a number of experiments - that the results of the model remain 'reasonable'. Despite these reasons it should be clear that there are some dangers in the practice of model builders acting

politicians. Notably, it is quite well possible that a number of potentially good policy choices are left out of consideration. Furthermore, because of their willingness to come up with 'reasonable' solutions, model builders tend to be misused by politicians in the sense that the results of their models are used as justifications of choices already made by the politician.

On the basis of the above reasoning, we strongly believe that it is the model builder's responsibility to leave political responsibility to whom it belongs, viz. politicians. Even if the politician is unwilling to be precise and explicit, the model builder should be careful, for instance, by providing a series of conditional results only, stating which results would obtain for which set of objectives and political constraints.

d) No method is a panacea

Macro-economic planning with conflicting goals does not stand for one and the same problem, but encompasses a great variety of different planning problems which, moreover, can be attacked from many different angles. Therefore, it does not make sense to search for a single multiple criteria method which can be fruitfully used in all macro-economic planning problems. Such a uniformly valid panacea for all problems simply does not exist. Fortunately, many problems can benefit from one of the many multiple criteria decision methods which are currently available. However, in order to build a useful framework of decision support for macro-economic planning, it is not always necessary nor desirable to select a single method and to use it as it is. Instead, depending on the characteristics of the problem at hand, it may be advisable to adapt and/or to combine methods into a well-tailored planning support system. In other words, it is better to concentrate on the problem and to adapt the methods than the other way around.

A general conclusion to this section is that multiple criteria decision methods have to be regarded much less as tools of optimisation than as tools of learning and communication, especially with respect to what policy makers really want given their set of policy choices. It is the task of the model builders to guide and systematise the inherent learning and communication process. A number of problems with respect to the operationalisation of these tools are discussed in the next section.

3. RESEARCH DIRECTIONS

Despite path breaking and highly interesting recent contributions to the area of multiple objective decision making, various limitations and flaws in the use of multiple decision models still do exist. In this section, we discuss a set of open problems regarding the operationalisation of multiple objective decision analysis. The following important issues will be dealt with successively: specification of objectives, specification of alternatives, assessment of preferences and dynamics in choice problems.

a) Specification of the set of objectives

In modelling macro-economic planning problems, it is generally assumed that the set of objectives, together with their exact specifications, is given and fixed. The set of objectives, together with the set of policy constraints is then used as a tool by means of which the preferences with respect to the state of the macro-economic system can be expressed. Therefore, the set of objectives is a means of expression deserving a good deal of attention, both from policy makers and analysts. Clearly, the formulation of the set of objectives is a problem demanding an element of creativity (see Winkler 1982). Some researchers even maintain that the adequate formulation of a decision problem (of which the formulation of objectives is an important part) is much harder to achieve than a solution of the problem, once it has been formulated adequately (see Rittel and Webber 1973). Thus the relevance of multicriteria decision analysis can be improved by extending its scope so that also the formulation of objectives are taken into consideration.

A first question is whether the set of objectives is sufficiently representative. In other words, is it possible to describe the preferences of policy maker(s) and possible others involved in terms of the chosen objectives? Especially in macro-economic planning, it is generally assumed that all objectives and their specifications are known at the beginning of the solution process of the multiple criteria decision problem. In reality, neither the analysts nor the policy makers have a perfect insight into the various objectives to be considered in the decision. Clearly, official documents and statements give some indications concerning objectives to be reached, but these often leave open different interpretations (especially when general

objectives have to be translated into operational policy criteria). In addition, during the process of solving the decision problem, new insights are obtained which may lead to reorientation and respecification of objectives. Difficulties in the specification of objectives may arise from different sources. For instance, it may be that alternative specifications do exist, but that it is not a priori clear which one to choose. Consider for instance the objective of income inequality. A rather large set of inequality measures does exist. Depending on the preferences of the policy makers, the choice from the set of inequality measures will differ. In this stage of the decision process, multiple criteria decision methods may already be helpful in showing the policy makers the implications of alternative specifications of an objective. A particular specification problem may arise in macro-economic planning problems, because the preferences of the policy makers may refer to a multiplicity of periods, sectors of an economy, etc. In principle one could define a given objective for each of the periods, sectors, etc. concerned, but this generally results in an unmanageable number of objectives (cf. Spronk 1981 and Spronk and Veeneklaas 1983, and Winkler 1982). This explains the clear tendency in this case to specify preference structures by means of a small number of parameters, such as, minimum, average or maximum levels, and desired trajectories. There is certainly scope for more refined approaches in this respect.

b) Specification of the set of alternatives

As with the set of objectives, it is not always sure that the set of alternatives has been well-defined. Both the case that too many and too little alternatives have been defined may occur. In the first case, it may be that alternatives are included which are feasible within the model but not in reality. For example, this may happen when the choice set is defined in terms of a number of linear equalities and inequalities. Linear (in)equalities are frequently nothing more than linearised versions of non-linear relationships which only give a reliable approximation on a limited interval. When extreme alternatives are generated on the basis of the linearised constraint set, there is a possibility that these extremes are considerably far off from the real extremes. An implication is that maximum or minimum attainable values for individual objectives may be very unreliable. This is an unfavourable situation for methods in which the well-known ideal solution is used as a point of reference. In the second case, it may be that the generation of alternatives has not been adequate.

The process of generating alternatives has, apart from a few attempts (see e.g. Starr and Greenwood 1977, and Zeleny 1981), not received much attention in multiple criteria analysis. Usually, the choice set is assumed to be given and fixed. This is regrettable, since one does not only run the risk that attractive alternatives are not taken into consideration in this way, but also that one arrives at a choice set which inadequately reflects the real option space. Especially a procedural view of planning is inadequately reflected in conventional multicriteria methods. We further note that the generation of new alternatives is an important element in the practice of group decision making. Therefore the relevance of multicriteria decision methods for group decision making can be improved, by more systematic attention to search strategies for new alternatives.

In many planning problem, constraints are included which attempt to take account of policy considerations other than those formulated in terms of objectives. An important objection to such a procedure is that policy constraints limit the set of alternatives without knowing what the 'price' of these constraints is in terms of the other policy considerations as formally translated by means of objectives. Even worse, the policy constraints have absolute priority over the policy objectives. Instead, it is better to know which alternatives are excluded by a policy constraint before choosing its exact position. This can be done by considering these 'policy constraints' explicitly as objectives, which can be traded-off against each other.

c) Assessment of preferences

Preferences can be formulated in many forms: by means of utility functions, desirable levels, minimum requirements, lexicographic statements, etc. They may be formulated or assessed prior to multicriteria analysis, but also during multicriteria analysis as is the case with interactive methods. A major feature of multicriteria analysis is that the information available at the beginning of the procedure is incomplete or vague, so that a unique optimal solution cannot be determined (see also Finsterbusch 1981).

When dealing with utility functions, there is a tendency to make use of linear ones. The obvious consequence is that the (possibly unknown) weights should be applicable to all alternatives. When a linear function is interpreted as an approximation of a nonlinear one, the assumption that the same weights vector can be applied to all feasible alter-

natives becomes questionable when the choice set includes very dissimilar alternatives. In that case different weights vectors for various parts of the choice set would be more appropriate if one wants to retain linear formulations. This possibility of specifying more than one weights vector has not received much attention up to now (see also Hinloopen et al. 1983).

Problems arise with relative weights when they are interpreted in terms of relative importance. The expression 'criterion 1 is more important than criteria 2' is not unambiguous. First we note that it is difficult to interpret this expression when the criteria do not have the same dimension. This expression presupposes in most cases a standardisation of criteria. Since there are many ways to standardise (see e.g. Voogd 1983), an element of arbitrariness becomes involved, since priority statements such as the one presented above are made independent from the choice of a particular standardisation. Another problem is that the above priority statement can be interpreted both in terms of a linear (additive) utility function, but also in terms of a multiplicative one. In the latter case, the weights concerned have to be interpreted in terms of elasticities.

We conclude that preference assessment in terms of weights is often used in a much more specific way in multicriteria choice methods than intended by the policy maker (see Rietveld 1980). One obvious approach to solve this possible incongruence is to check the sensitivity of the outcomes for particular interpretations of the statements concerning the preferences. It is also meaningful however, to investigate whether for other types of preference statements an incongruence between the languages of analysts and decision makers is less likely to arise.

In interactive methods, the generation of alternatives is carried out simultaneously with the production of information on the preferences. This raises the issues of manipulation: is it possible to generate alternatives in such a way that the policy maker ends up with an alternative which is not in agreement with his implicit preferences? It is not difficult to show for most interactive methods, that if the policy maker has in mind a certain final efficient solution, the analyst cannot prevent him from reaching this solution by generating a particular sequence of alternatives. However, this is a rather weak response to the question posed above, since in reality the policy maker will not always have in mind a priori a certain solution to be reached. An open-minded policy maker will probably be influenced by the particular

sequence of alternatives, so that the final alternatives may indeed depend on the method used. Obviously, one may try to resolve this problem by using an interactive method repeatedly, but it is by no means sure that policy makers are prepared to cooperate during multiple iterations of the analysis.

d) Dynamics of planning problems

Many planning problems have a far more dynamic nature than is often assumed in the formal analysis of these problems. The process of solving a planning problem may take some time and, sometimes, the plans made have implications which reach far beyond the actual moment of planning. During the implementation the actual situation may alter, the policy makers' image of reality may change and - not unimportant in the presence of a multiplicity of objectives - the policy makers' preferences may change. It was already argued that during the process of solving decision problems, new insights may be obtained that may lead to reorientation and respecification of objectives. Furthermore, it was stressed that the choice set is also dynamic. New alternatives may emerge, the choice set may be expanded by additional search, the effectiveness of instruments, etc.

Although the abovementioned remarks with respect to the dynamics of planning problems are probably not controversial at all, multiple criteria decision making theory still pays relatively little attention to these dynamic aspects (see for instance, Moscarola 1977, and Roy 1977). In practice, the dynamics of planning problems can be handled in several ways. For instance, in many real-world problems, one sees that the option of postponing decisions is well-known. The reason is that, after some time, part of the uncertainties involved may have disappeared. A delay may be a rational decision, if the benefits of better information are higher than the costs of a delay. Another way to take account of the dynamics of planning problems is to construct a plan which is not completely fixed but which leaves some flexibility and thus the possibility to react to future events. It might be worthwhile to investigate whether, and if so how, the abovementioned (and possible other) solutions which are being used in practice as a response to the dynamics of decision problems, can also be included in multiple criteria decision methods.

As a result of the dynamics of macro-economic planning problems, among others in the complex of objectives, the concept of optimality is much

less relevant than in single objective planning problems. Quite often, a partial ordering is the best that can be obtained in multiple criteria planning problems. For example, various methods aim at finding a (set of) 'satisfying' solutions, others aim at eliminating clearly inferior solutions, and so on. In summary, the major contribution of multiple criteria decision methods is much less to optimisation than to providing procedures for systematically investigating the set of alternatives. As such, these methods get the character of learning tools and means of communication. Of course, when methods assist policy makers in getting a better insight into their tradeoffs and/or in improving the communication between policy makers and other participants, these methods have a positive contribution. Nevertheless, a number of questions arise. How does one measure the effect of a given method on learning and communication? Given the large set of competing methods, which one may be expected to be the most fruitful? Do the insights which can be obtained through a given method outweigh the costs of employing that method? Is there a difference in the danger of manipulating between alternative methods? With respect to learning procedures, Spronk and Veeneklaas (1983) have argued that a condition for a decision method to be considered a learning tool is that it should produce results which are non-trivial but are nevertheless explicable afterwards.

Especially in recent years, much progress has been made in decision support systems (DSS), aiming at an interplay between experts and decision makers on the basis of man-computer interactions. Such decision support systems are also capable of including qualitative and less structured views from decision makers. Such systems do not aim at an optimal solution, but at structuring and rationalising complex choice problems by highlighting the qualitative dimensions and impacts of the decision makers' views. A major advantage of such a system is the direct availability of consequences of alternative options. This new trend is essentially an outgrowth of recent developments in information systems for planning (see Nijkamp and Rietveld 1983). In this context, the input side of complex decision problems (e.g. the problem definition, the assessment of data, etc.) is receiving much attention. There is a growing awareness that the demands placed on highly technical and advanced decision methods tend to become lower as the quality of information systems increases.

4. CONCLUSIONS

In macro-economic planning one is generally confronted with a multiplicity of conflicting objectives. Both in the design and evaluation phase of conflict analysis, a quite natural use can be made of large parts of the vast growing body of multiple criteria decision methods. Although, formally speaking, most multiple criteria decision methods can produce guaranteed 'optimal' solutions, their primary purpose is rather to serve as a learning device and as a flexible means of communication, both for the decision maker and decision analyst. One implication of this position is that much attention should be paid to the organisational and institutional setting of macro-economic planning processes.

As demonstrated by several contributions to this volume, multiple criteria decision methods can be used fruitfully in practice. Nevertheless, in the operationalisation of multiple criteria decision methods, a large number of problems may arise. In the literature, several of these problems have been signalled although many of them have not yet been solved in a satisfactory manner. In this article, we have listed a number of problems which in our opinion deserve more attention than they have received thus far.

An important lesson to be drawn from this volume is that no single standard procedure for all macro-economic planning problems exists. In assisting policy makers one should be well aware of the peculiarities of the problem at hand. This may imply that each particular problem calls for its 'own', well-tailored solution. By considering the various elements of multiple criteria analysis as 'building blocks' which can be combined into a planning support system, the needs of practice can be met. Therefore, it may be expected that the role of multiple objective decision methods in macro-economic planning will become more important in the near future.

REFERENCES

- Finsterbusch, K., 'A survey of methods for evaluating impacts', in: Finsterbusch, K. and Wolf, C.P. (eds), Methodology of Social Impact Assessment, Hitchinson Ross Publ. Co., Strouesburg, Pa., 1981.
- Hinloopen, E., Nijkamp, P. and Rietveld, P., 'Qualitative discrete multiple criteria choice models in regional planning', Regional Science and Urban Economics, vol. 13, no.1, 1983, pp. 77-102.

- Mascarola, J.S., *Recherche Opérationnelle, Processus de Décision et Aide à la Décision*, Université de Paris-Dauphine, UER, Sciences des Organisations, cahier 68, Paris, 1977.
- Nijkamp, P. and Spronk, J. (eds), Multiple Criteria Analysis, Gower, Aldershot, 1981.
- Nijkamp, P. and Rietveld, P. (eds), Information Systems for Integrated Regional Development, North-Holland Publ. Co., Amsterdam, 1983.
- Rietveld, P., Multiple Objective Decision Methods and Regional Planning, North-Holland Publ. Co., Amsterdam, 1980.
- Rittel, H.W.J. and Webber, M.M., 'Dilemmas in a general theory of planning', Policy Sciences, vol. 4, 1973, pp. 155-169.
- Roy, B., 'A conceptual framework for a prescriptive theory of decision aids', in: Starr, M.L. and Zeleny, M. (eds), Multiple Criteria Decision Making, TIMS Studies in the Management Sciences, North-Holland Publ. Co., Amsterdam, 1977.
- Spronk, J., Interactive Multiple Goal Programming for Capital Budgeting and Financial Planning, Martinus Nijhoff, Boston, 1981.
- Spronk, J. and Veeneklaas, F.J., 'A feasibility study of economic and environmental scenarios by means of interactive multiple goal programming', Regional Science and Urban Economics, vol. 13, no. 1, 1983, pp. 141-160.
- Starr, M.K. and Greenwood, L.H., 'Normative generation of alternatives with multiple criteria evaluation', in: Starr, M.K. and Zeleny, M. (eds), Multiple Criteria Decision Making, North-Holland Publ. Co., Amsterdam, 1977, pp. 111-127.
- Voogd, H., Multicriteria Evaluation for Regional and Urban Planning, Pion, London, 1983.
- Winkler, R.L., 'Research directions in decision making under uncertainty', Decision Sciences, vol. 13, 1982, pp. 517-533.
- Zeleny, M., 'Case study in multiobjective design: de novo programming', in: Nijkamp, P. and Spronk, J. (eds), Multiple Criteria Analysis, Gower, Aldershot, 1981, pp. 37-52.