CHAPTER VIII

THE SOLUTION OF COMPLICATED PROBLEMS BY SPLITTING UP IN STAGES

1. Actual problems of economic policy are much more complicated than those dealt with in the examples (1) and (2). These complications arise partially as a consequence of extra-economic factors of which will be spoken in chapter X. But the purely economic aspects of the problems are also more complicated than our simple models, in fact so complicated as to make it virtually impossible — or at least inefficient — to deal with them in only one very complicated model of variables and relations. All macro-variables in the models used should be split up into micro-variables; the number of taxes or subsidies or different prices is very large indeed. Even if the construction of models with a hundred or a few hundreds of variables is a possible approach today, it may be questioned whether they will ever convince the non-mathematical politician and whether they can easily be interpreted for them. No doubt their scientific development should be furthered and it may one day become different. But for the time being this way seems barred for immediate use.

Which approaches are to be recommended and what is the use of the models so far presented? In the author's opinion the most practical approach is that of splitting the problem up in two stages: at the first stage, coinciding with methods exposed in the preceding chapters, the "broad lines" of the policy are determined, whereas the second step consists in refining each of the compartments. After having decided e.g. that the burden of indirect taxes should be increased by, say, 2 % of national income, the further questions should be considered what taxes in particular should be increased or

what subsidies decreased. This may be done independently of the refinement of another part of the macro-economic approach, such as wage policy or price regulation. The distribution of a necessary wage decrease or profit decrease over various categories may, on the other hand, be undertaken independently of the tax specification. Possible changes in direct taxes, to quote another example, are especially in need of a refined analysis given the importance of the nonlinear shape of these taxes. Special, more refined models, may be used for the solution of these partial problems; or they may be solved along more "common sense" methods.

In fact more extra-economic considerations will have to be taken care of in most of these refinements.

The significance of the macro-economic approach of the first stage remains, in the author's opinion, that the interdependence of the various large compartments of economic policy can only be taken care of in that way. And the examples presented actually show that this interdependence is just somewhat too pronounced to make the verbal approach sufficient.

2. In principle a two-stage approach is only mathematically correct under rather rigorous conditions of which we have met some examples. A splitting up of the problem is correct if the phenomenon of corresponding partitioning occurs in the matrices of our relations. The problem is then reduced to a combination of independent partial problems. It is hardly probable, however, that actual economic structures are so simple. Some degree of consecutiveness seems nevertheless to exist (cf chapter IV, § 2) and this also simplifies the method.

The two-stage approach may, in other cases, be correct as a first approximation. Here we may quote example (1) as amended in chapter V, § 2 by the introduction of supplementary taxes. There it appeared that the specification of these taxes would not change the total result of their increase

In this context this means that a first-stage calculation could yield the total increase in tax burden and the second-stage calculation the distribution which is irrelevant for the effect. Irrelevant, that is, to the effect as far as shown by the macro-model. It may nevertheless happen that a micro-model would show some difference in effect between two distribution specifications which are indifferent to the macro-model.

In cases where the macro-model would already prove, to some extent, to be too coarse for the study of the refined problems one could try to use some method of successive approximations.

3. The techniques used in the second stage are often more "pedestrian" and may be of different types. They are less amenable to a general theoretical treatment and also less characteristic of our subject, and will therefore only be just mentioned. A few examples may be given without attempting to be complete or exact. If government expenditure has to be reduced or increased the problem of "priority" arises. This may be solved upon an incidental and subjective basis, but also with the help of quantitative principles, if e.g. the yield of alternative objects can be calculated. Sometimes there will be appropriate yardsticks to estimate such a yield, as in the case of investments in transportation equipment, public utilities, soil improvement and the like.

If a wage reduction or increase has to be distributed account may be taken of the need for expansion and contraction in various industries or of the need to create a system of incentives to increased productivity.

If tax changes are to be specified, consideration may be given to both social and economic viewpoints and the results will almost invariably depend on certain technical peculiarities of the taxes under consideration.

Regulation of profit margins will depend on similar con-

siderations. The initial situation may be characterised by certain disproportionalities, often rather accidentally distributed over the various branches. These may need correction. But again the viewpoint of development in a certain direction may be important too.

With all these decisions extra-economic factors must also be considered, as has been observed above. These will be described in some more detail in chapter X.