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OFFICIAL STATISTICIANS AND ECONOMETRICIANS IN THE PRESENT-DAY WORLD

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Official Statisticians and Econometricians in the Present-day World.

Roy Geary has devoted his life to statistics and econometrics, embracing the whole field from its theoretical foundations to its applications. He is one of the very few who can claim long acquaintance with all its aspects, from mathematical statistics and econometrics to the collecting of data by public statisticians or the building of econometric models as tools for the discussion of economic policy. It is therefore fitting in this series of lectures that, at some occasion, the role of official statistics and applied econometrics in our modern societies be examined.

I have a personal reason for selecting this subject. I remember my first meeting with Roy Geary in the early 'fifties. I was presenting to my colleagues of the Econometric Society a theoretical paper on linear estimation. In the discussion Geary stood up and, in his loud voice that all of us know and like so much, vividly opposed the way I had posed the problem. Thinking he was addressing a young mathematician, he stated he was speaking as an official statistician who knows how data are collected, implying that no official statistician would follow my approach. Later in the day, he was told I was working at INSEE, the French Central Statistical Office. He then looked for me and offered me a glass of his favourite whiskey. As we were cheerfully exchanging ideas, I promised him that I would find some occasion to speak of official statistics. Here it is.

Since that time in the early 'fifties, we have witnessed a tremendous expansion of public statistics, and of applied econometrics as well. We may wonder today whether or not this expansion has come to an end. We are faced with dissatisfaction and with opposition either to new developments of official statistics or to the present reliance on econometric models. It is an opportune time, therefore, to discuss where we, econometricians and statisticians, stand today.

I shall now speak of statistics and econometrics without further mentioning that I mean, on the one hand, the public collection, processing and diffusion of statistical data, and on the other hand,

the application of econometric methods for the study of economic policy. I shall deal with both aspects of the subject, statistics and econometrics, simultaneously or rather along parallel lines of argument. I shall first try to define the role we statisticians and econometricians have to assume in our present societies, and shall then speculate on how we are likely to succeed in assuming this role.

I. Our Role

Faced with a demand that is subject to continuous changes, and knowing that extremely long lags are necessary before we can satisfy any new request, we have to anticipate this demand. To do so effectively, we must be open-minded and sufficiently cultured to form good judgements about the forthcoming dilemmas of our fellow citizens or about the approaching problems of our economies. Moreover, we must always strive for objectivity. These are the points I will now examine.

1. *The Demands We are Facing.*

In the 'fifties and early 'sixties the main demand addressed to statisticians concerned macroeconomic indicators. The introduction and development of systems of national accounts was the answer. To some of us this particular demand looked so prevailing that we considered organising the full system of economic, demographic and social statistics in the unified framework of completely integrated national economic accounts. Trying to achieve this end, or more modestly to develop economic statistics, brought undoubtedly positive results, which I do not want to minimise here.

But it now appears that, as we were making great progress along the particular line then stressed, and even though we did not neglect demographic and social statistics, we did not pay enough attention to the fact that some important demands were not sufficiently met. These demands we must now face: they concern both a finer description and a description oriented more towards social phenomena than towards economic ones.

As the public habitually referred to the main national statistical indicators, not surprisingly it requested similar indicators for regions and even smaller local communities. But we must place still more emphasis on the fact that many uses of statistics concern decisions of a local nature, the relevant area often varying from

one case to another. Hence, the need exists for a complete framework of localised statistics, which can be easily retrieved in a large number of possible formats.

The demand for micro-data banks also follows from the realisation that potential applications of statistics may involve the simultaneous consideration of many characteristics of a sample of individual units, the set of these characteristics varying from one application to another. Hence, the statisticians should prepare clean data bases ready for many alternative uses and concerning a large number of variables observed on the units of a full population, as in the case of large firms, or on those of a representative sample, as in the case of individuals or households.

Economic growth has certainly solved some of the social problems we were facing in the immediate postwar period, but many of those problems remain and the discontent about some features of growth has created new concerns. Simultaneously, the questioning of some aspects of the welfare state and the awareness of the ever increasing costs of some collective services or transfers have created the need for a detailed scrutiny of the benefits and costs of social policies. For all these reasons the demand for social statistics has been rising rapidly during the past decade.

Parallel evolutions have occurred in the demands addressed to econometricians. In the 'fifties and early 'sixties econometricians were requested to build the tools for the study of macroeconomic policies, and even more particularly for the study of aggregate demand management policies. The picture of this period has not changed much when we remember that, in some European countries such as mine, econometricians were also asked to take part in medium-term economic planning, which involves not only demand management but also some structural decisions.

Recently, the introduction of income and price policies, the objective to counteract the increase of structural unemployment, the questioning of social policies and the awareness that they have secondary effects not to be neglected, have led to requests for new econometric studies, which, on the one hand, should often go into more disaggregated analysis than was previously needed and, on the other hand, have to pay particular attention to social phenomena.

We should keep in mind that, not only at the present time, but at all times, new demands addressed to statisticians and econometricians often arise from the questioning of the prevailing state

of affairs and therefore often emerge on the occasion of conflicts. Political opponents make contradictory claims about what is the exact situation in the country and about what are the best policies for improving this situation. Statisticians and econometricians are requested to give the objective basis for a correct evaluation of such contradictory claims.

The fact that we have witnessed a reorientation of the demands addressed to statisticians and econometricians and that a continuous reorientation is also to be expected in the future suggests that we should know how to detect in advance what the new demands are going to be. The fact that we have to give expert advice when our fellow-citizens have opposing views suggests that we should think over what we ought to aim at in our search for objectivity.

2. *The Need for a Broad Socio-economic Culture.*

We, statisticians and econometricians, face a real challenge when we are requested to meet new demands on time.

On the one hand, these demands are hardly ever well formulated, particularly so when they make their first appearance. For instance people developed a new concern for social inequalities when they began to suspect that economic growth would not by itself solve the problems due to such inequalities. But the concern was first expressed about particular questions such as unequal access to good schools or industrial disparities in wages. Statisticians should have realised that this concern would become more general.

As another example of the same difficulty, we may also consider the present need for a precise analysis of the inflationary process whenever advise on economic policy must be given: how and when will each policy measure react on prices? This question, which is no longer second to that concerning the impact on unemployment, was of course already raised in the 'fifties; but econometricians then thought they could answer by pointing to the elementary Phillips Curve, later to become popular and implying a strict inverse relationship between the rate of inflation and the rate of unemployment. The users, in charge of determining the economic policy, did not make it sufficiently clear that this could not be the complete answer. It is now obvious that a dynamic and somewhat detailed formulation was required, in which the instruments of price and income policies would be explicitly represented. The Dutch econometricians were probably the first to realise this.

On the other hand, long lags occur between the moment when a new question is approached and the moment when it is grasped with sufficient precision for worthwhile answers to be given to the demands. Even such a simple statistical operation as a new sample survey intended to measure some social disparities actually requires several years between the time it is first thought of and when its results are available. The lags are still longer when statistics are to be built from administrative records, as we do more and more nowadays. Several years are required to build a good econometric model and make it ready for the analysis of economic policies, a model based on proper time series, with the main blocks fully scrutinised and checked.

These conditions imply that statisticians and econometricians need to detect well in advance what exactly the new demands are going to be. This in turn means that they must be more than pure technicians. Indeed, since statistics and econometrics are not easily learned, the risk exists that their application is left in the hands of people who are very well trained in these skills but not sufficiently sensitive to the environment in which they will be used.

Since teams of statisticians and econometricians should react in advance to the new demands of the societies in which they live, a strong case can be made for an organisation in which such teams are not unduly specialised. Statistical offices that indulge in economic and sociological analysis are less likely than others to miss a reorientation when one is needed. They have a good chance of knowing the changing priorities of public demands, both directly because they themselves are users of their own statistics, and indirectly, because they keep in touch with the broader community of economists and sociologists. Similarly, teams in charge of building and operating econometric models should be placed in research centres or institutes where a broad range of questions is approached, so that the aims and conditions of economic policy are permanently reconsidered.

Moreover, individual statisticians and econometricians themselves should have an educational background which exceeds the narrow confines of their technique. They need not only to be broadminded, because this alone would not give them a deep insight into economic and social realities, but they need also a serious intellectual culture in at least one of the social sciences, so that they have learned to study in depth the corresponding phenomena, they know the scope and, still more, the fundamental difficulties

of these sciences, they are capable of searching thought and their ideas may be in advance of the commonly-held notions of public opinion.

3. *The Search for Objectivity.*

Since we statisticians and econometricians are often called for testimony in circumstances when conflicting views exist, we should permanently aim at objectivity. This is not so easily achieved. For one thing, objectivity is a somewhat elusive concept.

I was particularly pleased to discover that one of my predecessors in these Geary lectures, Professor Alvin Gouldner, discussed this concept at length in the first part of his talk[1]. He was thinking mainly of objectivity in academic sociological research; but much of what he said was intended to apply generally; moreover, the distance between statistics, or even econometrics, and sociological research is not great.

I cannot repeat his full argument and I run obvious risks of quoting a few sentences out of context. But I want to remind you what was the essence of his conception.

He considered "objectivity as a morality of cognition" (p. 7). To be objective, we should not be biased in favour of our own side or against our adversaries; not only should we be "correct", that is we should make statements that are logically and factually correct; but we should also be "true", that is we should present the whole picture, we should affirm the limits of our factual or logical statements. Professor Gouldner shows that this moral aspect of objectivity follows directly from the modern view that sees truth as "a judgement that is collectively constructed and which does not have an unmediated availability, either as subjective "intuition" or as objective "evidence" (p. 2)".

Although, nowadays, it is not fashionable to speak of morality, I think this conception is, indeed, right. I stressed a moment ago that statisticians and econometricians must have a wide culture. I now add that they must also have a strict morality. They should be well educated, in both senses of the term.

Indeed, a wide culture is also a condition for true objectivity. Moral rigour alone might fail to protect statisticians against such

[1] "The Dark Side of the Dialectic: towards a new objectivity". **Seventh Geary Lecture, 1974** (The Economic and Social Research Institute, Dublin, 1975).

unconscious bias as may result from their own preconceptions. A wide culture means not only a good acquaintance with the uses to which statistics will be put, but also an openness of mind and a critical scrutiny of one's own ideas.

To be objective is to strive against a natural inclination of human individuals and groups. "Good news tends to be credited *more* readily—by those to whom it is good news—than bad news because it is dissonance-reducing. Bad news is credited *less* readily —by those for whom it is bad news—because it is dissonance-generating" (p. 4).

Statisticians have many opportunities to face this inclination of their fellow-citizens. Their results are always readily accepted and used by those for whom they are good news; they are questioned and forgotten by those for whom they are bad news. Moreover, the definitions of, for instance, who should be considered as unemployed or of what is meant by the purchasing power of wages are disputed by opposing groups, each one giving its preference to whatever definition will best convey a picture fitting its prejudices.

But econometricians also face similar problems. Their forecasts are accepted by whoever finds them "good" and rejected by others who find them "bad". I shall come back on some consequences of this fact in the second part of my talk.

To achieve objectivity, as much as is possible, statisticians and econometricians know that they must stick to rules that have long been held and are permanently reaffirmed or even made more precise. One of these rules may be mentioned here, namely, that definitions and methodologies should not be revised often; they should not, of course, depend on what the results turn out to be; but they should be very familiar for the users who should not be confused as to the meaning of the results. Hence, whereas statisticians and econometricians should adapt their output to changing demands, they should also strongly resist the frequent requests for revisions that would play no useful long-term purpose; they should themselves be careful to maintain statistical or econometric tools with which the public are well acquainted, while making sure that their significance is not altered by political or administrative circumstances.

II. *How Well are We likely to Succeed?*

Now that I have broadly presented what statisticians and econometricians should try to do, I turn to examine how well they have

so far managed to do it and whether they are likely to make substantial progress in this respect. In this second part it will be necessary to distinguish statistics from econometrics. Hence, I shall consider first the one, then the other.

1. *The Present Obstacles to the Progress of Statistics.*

As I said at the beginning of this talk, official statistics is facing opposition nowadays. I shall distinguish four main causes for this opposition and see what each one of them really implies.

In the first place, the possibility of objectivity in statistics is disputed by some intellectuals who draw a negative conclusion in this respect from the modern developments in the philosophy of sciences. From the recognition that truth is not precisely reality but rather speech about reality, or better "speech-mediated reality" to use Gouldner's clause, these critics conclude unjustifiably that truth is always relative, not only in its fundamental essence but also in its actual expression. They speak as if practically any statement about the facts could be made, as long as these facts are viewed from a convenient angle.

Such a view, which is quite destructive as to the possible role of scientific knowledge in general and statistics in particular, should not disturb us too much because it is so extreme. Public opinion does not hold it and is not likely to really accept it. On the contrary, experience shows that most statistical indices are insensitive to such changes in their definitions as may result from changing preconceptions about their meaning. Even with such a notion as unemployment, for the definition of which a boundary must be drawn within a large spectrum of attitudes to job search, though the actual number of unemployed workers depends on where the boundary is placed, its movement over time is, to a certain extent, independent of that.

Statisticians know that perfect objectivity in measurement and in the presentation of the measures is an ideal never completely achieved. But they also know they can approach much closer to this ideal than their critics claim.

In the second place, and this is a consideration of a different nature, the new demands addressed to statisticians are conceptually difficult to satisfy. The request for a better system of social statistics often assumes too close an analogy with the system of economic statistics. We are asked to define a conceptual framework for social data that reaches the same degree of consistency

and integration as is now achieved for economic data. We are asked to set up social indicators, each one summarising a particular aspect of reality in the same way as is done by an index of industrial production or of consumer prices. We have even been asked, at times, to build one single aggregate that would measure the global performances of a society, the so-called "Net National Welfare" that would replace the purely economic "Gross National Product".

But it is clear that social phenomena do not lend themselves to synthesis and aggregation as conveniently as economic phenomena do[2] and even for the latter it is not so easy. Indeed, the interest in social data often arises from concern about disparities of many different kinds. Without disregarding some old and recent research[3], it is fair to say that we still lack a commonly accepted formula for defining a numerical index of disparities, an index that, once known, would make a detailed examination of these disparities of secondary importance.

Detailed reporting of data will certainly remain of major importance in the field of social statistics. But such reporting may not always reach the final user because his education and familiarity with social phenomena do not enable him to grasp the substance of the somewhat complex reports that are offered. For instance, some phenomena can only be measured from "longitudinal data", also called "panel data", the same units being observed for two or several periods; but reporting the results of such statistical inquiries cannot be done simply, precisely because the phenomena are not simple. Hence, progress in social statistics is somewhat dependent in practice on parallel progress in the education given to the users of data.

In the third place, the new demands addressed to official statistical offices is often quite costly to satisfy. This is true of all requests for micro-data, concerning, for instance, the market of a narrowly-defined product or the incomes of a narrowly-defined profession. It is particularly true of the request for local data. To meet such demands we cannot rely on sample surveys and have to use exhaustive—and hence costly—modes of observation. We also

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[2] In some cases, for instance, for demographic phenomena like natality or mortality, aggregate indicators do exist and we may hope to develop a few new indicators for some other phenomena.

[3] A. B. Atkinson, 1976, **The Economics of Inequality**, Oxford: Clarendon Press. A. Sen, 1977, "Ethical Measurement of Inequality: Some Difficulties", paper read at the IEA roundtable on "Personal Income Distribution".

need to set up appropriate systems of data storage and retrieval, and this again is costly.

These new demands appear at a time of mounting public opposition to the rise of collective costs. The increase of public budgets is more and more difficult to obtain: this applies particularly to statistical offices, which in the 'sixties were accustomed to obtaining large increases in their allocations. We may charge for some of the services provided to the various users: there are good reasons for doing so in a number of cases where, moreover, other means of choosing which demand to satisfy would be quite inefficient. But such charges will only be of marginal significance for covering the costs of the new statistical programmes.

The new demands occur at a time when respondents are also increasingly aware of the burden of public inquiries. Firms in particular claim that answering all public questionnaires involves increased cost for them. Statistical questionnaires, which are not directly related to any administrative operation that would hurt or benefit the firm, are likely to suffer particularly from this situation, i.e., to be left unanswered or to be answered inaccurately. In order to avoid this, statisticians must limit the number and complexity of their questions; they must also visit the firms to explain the usefulness of their inquiries and to study how to reduce the response burden. But this again means new costs to be supported by statistical offices.

Finally, statisticians are facing today still another main obstacle. Public opinion is more and more concerned with confidentiality and with risks to private liberties that may follow from the assembly of individual data files. This puts a new stress on confidentiality and the protection of privacy. In two respects, it makes progress in statistical knowledge more difficult.

On the one hand, the demands for detailed microdata and for local statistics often conflict with strict adherence to confidentiality. All statisticians agree that, when individual persons or families are involved, confidentiality should be given priority. This means that a micro-data base must be set up in such a way that confidential data are not disclosed. This puts a serious constraint on the organisation of the data base and on access to the statistics it may produce. When firms are involved, similar problems must be faced for all data the confidential character of which is commonly recognised. We French statisticians believe[4] that this principle should

[4] I am expressing here our ideas for the future. At present, we operate under laws passed in 1951 and under regulations which are somewhat more restrictive than we think they ought to be.

not preclude us from presenting statistics in which some large or medium firms can be individually identified, as long as the characteristic involved is not considered by public opinion as being confidential (for instance, the number of employees). But again the data base and the published documents must be very carefully organised in order to avoid a possible break of confidentiality.

On the other hand, the public does request that strict rules be followed for the operation of individual data files, so that private liberty may be protected not only against disclosure within normal statistical diffusion but also against misuse of the data files. Laws are passed or are in the process of being passed in all countries, which will impose new constraints on statistical production, particularly when it uses administrative records, as it does more and more. Some difficult problems will have to be faced, for instance when the production of new statistical information will require matching of two or several data files. I shall not say more in this respect here because it would lead us too far away.

Two general conclusions may be drawn from consideration of the difficulties faced now by official statistics in its development. First, this development is likely to look slower during the coming decade than it was during the three preceding ones. Certainly progress is still possible because none of the difficulties mentioned above completely prevents it. We can do a lot to improve social statistics and set up micro-data banks. Our budgets look tight, but they still permit more than the keeping up of current statistical operations launched in the past; investment has always absorbed a large part of our financial resources and, even though its share has decreased, it is still substantial. The need for confidentiality and for special protection against misuse of individual data files make some statistical operations more difficult but do not forbid them. However, whereas the progress was very rapid in the decades following the last war, particularly so in a country like France, which was lagging as far as its statistical system was concerned, the development of statistics will now look definitely less rapid.

Second, official statisticians have to become experts in techniques unfamiliar to them twenty years ago: the building up of statistical systems requires something more than a good knowledge of mathematical statistics and an educational background in economics, demography or sociology. Statisticians must also be system analysts. I know that the name of system analysis is now used too

much as if it was a really new technique and as if it could solve some problems against which economists have struggled with only limited success. I should not like to be associated with such unwarranted claims. When I say that statisticians have to become system analysts, I mean that they have to be acquainted with the theoretical and applied work on programming complex situations in which random events occur, and in which the succession and interplay of operations must be carefully designed.

2. *Econometrics and Public Decision Making.*

When we turn to applied econometrics, we see that, although its performance remains modest, it can be used much in public decision making. But econometricians must carefully avoid making their models appear as black boxes.

After more than thirty years of experience, the application of econometrics to the study of economic policy does not confirm the hopes placed on it by some of its early proponents. This was probably to be expected considering how complex economic phenomena are and how limited the analytical and factual knowledge was about them.

To evaluate the actual performances of applied econometrics is not easy because the range of applications is so broad, from the study of very specific measures intended to act on a particular market to the study of the most global demand management policy[5]. To have a full idea of the applications of econometrics we should, in particular, look at its contributions to the location of economic activities, to the policies with respect to labour relations, to fiscal reform, to the study of new social security measures, to agricultural policy and so on. But it is convenient and probably fair in this evaluation to limit attention to the performances of short-term macroeconomic models, since so many of them were built, published and scrutinised.

When referring to the papers reporting the accuracy of the forecasts made with these models we must keep in mind that model-builders had to use whatever knowledge they had at the time and whatever statistics were available. The progress of economic theory and of statistical investigations made improvements in the

[5] The present situation appears in the proceedings of a roundtable held by the International Economic Association. See R. Stone and A. Deaton (eds.), 1978, **Econometric contributions to economic policy**, London, Macmillan.

models possible, each time a new one was built. But scientific assessments of the forecasts often concern rather old models, on which many experiments were made through the years.

Whatever weight should be given to this remark, we may conclude today that forecasts based on macroeconomic models, if better than "naive forecasts" extrapolating series independently of one another, do not reach a high level of accuracy. In the period from 1950 to 1973, during which business conditions did not experience strong changes, the models did not overwhelmingly dominate naive forecasts[6].

Such a conclusion, unpleasant as it is, does not, however, detract from the usefulness of models. I shall not even rely on the argument that models have done much better than naive forecasts during the past four years, as I think it is true to say, although I do not yet have formal proof of this statement. I shall rather point out that econometrics is the vehicle of objectivity in the art of economic forecasting and the shaping of economic policy.

The alternative, which we call in France *analyse discrétionnaire*, runs the risk of hearing only "good news", those that make the policymakers intended actions look attractive. I feel rather sure about the existence of such biases, since I had occasion to observe it several times when I was advising the Minister of Economy and Finance in my country. For instance, the need for some direct wage restraint within any successful anti-inflationary programme was long discarded, because it was thought to be politically unfeasible; undue reliance was then placed on forecasts that did not take proper account of existing econometric equations explaining increases in wages and prices. In late spring of 1974, whereas models were well forecasting the depressive impact of the increase in oil prices, preference was given to *discrétionnaire* forecasts that did not believe in it: at that time the Minister wanted to enact a deflationary fiscal and monetary policy intended to curb inflation.

Forecasting economic conditions, advising about policy measures and deciding them, result in a kind of team work, which cannot operate properly unless roles are correctly identified and their interplay obeys strict rules. The introduction of econometric methodology into the forecasting and advisory work means a definite

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[6] The following reference may be proposed as among many similar ones for substantiating this conclusion: Y. Haitovsky, G. Trezy and V. Su, **Forecasts with Quarterly Macroecomic Models,** National Bureau of Economic Research, New York, 1974.

advance toward a better preparation of public decisions. Forecasters and advisers should never be motivated by the wish to please deciders; they should always look for pure objectivity.

Their role also requires that they do not oversell the accuracy of their knowledge. They should be able to explain in simple words the results of their econometric investigations and they should say what degree of confidence should be placed in these results. This means that econometric models should not be black boxes whose inner working is not revealed to the users. On the contrary, every effort should be made to help the policy makers to understand what kind of representation of economic phenomena is being used and why this representation is the appropriate one.

This conception on the role of econometrics should be kept in mind when one decides on the type of model to be used. It is interesting in this respect to keep in mind the position taken by our Norwegian colleagues[7]. They argue as follows: because they are designed for use in the public domain econometric models should contain only robust equations, i.e., equations that have been well tested, whose significance can be demonstrated and whose meaning can be explained in words.

I should not go that far. It seems to me that the Norwegian position would prevent us from taking advantage of recent advances in knowledge that are not yet universally accepted but about which model builders may feel fairly confident.

I do not take sides strongly either in the debate between those who favour very large and detailed models and those who argue for small ones. On the one hand, the gain resulting up to now from a detailed representation was negligible most of the time. On the other hand, small models have to take drastic shortcuts about which everyone feels uneasy, realising that such shortcuts will be misleading in some circumstances. If medium-size models can be handled with the same flexibility as small ones, they will be increasingly preferred because even a simple-minded representation of our knowledge requires more than a small number of equations.

Since econometrics will be used more frequently as a tool for public decision-making, we should pay particular attention to the new developments in the theory of economic policy, i.e., in the theory dealing with the optimal choice of the values to be given to the instruments of this policy. If this choice appears less trivial

[7] See the paper by O. Aukrust in R. Stone and A. Deaton (eds.).—op. cit.

than may have been thought at first, it is because time and uncertainty play a large role: economic relations involve distributed lags and the environment will have changed by the time policy measures make their impact.

More and more one realises that, for instance, the old opposition between those relying on monetary policy and those advocating fiscal policy will be clarified definitely when two prerequisites have been met. On the one hand, we ought to reach a better accuracy in our estimates of not only the various multipliers but also the distributed lags after which they occur. On the other hand, we should discuss very precisely a subject that was far too much neglected during the past decades, namely, the relative priorities to be given to short-term and to medium-term objectives: this will lead us to consider the medium-term consequences of short-term policy measures. To take just one important example, the monetarist claims of Milton Friedman rely on two propositions: (i) monetary multipliers are stronger than fiscal multipliers, (ii) in the present state of economic knowledge economic policy will err unless it gives a strong priority to medium and long-term objectives. Both of these propositions need a lot of very serious theoretical and econometric investigations. In particular I think that macroeconomic theory ought now to study very carefully the medium-term course of the economic evolution resulting from a sequence of short-term temporary equilibria and this under various hypotheses concerning the strategy adopted for economic policy.

As a methodological framework for applied research along such lines, we now have at our disposal a theory of optimal control that takes into account the sizes and lags of the relevant multipliers as well as the uncertainty surrounding both the future environment and our knowledge of economic phenomena. This theory, presented in particular by G. Chow[8], has now more of a pedagogical interest than a direct usefulness for applied econometricians. But I am sure it will progressively become more operational as new theoretical and econometric results are reached. Thus a whole range of questions and problems await for the econometricians attention.

During this talk I discussed the role of statisticians and econometricians in our nations. If a general conclusion must be drawn,

[8] G. Chow, 1975. **Analysis and Control of Dynamic Economic Systems**, New York: John Wiley.

we may say that statisticians and econometricians are in a position to play their part but that, in order to play it well, they must not only rely on their technique but also be acutely aware of the concerns of their fellow-citizens.

But my talk missed an important aspect of the question. From now on, the most difficult problems facing human societies will probably be international. Let us hope that statisticians and econometricians will also pay great attention to the objective study of economic, social and political issues at the international level and so make still another important contribution to human development.

Here again let us follow the lead of Roy Geary who devoted so much effort within international scientific or governmental institutions.