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**MACROECONOMIC MODELS AND PLANNING IN THE
 CONTEXT OF AN UNCERTAIN FUTURE**

-The French Experience-

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MACROECONOMIC MODELS AND PLANNING IN THE CONTEXT OF
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--The French Experience--

Paul Dubois */

The large number of structural adjustments needed to emerge from the crisis makes it more vital than ever to think in the medium and long terms. The failure of the policies of the past is largely due to their negligence vis-a-vis the future: negligence concerning income formation unfavourable to investment, the creation of employment and price stability; negligence concerning deficits resulting in growing indebtedness; negligence concerning the training and research effort; negligence concerning the stability of the energy market and negligence concerning institutions capable of ensuring the maintenance of the kind of the international economic order needed in a world where interdependence among countries has increased significantly.

Now more than ever, planners must strive to keep political authorities, economic and social actors and public opinion abreast of the requirements for the future. But the crisis makes it necessary to think again about the concept of planning and the tools involved in it. In our contribution, we shall stress the vital need to take account of the uncertainty characterizing planning activities. This relates not only to uncertainties in terms of the future but also to the understanding of economic phenomena in a situation of economic instability and structural change.

Our contribution will concern the macro-economic aspects of planning and, more precisely, projections and models for clarifying macro-economic strategies. Consideration will be given successively to the different roles of macro-economic projections in planning, the value and limitations of having recourse to models and, finally, ways of incorporating uncertainty in the use of models for planning.

The study will be based on the French experience with planning. Some general lessons may be drawn from it, but caution must be used in doing so, for the structural and institutional peculiarities of each country forbid any hasty generalization.

*/ The views expressed in this work are the sole responsibility of the author and do not necessarily coincide with those of the Organization.

1. Macro-economic projections and the decision-making process

Macro-economic projections logically have three separate roles in the planning and decision-making process:

- at an early stage in the process, exploratory projections throw light on problems of macro-economic growth and stability;

- at a later stage, studies of variables relating to economic policy and also to the behaviour of decentralized actors make it possible to see how tendentious trends can be changed for the better;

- in a final stage, which is one of synthesis, projections are established to explain the economic policy adopted and the results expected from it.

Exploratory projections

In what medium-term macro-economic developments does the pursuit of the tendencies of the past result? How are these developments conditioned by different economic policy approaches and what is the purpose of first-phase projection activities.

The hypotheses which must be drawn in order to prepare these exploratory projections relate to the evolution of the international environment, to the behaviour of domestic agents and to economic policy.

The evolution of the world economy has a marked effect on the evolution of the domestic economy in the many small and medium-sized countries which are wide open to the exterior. This is notable the case of France. World growth and its distribution by zones is largely responsible for the evolution of exports, although shares in the market may increase or diminish. International prices of raw materials, and of petroleum in particular, and the exchange rates of the dollar dictate the terms of trade. Interest rates depend on the international capital market. Since the early 1970s, the volume of world trade and the key price indicators (prices of raw materials, rates of exchange and interest rates) have shown marked fluctuations. This instability has increased since the end of the 1970s. Thus, concepts of trend evolution or of the most probable evolution of the international economy no longer make much sense. It has become necessary to construct diversified scenarios of the possible evolution of the international economy in order to explore the future. It is, however, useful to favour one of those scenarios as a basis for a "reference" or "trend" projection of the national economy.

In the case of a country such as France, at least it is easier to explain the trend behaviour of domestic agents (prices, investment and employment in enterprises, exports and imports, household savings and consumptions, wage fixing, etc.). Econometric analysis shows that behaviour equations are stable in spite of the great diversity of economic situations over the past 25 years.

The concept of trend evolution of economic policy is, on the other hand, difficult to define since successive governments may practice contrasting economic policies. Thus, in France, the socialist government which came into power in 1981 nationalized a large proportion of the enterprises. Conversely, the liberal government which succeeded in it March 1986 is going to implement a sweeping denationalization programme. However, at the macro-economic level, the trends followed by public spending and earnings are not very responsive and are slow to change. Conventional hypotheses of economic policy may thus be constructed in which sometimes long-term trends and sometimes more recent orientations are projected. As in the case of the international environment, some contrasting scenarios may, however, be established, so that various possibilities for growth can be explored.

All in all, the first logical stage in macro-economic planning, a state which is devoted to exploring the future, consists in establishing some medium-term scenarios, one of which should serve as a "trend" as much as possible and may be used as a reference projection. The purpose of this exploration is to provoke thought rather than to come up with quantitative forecasts. It is aimed at making not only government officials but also economic and social actors in the private sector and public opinion more keenly aware of the difficulties to be overcome, of the opportunities to be seized out of open constraints and possibilities in other words, to make them more cognizant of the challenges of the future. Thus, there are only two important questions: Do the projections clarify the problems which will arise? Will they not point to problems which will not in fact materialize?

On reply may be made to these questions by citing a case which does not seem to be unusual. In 1978, a trend projection of this kind had been established for the French economy, for a mid-term review of the Seventh Plan (1976-1980). This projection concerned the period 1978-1983. Enough time has now passed to make it possible to evaluate the relevance of the problems to which attention was drawn at that time, on the basis of the trends observed. Those trends were of course quantitatively different from the trends forecasted, mainly because the international economy developed in a much rare unfavourable way than had been assumed. However, the four main qualitative conclusions drawn from those projections in 1978 have proved correct:

- the French economy would suffer great constraint from the exterior (balance-of-payments difficulties);
- growth would continue to be slow;
- inflationist pressures would persist;
- the weakening of growth would have two major adverse consequences: increased unemployment and difficulties in financing social security.

At the time, those conclusions provided information which was particularly useful since there was nothing obvious about them. This is best illustrated by the fact that at the time the projection was made many observers regarded such projections as overly pessimistic. Perhaps the greatest contribution to be made by macro-economic studies carried out for the purpose of exploring the future is that they help to clarify the thinking of public officials and hence that of the society at large.

Studies of alternatives

The second step in the logic of planning is to consider how to resolve the problems exposed by exploratory projections or at least how to reduce them and how more favourable plans can be achieved.

Some factors which motivate action resulting in the achievement of more favourable trends are the direct responsibility of public officials. These include government spending and mandatory taxation, and hence public deficits as well; the management of money; changes in rules governing the movement of macro-economic actors (laws and regulations; administrative controls; provisions for incentives; management and scope of the public sector, etc.). The room available to public authorities for maneuver, is, however, limited by the impact of social forces and the weight of public opinion and their consequences for the maintenance of the government in office, and also by international constraints. Action may also be set in motion by the behaviour of macro-economic actors, but here the actors themselves play the leading role although public authorities may exert some influence over them.

Analysis of possible action and its impact on the economy is not based solely on macroeconomics, as in the case of any analysis which relates to questions of macro-economic allocation. Macro-economic theory does little to facilitate the analysis of incidents of institutional modifications --nationalization or denationalization, regulation or deregulation, etc. But macro-economic studies of alternatives may be aimed at answering two kinds of questions:

- how much does manipulation of the factors responsible for macro-economic regulation (budget and fiscal policy, monetary policy, price and incomes policy) affect the results of projections?

- what are the effects of changing structural parameters of behaviour?

The content of the answers to these two type of questions is, however, very different. In the first case, the decision to be taken at public level is directly clarified. In the second case, the consequences of a change in behaviour will be clear, but nothing will be said concerning how to bring that change about. It is necessary to carry out case studies prior to making macro-economic projections in order to be able to reply fully to the question relating to changes in the behaviour of macro-economic agents.

In the process of preparing French plans, such studies have been carried out systematically for variables relating to public spending, public utility rates and taxation. For the most recent plan (the Ninth Plan, covering the period 1984-1988), variant behaviours of macro-economic actors have also been studied. These studies touched on wages and non-wages incomes, investment in production, the duration of work and of use of equipment and, finally, household savings. Consideration of such variants when drawing up a macro-economic strategy may, however, be characterized by some ambiguity if the conditions surrounding the behaviour changes are not sufficiently clear.

Clarification of a macro-economic strategy

The final stage in macro-economic planning is the establishment of macro-economic forecasts relating to the scenario(s) adopted for the growth of the world economy, the economic policy orientations as explained by the governmental authorities and the expected behavioural changes. These forecasts must not be confused with the clarification of the macro-economic strategy of the government. That strategy may be defined only in more qualitative terms.

In establishing these forecasts, there is need to combine, in the best way possible, the variants relating to the action motivators studied during the second phase of the operation. This combination may be found by trial and error or a more formal approach may also be used. In the latter case it is necessary to determine the maximum which can be expected from a objective-function (employment, for example) operating under a constraint (for example, a constraint in stability vis-a-vis the exterior or in the size of the deficit or surplus in public finances or minimum growth of the purchasing power of wages) and to make the best possible use of each of the action motivators within the possible intervals of variation established for each of them.

Thus, the optimum combination is obtained through the resolution of a linear programme. This was the method adopted in preparing the Ninth French Plan.

This optimization resulted in the adoption of the following *macro-economic strategies*:

- In the first phase (1984-1985), priority is given to the reorganization of the economy and in particular to the return to stability vis-a-vis the exterior. Thus, what is called for is a policy restricting domestic demand based on a large effort to limit household income by practicing moderation in wages and social security benefits, on an increase in household savings and on a reversal of the upward trend in public deficits. The moderation practiced in connection with wages and mandatory corporate taxes is intended to make enterprises more profitable, thereby favouring investment in production. Progress in connection with investment should be particularly marked in industry, which plays an essential role in ensuring stability vis-a-vis the exterior. All and all, the policy followed should make the French economy grow at a lower rate than the economy of its trading partners.

- In the second phase (1986-1988), stability vis-a-vis the exterior will have been restored, and the restrictive policy may be relaxed. Domestic demand is expected to grow more rapidly, there being more flexibility where wages are concerned, the employment situation being more favourable and household savings having dropped. Enterprises are expected to continue to show greater profits, real wages growing at a lower rate than productivity. A more sustained domestic demand and rising profitability is expected to encourage rapid growth of investment. When all is said and done, France will show a higher rate of growth than its trading partners. Stability vis-a-vis the exterior is, however, expected to be maintained because of a lively growth of industrial investment favourable to exportation and to the limited growth of imports.

Over the period as a whole, the rise in public spending will be sharply reduced from what it was in the past with the result that the rise in fiscal and parafiscal pressure noted earlier may be contained and the deficit in public finances limited.

In addition, the strategy favours a reduction in the duration of work so as to obtain a "division of labour" leading to an increase in employment corresponding to a given rate. However, so that this reduction does not result in a decrease in production capacities, the duration of use of equipment must be maintained. Team-work and part-time employment must also be encouraged.

2. Recourse to models

How should the projections needed at the various stages in the process of macro-economic planning be carried out?

In France, these projections have been prepared with the help of macro-economic models, for close to 20 years. These models incorporate the description of the economy supplied by national accounting. National accounting has been in operation for many years in France, and econometric estimates may be prepared on the basis of long series of national accounts. In addition, this type of work has been very much oriented in the direction of the need for economic projections, especially for planning. The work is highly integrated and relatively detailed and is carried out by institutional sectors, by branches of activity and by operation. French macro-economic models are therefore rich of accounting data and they give rise to projections based on past national accounts.

Advantages

Econometric models are used because they present the following advantages:

- they make it possible to take account of complex relationships of interdependence, which are inaccessible to non-formalized economic thinking;

- they make it necessary to work hard to formulate the technical behavioural and institutional relationships which explain this interdependence;

- they are powerful tools for mobilizing and accumulating information and know-how;

- processed by computer, they make it possible to prepare projections and variants rapidly so as to be able to reply to questions asked by actors in the field of planning (once the sizeable preliminary investment needed for their construction has been made, of course).

Criticism

Considerable criticism has, however, been directed towards this type of models. They are often accused of representing reality incorrectly or partially (and therefore in a biased manner), of being black boxes or of giving a conservative picture of the future.

. There is some truth to the criticism relating to the adjustment of the models to reality. In the first place, different theoretical representations of reality may conflict, while at the same time the econometric findings obtained by comparing them with the facts may not discriminate between them. But this is no argument against models but rather an argument in favour of comparing the results provided by different models. This is the practice which is developing in France, although one model (the DMS model of the INSEE) is preferred in work relating to planning. The lessons to be drawn from the models may thus be compared.

Second, partial criticism may turn out to be correct. Such criticism is often addressed by the users of the models. This does not mean that the models must be abandoned but rather improved. In other words, a model must not remain static but must evolve as economic knowledge progresses.

Third, a model never represents reality exhaustively. It favours some phenomena while neglecting others. A model should therefore be used only in the field for which it is valid. Whenever an attempt is made to go outside that field, case studies must be prepared. This is true in particular in the case of studies of variants relating to structural policies (for example, a policy aimed at reducing the duration of work).

. Models are often black boxes in the eyes of their users. When that happens, the results they give appear to be oracles. There is, in fact, a discrepancy between the complexity of economic and social reality and the legitimate desire of public officials and economic actors not to depend on the judgement of experts alone. Comparing several expert opinions formulated by various teams of model-makers acting independently of one another, is one remedy. A second remedy, is for those who prepare the models to make a big effort to be transparent and to play the role of teacher by a clear explanation of the main links between the hypotheses and the results as well as of the scope and limitations of the lessons to be drawn from the model.

. Finally, models lead to conservatism because they are based on relationships which are estimated on the basis of observations made in the past. Economic mechanisms may of course be changed. The emergence of new situations during phases of structural change may also reveal the importance of factors whose influence was not apparent before. Thus, it may be deemed necessary to change the model before making projections.

But such changes must be based on a thorough examination of the most recent trends or on expert macro-economic knowledge as well as on solidly based theoretic argument. The users of models, and

especially public officials, may be tempted to question the model if it casts doubt on ideas they entertain or forecasts results they deem unacceptable. Those responsible for the policy may overestimate the importance of economic policies or they may be prone to put a favourable light on the results of their own activity. Thus, in France, the growth of unemployment presaged by teams of model-makers over the past 10 years has resulted in marked criticism of the models. It is easy to make problems illuminated by projections disappear by changing some crucial parameters of a model (import-demand elasticity, capital coefficients or coefficients used to determine corporate investment or household savings). The practice of manipulating models in this way must be rejected for ethical reasons.

Models used in French planning

A number of models are used for planning in France, including the DMS, which is a central macro-econometric model, and models used in individual cases for carrying out more detailed analysis of certain aspects of reality.

- The DMS is a dynamic model, suitable for projecting time paths for the French economy for a 6 to 8 years period. It distinguishes between six large institutional sectors (the corporate sector, the household sector, the administrative sector, etc.), the corporate sector being itself subdivided into eleven subsectors. It retraces transactions on goods and services (in the descriptive part of an input-output table showing 14 branches), the relationship between production and the factors of production, the formation and use of income, and, finally, the flow of financial operations. It is a large model with 500 exogenous variables, 2 650 endogenous variables and 2 900 equations of which 970 are econometric equations. It is estimated econometrically on the period 1959-1981.

It is a short-term neo-keynesian model, but one which gives a key role to capital accumulation in the medium term. Capital accumulation is not determined solely by the expected demand of enterprises but also by their rate of profit. The factors of production are capital-generating factors. Finally, it gives an important role to prices in economic adjustment mechanisms. It is therefore, based on composite theory.

- The following models used in specific cases are associated with this central model.

A small version of the DMS ("mini-DMS" with 250 equations) in two branches (industry, other branches) is used for long-term projections. This small version is itself linked to an energy-supply and demand model used for studying medium-and long-term interactions between

macroeconomic trends and trends in the energy subsystem ("mini-DMS-energie" model, 400 equations).

A dynamic Léontieff model (5 000 equations) carries out a more detailed analysis of the production system and transactions relating to goods and services in 36 branches. An even more detailed set of econometric equations, makes it possible to project household consumption of 200 products.

A number of models (administration models, social security models and fiscal submodels) make a fine analysis of the operations of administration with a view to describing industrial relations, which are particularly numerous in this field.

Specific models are used for making national, regional and local demographic projections and regional employment projections.

. These models operate independently of the central model. The latter may, however, provide the former with entry variables, which are endogenous in the case of the DMS but exogenous in that of the specific models. By the same token, output variables from specific models may be input variables for DMS (in the demographic field, for example) or may improve the DMS model (in the case of relations pertaining to administrations for example). A flexible exchange of information thus takes place between the various models and the teams of economists responsible for them.

This system of models is a system which evolves. In the first place, it is adaptable to changes in projection needs. In addition, models are changed in order to incorporate progress made in economic knowledge of economics and statistical data, institutional changes or the lessons drawn from discussing the results obtained with the users.

With regard to DMS, which was created in 1978 after a number of years of preparation, three re-estimates have been carried out. Interrupted re-estimates are considered preferable to an automatic annual re-estimate (carried out whenever a new year is added to the statistical series), for re-estimates provide an occasion for critical thought concerning the model as a whole. Although the general structure of the DMS 4 does not differ from that of the DMS 1, numerous partial changes have been made between the first and the last version of the model.

Work is currently underway with a view to reducing the size of the model. A smaller-sized model might actually be econometrically more sound. It would also be more transparent to the users.

Finally, it would be less clumsy to handle, which would mean that more energy could be devoted to making methodological progress leading to more effective integration of financial transactions (formation and impact of interest rates, flow-stock ratios, etc.), the preparation of forecasts or supply effects.

3. Handling uncertainty

We live in a world in which uncertainty has been markedly increasing since the early 1970s. Growth has become slower and is also more irregular. International trade is unstable. Foreign currency exchange rates have fluctuated greatly since the fixed exchanges rates system was abandoned. Oil prices are in violent upheaval. Interest rates are characterized by strong movements. Economic policies undergo sudden shifts. In short, the main variables used to describe the "state of the world" now fluctuate sharply.

Major disequilibria characterize the world economy (domestic and foreign deficits in the United States, surpluses in Japan, unemployment in Europe, indebtedness and dubious solvability in some of the developing countries). The outcome of these disequilibria is very uncertain.

Thus, it has become more difficult to forecast the future than it was when growth was rapid and steady. Uncertainty is a major challenge for planners in that the implementation of the best designed programmes may be beset by enormous hazards. The threat of the unexpected tends to lay waste to the concept of planning and to confine economic policy to the art of visual navigation. 1/

1/ There are three other causes for a planning crisis:

- the belief that the economic intervention of the State is ill-advised and that market forces are enough to restore stable growth;
- the crisis in economic theory, i.e., the absence of a consensus on what constitutes economic reality and therefore on what should be done;
- the dilemma facing governments in a crisis situation is whether to make cheerful forecasts concerning the results to which their action;
- will lead, although those forecasts will be proved wrong by the facts, or whether to make glum forecasts which will cast doubt on their ability to solve problems.

Thus, planners must make uncertainty one of their main concerns if they want planning to remain useful. This is particularly important in the case of the macroeconomic aspects of planning, where the level of the objectives sought and the means of attaining them cannot be rigidly determined since the need for allowing for the unexpected must be taken into account.

A great deal remains to be done to specify how such planning must be approached, especially since the present situation seems to involve more risks than the human mind has been able to grasp so far. Some guidelines may, however, be suggested, on the basis of our first experiences.

Planning by scenarios

• The greatest uncertainties are those which relate to trends in the international economy. Therefore, in France, a much greater effort is now being made to formulate international scenarios. For the exploratory projections used in connection with the Ninth Plan, three contrasting scenarios were adopted, in which the following three major factors of uncertainty were shown in combination: the evolution of the North American economy and the dollar, the degree of international financial instability and the danger that European companies would break up. The numerical data used in these scenarios was rather subjective and could not be established with a model, which was a drawback. The construction of a model of the international economy has since been undertaken with a view to the more rigorous establishment of scenarios in the future.

For those exploratory projections used in connection with the Ninth Plan, seven scenarios showing possible trends in the French economy were also established, on the basis of hypotheses relating to economic policy and the behaviour of microeconomic actors. External and internal scenarios were crossed, but so that a large number of scenarios would not prejudice the clarity of the debates, they were not crossed systematically. A total of nine exploratory scenarios were formulated.

• Studies of variants can in their early stages overlook uncertainties relating to the national environment and, more generally, to the evolution of exogenous variables used in the models, which are actually semi-linear. The variables must rather take account of uncertainties relating to the known, that is to say uncertainties which affect the econometric relations of the models. In order to test the soundness of the results and, in particular, to evaluate the uncertainty relating to the effects of economic policies, it is useful to test the sensitivity of the results to certain coefficients or

equations. In addition, as indicated above, it is desirable to compare the results achieved with different models.

• Finally, the clarification of a macroeconomic strategy should take uncertainty into account, for this kind of strategy frequently considers variables in level in dealing, for example, with foreign indebtedness, public deficits or fiscal pressure. Thus, different strategies should be drawn up in accordance with the structuring of the international environment. In practice, two or three profiles of the international environment should be preferred so that the presentation of the strategies will not be overly complicated. This was true in France in the case of the Ninth Plan, in which a distinction was drawn between two domestic strategies, one of which was based on a scenario of non-inflationary growth of OECD countries and the other on one showing a combination of slow growth and high interest rates.

Linking the short and the medium term

Short-and medium-term concerns must be well integrated in order to ensure a good economic policy. The medium-term consequences of decisions to be taken in the near future must be evaluated so that decisions are not taken on the basis only of their estimated short-term effects. By the same token, consideration of the medium term must result in the immediate taking of decisions providing for the future even if their short-term effects are negligible and even costly. The same is true of the implementation of structural policies, which are often costly in the short term and will show favourable results only in the medium term.

The present instability of economies as well as the significant structural adjustments needed to remedy it make it particularly vital that tools providing for the linking of the short and medium term are immediately available.

Dynamic medium-term models (such as DMS) do make it possible to effect such a link, but of course the link also affects the way in which these models are used. In the first place, there is need to ensure that short-and medium-term projections are adapted to recent short-term changes clarified by the most recent statistics available and also with short-term projections drawn up in a more detailed manner through the use of other tools. Thus, in France, the short-term projections made with the DMS model are adapted to short-term projections (economic budgets) drawn up with a view to the preparations for the taking of yearly monetary decisions affecting the budget and then of incorporating those decisions in a macro-economic forecast. Care is also taken to achieve coherence between the bases used by those responsible for budgetary and monetary policy to obtain information used in forecasts and those used by planners.

Second, medium-term projections must be brought up to date each year so that the most recent trends can be taken into account. Comparison with the original projections on which the strategy of the Plan is based shows the extent to which the strategy remains valid, how it should be changed or whether changes should be made in the path followed by the economic policy so that the medium-term objectives will be met.



