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ASSESSING THE CONTRIBUTION OF THE REGION TO THE GROSS NATIONAL PRODUCT

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Introduction

THE need for an analysis of regional economy has been more and more distinctly felt during the past few years. Studies of national economies were at first intended to examine the relationships between the different sectors of the economy of a whole country. The tendency now is to study also the relationships between regions, and this requires the drawing up of detailed regional economic statistics. But the object of economic research is not merely to study existing situations, even in depth. It is also, increasingly, to determine one or several optimum situations, with reference to the objectives of economic policy, for the information of those responsible for the decisions. Certain studies set out to determine the optimum for a region, considered in isolation. Others, more and more numerous, integrate the region in an inter-regional model. This is above all true of the studies of inter-regional agricultural planning which have been developing rapidly for a number of years in several countries.

According to the object of the economic study the emphasis is placed especially upon the description of the present state of the region, or upon that of its potentialities. But in either case, an increasingly intimate knowledge of the regional economies seems necessary.

I. Researches required at Regional Level

We shall not here embark upon the first problem to present itself, that of the definition of the region. Let us recall, simply, that according to the object of the regional economic analysis, it will be necessary to consider various conceptions of the region: economic, administrative or natural regions, large or small regions, homogeneous regions (for agricultural studies) or regions with complex economies, &c.

Regional economic analyses may be classified in three main groups: appreciations of the current situations, studies of evolutionary

tendencies and, finally, the evaluation of the potentialities of the regions and their possibilities for development.

With reference to the appreciation of a current situation, the first objective may be the calculation of a certain number of general data: the gross and net production of the region, the average income per head, the average income per working member of the population. But the necessity of providing more detailed information on the income structure will soon be felt—the need to differentiate among the kinds and the scales of incomes.

The calculation of these generalities already requires the collection of a considerable quantity of data. But much more is necessary if it is desired to establish a picture of input and output, showing the relationships existing between the different sectors of the region, and with the rest of the country.

The appreciation of evolutionary tendencies must usually be confined to a certain number of general facts. It would, however, be very useful to be able to measure the evolution of the technical coefficients of the table of input and output. This would be a most useful instrument to assist us in foreseeing the future.

But it is the evaluation of the region's potentialities which poses the most difficult problems. Methods may be suggested for making such evaluations in the field of agriculture. Matters are often more delicate, and the scope for arbitrary selection greater, in the case of other activities.

II. *Problems raised by the Appreciation of Current Situations and Evolution*

I. *Agricultural statistics*

To demonstrate the difficulties of regional economic analysis, let us first take the example of agriculture.

The drawing up of regional agricultural accounts is very much more difficult and presents many more problems than the establishment of national accounts.

The first problem is that of the accuracy of the statistics. The margin of error in statistical evaluations varies inversely with the size of the geographical unit under consideration. Errors are largely compensated on the national scale, since they are not all on the same side. If the production of a crop is known with a margin of error of 5 per cent. in a country as a whole, it is not impossible for the error to amount to 50 per cent. in certain regions of the country—and even much more, in the case of extremely small geographical units.

The fact is that corrections are possible on the national scale, by means of various cross-checks, while no correction of this kind is possible on a regional scale. We shall quote, in this context, the example of the production of beef in France. The sum of all departmental estimates was, a few years ago, 30 per cent. less than the national total. The latter is calculated with the aid of the statistics provided by slaughterhouses, corrected to take into account a certain percentage of fraud, this last having been estimated a few years ago by means of a cross-check with the figures for the collection of hides.

Most of the departmental estimates of meat production were, therefore, very much below the real figures (the situation has since changed slightly). But how can we know what the real meat production of a department is, if we consider the national estimate to be fairly nearly accurate? It is clearly not possible to increase all departmental estimates in the same proportion, as this might in some cases lead to figures very far from reality. If, on average, the department estimates represent 70 per cent. of the true production, it is permissible to think that the proportion varies from 30 per cent. to perhaps over 100 per cent. in different departments. Only a very close study of the methods used in each department to estimate meat production can make corrections possible, and this will yet leave considerable scope for arbitrary corrections.

Now, in many French departments, meat is the principal agricultural product. What, then, are the agricultural accounts of such departments worth?

On the other hand, the setting up of regional agricultural budgets requires the knowledge of data which it is possible to ignore in the establishment of national figures. We may take the example of hay. Only small quantities of this product are traded in, and exchanged between one region and another. In the establishment of national agricultural accounts we need only enter, on the debit side, the cost of trade in hay (that is, the difference between the sums paid by the buyers of hay and the sums received by the sellers). But the total cost of the trade in hay is so small, in relation to the costs of agriculture and even in relation to the error on these costs, that it may be neglected. It is a different matter in the case of a department, and, *a fortiori*, in that of a smaller region. Certain regions of France do in fact export fodder and the income derived from the sale of this fodder represents an appreciable part of the agricultural production of the region. This is true of the irrigated part of the Crau, which sells fodder to the neighbouring areas. In this case the cost of trading in hay is no

longer the only question to be considered. The total value of the fodder sold needs to be taken into account.

But it is also possible for purchases of hay to represent an appreciable part of the spending of the importing region. It is necessary, then, to know how much hay this region buys, and at what price (this price being obviously higher than the sale price in the region which produces it).

While the evaluation on the national scale of the quantities of hay exchanged and the prices of the product is perfectly dispensable, it may be necessary, in many regions, to know what quantities are bought and sold, together with the sale and purchase prices.

In other cases, it is necessary to make estimates on the national scale, but these may be fairly general; while very much more detailed information is required at the regional level. The most striking example is perhaps that of inter-regional exchanges of animals. The exchanges are extremely complex. One region may breed the beasts, selling them very young to a second region where they are reared; this region itself sells the young beasts to a third, where they are fattened for meat. In other cases it is the draught animals which follow this course. The adult animals also may be exchanged between regions during their useful life: a farmer will buy a cow from a distant area.

This case is very different from that of the sale of hay. These exchanges amount to so much that the total cost of the trade in beasts may not be neglected in the national agricultural statistics. But it is possible to make do with a rather rough estimate of this cost. It will first be necessary to evaluate, in general, the number of animals exchanged, then to construct a hypothesis on the margin of profit. The margin of error on such an estimate will undoubtedly be high. But, in terms of absolute value, the error will be very small relative to the total of agricultural costs.

On the regional level it is a very different matter. It is indispensable to know the quantities of the different categories of animals sold to other regions and their respective prices, as well as the numbers and prices of animals bought. Such exchanges, in fact, frequently represent an important part of the income or expenses of a region.

The evaluation of such detailed data is necessary not only for drawing up the budget of the region, but also in order to make the total of regional accounts tally with the national accounts. If the production figures of the different regions are indiscriminately added together, the result will necessarily be larger than the total production of the entire country. But if from the agricultural production of each region

we deduct the intermediary agricultural stock bought from outside, the total will equal the production of the country in general. The same problem is also raised in the estimation of world agricultural production, on the basis of national production figures.

Therefore, the drawing up of the agricultural accounts of a region requires the collection of extremely detailed data. It is indispensable to evaluate the whole production of the region, while distinguishing the proportion which is traded outside the region. It is also necessary to evaluate separately the purchases of manufactured goods from non-agricultural enterprises within the region and the purchases of such goods—agricultural or not—originating from other regions or countries. It would even be necessary, for perfect accuracy, to estimate the cost of the trade in intermediary agricultural stock exchanged within the region.

Evidently there are very few countries or regions possessing sufficiently abundant and accurate documentation for their agricultural accounts to be able to be drawn up in this way. In general, the smaller the basic unit, the less detailed the statistics. Certain information can indeed only be at the disposal of large regional units. It is therefore necessary in the majority of cases to make do with less carefully sifted and, above all, very unreliable data. Often the producers of regional accounts make use of the statistics available without attempting to correct them. Indeed, correction is generally not possible until cross-checks have been made on the national scale. To take the example given above, a man drawing up a regional agricultural budget without knowing the difference at the national level between the two estimates of beef production might be tempted simply to use the statistics existing in the region under consideration.

It follows that the only way of achieving coherent results is not to limit ourselves to drawing up accounts for regions in isolation, but to proceed to the establishment of accounts for the sum of the regions of a country.

2. *Economic activities considered as a whole*

We have just seen what difficulties are presented by the drawing up of accounts for agriculture alone, at the regional level. But the difficulties are very much greater when we consider economic activity as a whole.

First there is the problem of definition and localization of economic agents. Households can certainly be localized, but how are we to know where their occupations are carried on? They do not all take place within the region.

This problem is yet much less important than that of firms with many branches, whether industrial or commercial. When the branches are situated in different regions, it is necessary to establish separate accounts for each one. Now, the statistical results are not generally available except to the firm itself. It is necessary, then, to be able to consult the accountants of the firms to obtain the results of each branch.

It is also sometimes the case that one branch of a firm makes only intermediary goods, without market value, destined for processing in other branches of the same firm. What is to be done in this case?

If all the necessary data can be obtained the drawing up of accounts is indeed possible; but their presentation is very complicated. As with agriculture, we are forced to take into consideration intermediary productions and consumptions which do not have to be considered on the national scale.

A further difficulty derives from the fact that financial operations are carried on by the central offices of a firm with several branches. A real hiatus exists between the accounts of production and operation on the one hand, and the accounts of distribution of capital on the other.

It goes without saying that all the difficulties which we have mentioned are greater in proportion to the smallness of the region whose accounts it is sought to establish.

The case is the same with regard to certain agents of special kinds, for example those who provide communication between regions (transport, telephone). The assignment of operations to such-and-such a region is often impossible. Another agent of a special type is the central office of a firm, which 'produces' its administrative services.

Finally, industrial production is often concentrated in large establishments. This can present a considerable advantage for our knowledge of certain productions. But if the number of firms in a certain activity becomes too small, we come up against professional secrecy. If in a department of France there is only one textile firm, publishing detailed data on the characteristics of the textile industry in that department amounts to giving the results of that one firm, which is violating professional secrecy. Now, for varying reasons many industrial firms are opposed to the publication of all their economic results.

Let us recall again the problem of estimating prices. When goods circulate among several regions, it would be necessary to be able to pinpoint their prices at the various stages of the commercial circuit.

3. *Is it possible to draw up the input-output table of a region?*

We have given only a certain number of examples of the difficulties presented by the establishment of detailed regional accounts. We have not mentioned all the problems. But we have said enough to demonstrate the near-impossibility of making up a table of inputs and outputs by current methods. To put it simply, we may say that it is necessary to know all that a firm buys and sells, and also to whom it sells and from whom it buys.

Since the statistical data normally available do not provide an answer to such questions, we have to consider the collection of the necessary elements by specific means. One possible method is that of drawing up a detailed questionnaire and submitting it to a number of firms. But since it is necessary to obtain results at regional level, the problem is not at all the same as that of a sample intended only to provide the national average. The study has to be conducted on a large sample if we wish it to provide usable results. In any case, the estimation of the exchanges between a region and the outside world will remain uncertain. A cross-check is possible on the national scale, through the addition of all the exports and imports of the regions. It is still necessary, for such a check to be possible, for the regional accounts to have been drawn up for the totality of regions of the country.

4. *Evolutionary studies*

It is unnecessary to recall here all the problems raised by the analysis of economic evolution. The principal ones are undoubtedly the continuity and comparability of the statistical series. This observation is valid for the region and for the country as a whole, but it is certainly even more applicable to the region. The more uncertain the statistical data, the less comparable they are. Only in exceptional cases is it possible for inaccurate statistics to be strictly comparable over a period of time. Now, as we said earlier, all regional statistics are affected by a greater margin of error than their corresponding national statistics.

Again, certain data, which are known annually on the national scale, are available on a regional scale very much less frequently. This is notably true of an essential item of information: the population. In many countries immigration and emigration are sufficiently well known or sufficiently small for the population to be precisely estimated every year between censuses. But, in the same countries, inter-regional migrations may be both large and poorly measured.

The population of a region cannot then be known precisely except at the time of a general census.

5. *Attempts at drawing up regional economic accounts*

The difficulties we have shown do not, evidently, mean that we must abandon the drawing up of regional economic accounts. The best proof is that numerous studies have already been carried out in this field, in many countries. We shall recall only, as examples, the work of Isard and of Leontief in the United States, of Stone in the United Kingdom, the studies carried out in the Netherlands, the U.S.S.R., &c.

In France, the National Institute of Statistics and Economic Studies is carrying on its work in two directions. A first study consists in establishing the accounts of the twenty-one large regions on the basis of the national accounts, applying certain criteria of distribution. This method is at present the only means of obtaining regional accounts to cover the whole country. At the same time pilot studies are being made, in various regions, to draw up tables of regional accounts and inter-industrial exchanges. Other organizations have also been drawing up regional accounts, generally within the frame of the department.

These different researches may be classified into three categories. Some seek the establishment of complete regional accounts, including the table of inter-industrial exchanges. Other studies confine themselves to accounts of agents. Finally, certain partial studies have the object of showing the regional aspects of a single economic activity.

But what must above all be pointed out is the great diversity of concepts and methods in different countries. In each case an adaptation to the special conditions of the country is to be observed. Thus, in France, the regional accounts adopt the framework of the national accountancy, itself adapted to an economic system based on indicative planning. The result of this diversity is that, for the present, these researches are being carried on separately in many countries, with few points of contact. One day it will undoubtedly be necessary to have a general comparison of concepts, definitions, nomenclatures and methods.

III. *The Determination of the 'Potentialities' of the Regions, and Inter-regional Models*

1. *The problem*

The analysis of a region's contribution to national production and even the drawing up of its detailed economic accounts and the study of the evolution of these accounts over a period of time would not be

sufficient. More and more, governments intervene in the economic development of their countries and make out plans of action. The tendency now is not to stop any longer at national programmes alone, but to proceed to the establishment of regional programmes. It is, then, no longer merely a matter of saying what happens in a region, or what the relations are between the different sectors of its economic activity. Nor is it simply a matter of foreseeing what the 'natural' evolution of the region will be. We will have to define the possibilities of the region, in order to determine what can be done there, taking into account the national programme and the possibilities of other regions of the country. If we refer to the title of this article we may say that, besides the *present* contribution of the region to national production, we need to know the *possible* or *desirable* contribution of the region to that production.

We shall confine ourselves, in the following pages, to showing how the problem may be formulated and resolved in the case of agriculture.

2. *The example of agriculture*

It is not enough to draw up a plan or programme for regional development, to study the potentialities of the region under consideration. For if we add together unco-ordinated regional programmes, the total runs a strong risk of being incompatible with the national programme. To define what can be done in a region it is necessary to take into account not only the possibilities of the region, but also the national programme and the possibilities of other areas. It is easily shown that it is necessary to integrate into a single economic model the totality of the regions and of the products, as well as the national objectives. Thus we generally arrive at a linear programme. Here is the simplest that can be imagined.

Let us suppose that the object is to distribute among the regions of a country the national targets for agricultural production, keeping the total production costs to a minimum. Let x_{ij} be the surface of the region i given over to the cultivation of the product j , r_{ij} the yield per hectare, and c_{ij} the production cost per hectare, respectively; we may state :

$$\text{Minimum of } \sum_i \sum_j c_{ij} x_{ij}$$

$$\text{with } \sum_i r_{ij} x_{ij} \geq Q_j \quad (j = 1, 2, \dots, n)$$

$$\sum_j x_{ij} \leq S_i \quad (i = 1, 2, \dots, m).$$

In these inequalities, Q_j is the quantity of the product j to be produced, S_i is the cultivable surface of the region i .

It goes without saying that such a programme is much too schematic to be able to give realistic results. Many other factors would need to be taken into account, expressed in the form of limitations: necessities of the rotation of crops, limitation of quantities of certain production factors, &c. It would also be necessary to consider the production targets as functions of the prices of the products.

However, this very simplified scheme already gives an idea of the importance of the problem of the collection of data. If a country is divided into a hundred regions and we have to consider twenty products, it is necessary to collect 2,000 estimates of yield, and as many estimates of production costs. But before beginning the collection of data, it is indispensable to define precisely the nature of the information to be collected: what yields and what costs must be taken into consideration—in other words, what, precisely, is to be understood by potentialities?

We have ourselves proposed another model for the study of the problem of inter-regional programming, which allows us to avoid the formulation and resolution of a vast linear programme. But the nature of the data to be collected is exactly the same as in the case of the linear programme. And, in both types of model, it is evidently necessary to begin by defining the idea of potentiality.

It is clear that the method which consists in determining a single possibility for a region (the production system desirable, for the present level of active population, or for an effective force of active population arbitrarily defined) is without value. A choice must be left between several possibilities, notably in what concerns the active population. This is, moreover, the case in any economic model, which consists in making a choice among an infinite number of possible solutions.

But what are the possibilities we seek to define? The first extreme hypothesis is that of assuming that nothing opposes the achievement of the best economic results. It is then necessary to evaluate, for each speculation, the norms corresponding to the best techniques known, or the best techniques foreseeable at the date for which the study is made. We have to assume that all the farmers of a region are capable not only of applying the best techniques, but also of determining and applying the best production systems which will give them the largest incomes. It is even normal to go still further and to assume that all agricultural units are of the ideal size. The result obtained by such an inter-regional analysis would evidently be unrealistic. But it can give an idea of what the optimum would be, without any limitation other than the surface areas available.

The other extreme hypothesis takes fully into account all the conditions which exist in reality. It will then be necessary to construct hypotheses on the structure of the agricultural units and the techniques applied in each type of unit and to determine the factors in the behaviour of the farmers—for the latter do not necessarily have the acquisition of a maximum income as their objective. If we wish to take into account all aspects of reality, we must also foresee the size of the active agricultural population. All these conditions being stated, it will be possible to calculate the production of the region. But by this procedure we shall simply have made a forecast—not a planning study. If we ask what may be done in a region, it is because we admit that there may be variation. It is possible, for example, to adopt all the foregoing limitations, while assuming that only the working population is a variable. The matter is then one of determining the production and working population targets for each region, taking into account foreseeable techniques and factors controlling the behaviour of the farmers.

Between the extremes cited above we may imagine an infinite number of conceptions of the potentialities of agriculture. We may consider, for example, that the techniques are susceptible of improvement, that the farmer's behaviour corresponds to the search for an economic optimum, but that the evolution of the structure of agricultural units obeys well-defined laws. But whatever hypothesis is taken as a point of departure, it is essential to define it clearly.

Another considerable problem is that of division into regions. A compromise must be reached between two contradictory requirements. On the one hand the basic regions must be sufficiently homogeneous for the data relating them to have some meaning; on the other the regions must be fairly large, so that their number is not too great.

What must also be emphasized is the need to collect a considerable quantity of data in each region. Thus, we may be led to distinguish in one region four or five types of agricultural unit, defined by their size. In each of these types we must determine all possible production systems, and, for each production system, define the characteristics of each hypothesis (yield and production costs). For the yield and production costs of wheat, for example, are not the same in a unit of 10 hectares and one of 100 hectares. In the same unit, the wheat yield varies according to the place this crop occupies in one or other system of crop rotation, wheat following sugarbeet does not give the same yield as wheat following maize. There are, besides, for each hypothesis, more or less intensive production techniques. Wheat

may be cultivated at a yield of 20 quintals per hectare or of 40 quintals per hectare—without it being possible to decide in advance which of these two techniques is preferable.

It is then necessary to collect a vast mass of documentation in each basic region; and if we give several definitions of the potentialities, we have to collect this quantity of information for each of these conceptions (for example, what the effective wheat yield will be in 1970, and what it would be if the farmers were in a position to apply the best techniques).

Our knowledge of the present state of a region may be considered sufficiently good if we have at our disposal a certain number of analytic and synthetic data. But if we are interested in the potentialities of a region, with the object of laying down a programme of action, a mass of data of a totally different significance will have to be collected.

We shall not in all cases be able to collect *all* the desirable information. The study must therefore be conceived in the light of the data which it will be possible to gather with a fair degree of approximation. The volume of the study and the complexity of the mathematical models must be in direct *rappor*t with the quantity and quality of the basic data available.

In practice, whatever the definition of the potentialities of a region, it is generally not possible to do anything but calculate a certain economic optimum, on the unrealistic hypothesis that all farmers apply the production system which provides them with the maximum income. In other terms, we make a realistic hypothesis with regard to the techniques practised for the different speculations, and an unrealistic hypothesis with regard to the choice made among these possibilities by the farmer. The results of the first economic analysis will therefore have to be corrected, to take a large number of factors into account.

The first question is the following: knowing that the farmer should carry out such a scheme, if he sought to maximize his income, for a given technical level, can we deduce from this what he will in fact do? Then we must take into account all the other factors which have not been considered in the model used. In particular, it is necessary to estimate the costs arising from the change of activities in a region. These changes must also be studied with reference to the relationship between agriculture and the other sectors of the economy. It is only at this point that we can offer those responsible for the political decisions a coherent programme which is sufficiently realistic.

And still we have spoken, here, only of agriculture. But a true

solution can only be found through an inter-regional model incorporating agriculture and the other sectors of economic activity. It will at least be necessary in the first place to add to the agricultural sector of economic activity certain branches supplying or supplied by it (food industries especially).

Thus, if the evaluation of the present contribution of a region to national production is a difficult task, that of the *desirable* contribution of this region to national production represents a task on quite another plane of complexity and difficulty.

IV. *Utilization of Regional Accounts for the Working Out of Regional Development Policies*

The analysis of a detailed regional account may allow us to point out the weak points of a region and, consequently, help us to find solutions which will accelerate its economic development. But in general numerical data do not show their full significance unless compared with other data. The results relating to a region cannot therefore be interpreted except by comparison with the national averages. Such an analysis is still inadequate. Descriptive regional accounts cannot really be made use of for the formulation of policy unless they make up a whole covering the entire country. If detailed accounts are available for each of the regions in a country, with tables of inter-industry exchanges, showing also the exchanges between each region and the rest of the territory, we have a tool of prime importance for the analysis of the functioning of that country's economy. Comparisons in depth of the regional accounts can give us an idea of the steps to be taken to realize certain objectives of economic policy.

But the description of conditions existing in the regions of a country can constitute only a first phase of the economic analysis, from which we can derive only general indications with regard to the steps to be taken. To obtain all the elements for a decision, we are driven to formulate and resolve an inter-regional model taking into account the potentialities of each region, and not only the present facts. The more limiting factors integrated into this inter-regional model, expressing economic, sociological and political limitations, the more applicable will be the results derived from it. Thus, to settle at the beginning upon a minimum figure for the active agricultural population of certain regions will certainly lead to a result more susceptible of application than if we had not assumed any limitation with regard to this population.

But the more elements introduced into the problem the more

complex it becomes. A linear inter-regional and multi-sectional programme, in which all the limiting factors were represented, would certainly be insoluble. Moreover, if we carry the argument to its reasonable conclusion, we reach the position that an economic model should comprehend the sum total of economic activities in all the regions of the world.

It is necessary then to confine ourselves to formulating more simplified models, limited to one country divided into regions, to a single branch of the economy—agriculture, for example—and taking into consideration only economic limitations. Such models can provide extremely useful results for the working out of policies, but on condition that these results are properly interpreted.

Let us consider as an example the case of a model of this type limited to agriculture. When once the solution has been reached, we must remember that it represents only an economic objective. Those responsible for the decisions then have to modify the solution, taking into account all the non-economic limitations which have not been incorporated in the model. They must also take into consideration the relationships between agriculture and the other sectors of the economy—that is to say, they must ensure that the solutions adopted do not lead to aberrations from this point of view.

But if one is well aware of these difficulties, and is in a position to be able to interpret the results correctly, studies of this type may be extremely useful for the working out of concrete and applicable regional policies.

To make use of the models of which we have been speaking is to draw upon a methodology which does not have recourse to the regional accounts. However, it is also possible to consider the elaboration of regional programmes on a basis of the data of the economic accounts—permitting a check on the coherence of the proposed action. The advantage is that we are then reasoning directly within a multi-sectional framework, which throws into relief all the interaction between factors on the regional level. It will surely be interesting, in the future, to compare the results of researches carried out on the two lines we have mentioned.

Conclusion

Important progress has been made during the last few years in the realm of regional economic analysis. But there is still a vast field of study open, with years of work to be done. Analysis of the present situation of regional economies must be perfected, with particular emphasis on evaluating the exchanges between sectors within the

region and the exchanges between the region and the outside world. But, more and more, we shall feel the need not to limit ourselves to the knowledge of an existing situation. We shall seek to put forward development programmes for the regions, programmes which will have to take into consideration the regional potentialities, within an inter-regional model. To formulate these programmes it will be necessary to have available much more detailed information than that needed for the analysis of the present situation. We shall be driven, at the same time, to develop mathematical schemes of a more and more complex variety.

In the face of the size of the task to be carried out, it seems eminently desirable that there should be increasingly frequent contact between researchers in different countries. The first stage is that of the exchange of information. It will undoubtedly be necessary to go further, to the point of carrying out a true co-ordination of research. This will avoid prejudicial duplication of work.

But it is not solely a matter of ensuring contact between the economists of different countries. Contacts must also be built up between economists and sociologists. We cannot, in fact, resign ourselves to merely proposing solutions based on purely economic calculations. Certain important non-economic factors can be integrated into the models or taken into consideration to modify the final solution. But we must go still further. The final purpose of studies bearing on regional economic analysis is to provide results which will be *utilizable* and effectively *utilized* for the working out of regional policies. This implies that liaison must also be ensured between the researchers and those responsible for the political decisions. If progress is made in this direction, we may be certain that regional economic studies will play an increasing part in economic research.

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Dr. Klatzmann has given us an excellent exposition of the requirements and difficulties involved in assessing not only the actual contribution, but also the potential contribution of a region to the gross national product. To assess the existing situation in a multi-sectional input-output model of even one region is no easy task. Most of the available statistics are not on a regional basis, but it is possible to make up for this by a subdividing national statistics, or by special inquiries. Additional statistics are required which are not needed in national accounts, because the movement of products between regions cancel each other out. The reliability of the data is all important.

All these problems are mainly of a statistical nature. They entail a great amount of extra work, but what can be done for a nation as a whole is also possible for a region. If the same is done for all regions of a country, an inter-regional multi-sectional input-output model will emerge. This certainly provides more detailed information than a national input-output model. Constructed for several periods, the input-output models give, by comparison, a picture of the trends of evolution in the past, though it is never more than an historical description. What is really needed beyond that—says Dr. Klatzmann—are estimates of the potentialities of agriculture in a particular region and also of the other sectors in that region, both in the framework of the potentialities of agriculture and of the other sectors in the other regions of the national economy, let alone in the international economy.

This is quite a programme! May be the well known universal intellect defined by the famous French astronomer La Place, would be needed. Dr. Klatzmann himself is convinced that such a complex programme would certainly be insoluble. He sets his sights high, but is at the same time a practical person. He proposes, therefore, that we confine ourselves to more simplified models, but still on an inter-regional base. I should like to follow him in limiting attention to the essential elements, but to go a little further than he suggests. I am aware that he was asked to write a paper about the problems of regional policy, and I understand, therefore, why he is rather brief and general about the objectives. It may allow us, he says, to point out the weak points of a region and consequently help us to find solutions which will accelerate its economic development. Nevertheless, overwhelmed by the difficulties and complexities of a multi-sectional inter-regional input-output model, taking into account the potentialities of each sector and region, although it may not be fair, I should like to ask if such an approach is really necessary as a basis for a regional economic policy.

I can understand that in a centralized planned economy something of this kind would be desirable, although I do not know if it is practised already in the manner Dr. Klatzmann has indicated. But I am not convinced that all this is necessary in the decentralized economics of the countries of the Western hemisphere. The economic policy of these countries can be characterized by the process of influencing strategic factors in the economy to create favourable conditions for economic development through free enterprise. State intervention may be added in special fields. Within this concept of economic policy, it is necessary to know only about the strategic

factors. There is more. An essential part of the science of economics has to do with minimizing costs for a given output. If we may assume that the work of economists is part and parcel of the production process, it is obvious that they themselves should apply the principle of minimizing costs, given certain objectives for their analysis. But it may be that it is not only on farms that one finds disguised unemployment. I have sometimes the impression that there may be also an over-supply of research capacity. I quite agree with Dr. Klatzmann that it is essential to indicate weak points. But what are they?

For an analysis of a regional economy, I think it is justifiable to take the framework of the national economy as the practical limitation of the problem. How the national economy fits into the international economy is certainly an important problem, but it is a problem on a different level. To take the framework of the national economy as a starting-point has the great advantage of working within an almost uniform national price structure, and without artificial hindrances to the movement of labour, capital, and products. If there existed an economic equilibrium throughout the national economy, in all sectors and regions, there would be full employment throughout and equal real rewards to the same kind of labour. I am aware that more conditions should be fulfilled, such as the absence of monopolies and the equation of marginal returns to marginal costs. But these conditions cannot easily be checked and are, moreover, part of the price structure and the concern of the enterprises themselves. For a regional policy, therefore, accurate information about the employment situation or, better, the magnitude of unemployment and the earnings of all kinds of labour seems to me essential.

For agriculture, there is also the problem of under-employment of the members of the family which shows itself in the family earnings *per caput*, but also can be assessed by comparison of groups of farms. Of course, detailed data, based on accurate book-keeping for several years from a large number of farms, are a great help. But, as the practical work executed by the Agricultural Economics Research Institute in Holland shows, a lot can be done with more simple, easily gathered, data on a much larger scale. The amount of work to be performed on individual farms can be measured crudely by the number of hectares of different crops and the numbers of different kinds of animals. The amount of labour available can also be assessed on each farm. In this way, the number of average work units per man, in different size groups of farms, and in the same size group

in different regions with similar patterns of agriculture, can be calculated. This gives a quite realistic picture of the existing under-employment, and even of the gains from labour saving by enlarging and mechanizing farms. In this way, an accurate enough estimate for practical policy can be made of the real and potential over-supply of labour in agriculture for, say, a policy of encouraging regional industrialization. In point of fact, this is widely done in Holland with remarkable success. I believe that the structural, mainly regional, problems in agriculture will, for a large part, solve themselves if in these regions enough opportunities are made available for gainful employment outside agriculture. The structural reform of regional agriculture itself, by way of re-allotment schemes and enlarging farms, will certainly follow suit if helped by efficient legislation and government help in drawing up plans and provision of financial assistance.

Thus, I doubt if it is worth while doing all the work outlined by Dr. Klatzmann in his paper. At the same time I am convinced that, if it should be done, Dr. Klatzmann has proved himself a good guide in this new field. At least we now know about most of the difficulties ahead before we begin.

D. S. THORNTON, *University of Khartoum, Sudan*

My comments will be made from the point of view of countries whose development has begun fairly recently, and my references will be to the Sudan which I know best.

It is clear from this paper that accurate regional analysis is very difficult, laborious, and, therefore, expensive. Many countries have yet to evaluate their resources, let alone study the internal *mechanisms* of their regions. The emphasis in these countries must be on the most urgent studies and it is, I suspect, in direct relation to planning that regional thinking of some kind may be required. In newly developing countries, planning is often chiefly a matter of finding local situations where concentrated effort will pay best or, perhaps, pay at least something with some certainty, as Dr. Lamartine Yates asserted. This process frequently gives rise to complaints of regional unfairness which may lead, in big and loosely knit countries, to political discontent. The important question often becomes whether regional equality or central concentration on development is better, taking everything into consideration. This is one argument for at least some attention to regional study in developing countries. A second reason applies when, as in the case of the Gezira in the

Sudan, one region has developed ahead of others, and has progressed a long way across the divide between subsistence and commercial farming, both in production methods and mental attitudes. The application of new resources to such an area may be much more promising in marginal returns than elsewhere. Yet the extra investment means far greater complexity in resource combination and human organization, so that the situation calls for careful analysis within one region and study of its relation to the whole economy. A third reason, likely to occur more quickly to the mind of a European than a native of these countries, is the ever-present danger of diseconomies arising from the over-development of the metropolitan areas.

Now to the difficulties. Before discussing the problems of regional research Dr. Klatzmann, deftly sidesteps the problem of defining a region, perhaps because the French, particularly their geographers, have already contributed so much to the subject. Indeed, he himself has contributed to an important work in this field.¹ But in his already full list of difficulties of regional analysis he should not omit this problem of definition. We may distinguish between regions defined by some dominant physical, economic, or social factors, or administrative boundaries. But how often we find that the boundaries based on these criteria fail to coincide, thus frustrating the regional analyst. To take the Gezira again as an example, it is extremely difficult to treat the irrigated area as a region for social planning purposes because the local authority boundaries which formed the basis of the population census do not coincide. Turning to problems of measurement, I can only echo Dr. Klatzmann, when he lays emphasis on the difficulties of measuring technical coefficients and the rate of change in them. The flow of resources and products between regions in newly developing countries tends to be small or often to pass along a few well defined channels. To measure the quantity of resources available and the relation between inputs and output, however, is far more difficult. There are a number of reasons for this, including the defining of precisely what resources are available and in use, the lack of records, the unfamiliarity of the local people with systematic questioning and also, under certain climatic conditions, the huge variations in output from year to year. Very painstaking work is required to build up sets of coefficients in developing countries. It is only just beginning in some of them. Western Tanganyika provides a good example of this kind of work. Then, to try to measure and forecast the *rate of change* in the coefficient raises further problems

¹ *Agricultural Regions of the E.E.C., O.E.E.C.*

of insufficiency of historical records, the imponderable effects of education (countered by the resistance arising from traditional values) and the incalculable effects of the introduction of drastically new methods and resources.

Some of the difficulties that Dr. Klatzmann quotes are happily less severe in newly developing countries. This is true for the industrial sector, for instance, which tends to be small and loosely attached to the regional economy (which incidentally means that inter-dependance is low and the effectiveness of input-output analysis is increased). Difficulties certainly occur with households, however. In the Sudan communities may migrate seasonally with their cattle across regional boundaries and in numbers varying from year to year. Or a large proportion of the male population may migrate from their homes, yet send back subsistence funds to their relatives (irregularly over time and nowhere recorded).

Bearing in mind all these difficulties, should we dismiss regional and careful planning as impossible? Dr. Klatzmann talks of the near impossibility of making up a table of inputs and outputs by current methods and, clearly, low-income countries are as far behind in reliability of data as in the supply of qualified personnel to do the work, even though in some respects the calculations may be simpler.

The following rough outline for a programme of investigation in a developing country is, I suggest, the most ambitious that can be expected. First, following an approximate assessment of the country's resources, the formulation of an overall framework plan primarily to control expenditure. (The output side of the plan is in any case often subject to great uncertainties.) Second, a study of the yield in alternative uses of the main limiting factors, such as water resources, capital, transport facilities and school-teachers. Then an imaginative search for promising points of growth where, though output is hard to assess, it can scarcely be less than the input. And finally a careful analysis of those regions which show the most promising signs of graduation into the complex modern world. It is *here* that the sophisticated techniques of regional study seem justified. Where development is purely agricultural a sequence of linear programming exercises seems most likely to succeed; the adoption of some simple maximization objective in line with national ideals and standards attainable in field-scale research or under enlightened management, is the first step. This will show up the overall scope for development and where changes in the constraints are likely to be most rewarding. This will be followed by the imposition of more realistic standards, made possible by investigating the capabilities and attitudes of the

local people, together with better knowledge of the technical and market aspects of the possible activities. I do not mean to imply here that we should seek a forecast of what farmers will do if left to themselves, though this might be useful when a basic change in the resources available is contemplated. I mean a plan which the local people could be reasonably expected to achieve given certain income incentives and adequate advisory services.

At this point the problem of price projection becomes important. Dr. Klatzmann does not mention this difficulty in his paper though the planning of one region and, still more, the integrated planning of a group of regions must be much affected by price levels and changes. His omission is partly due, no doubt, to the high degree of price stability which France and other Western countries enjoy. Planners working in these conditions do not realize how lucky they are! In the sort of problem I am thinking of here, the degree of price uncertainty is so large that sudden changes in the revenue for one product may be such as to affect materially the demand for, and therefore the producer prices of, others in the list of alternatives. I do not think Professor Weinschenk included this problem in his review of demand and supply studies.

I am aware that the suggestions I have made may exaggerate, at least temporarily, the disparities in pace and form of development between regions. To some extent this seems inevitable in those countries where development has been slow in the past, precisely because they are not richly and evenly endowed with resources. If growth is now rapid enough, its benefits will spread to the least favoured. Nevertheless, it may be good psychology on occasion to pay special attention to removing extreme disparities between regions in order to harness the enthusiasm of the people, which is as crucial a consideration as finding the best growing points.

Finally, Dr. Klatzmann in his conclusion makes the all-important point, which applies to both the simple and the more advanced types of study, that analysis and planning must be carried out by *mixed* teams of social scientists, not only so that the capabilities of the individuals and communities concerned should be fully explored, but also so that their values and aspirations may be fully taken into account. The old English saying that you can lead a horse to water but you cannot make it drink is often applicable to people who are 'developed' with too little thought being given to factors other than the strictly financial ones.

HARRY C. TRELOGAN, *U.S. Department of Agriculture, Washington, D.C., U.S.A.*

I was surprised to note that Dr. Klatzmann in his summary does not recommend that the agricultural economist should consult with the statistician. He mentions politicians and sociologists but not statisticians. This suggests the unjustified assumption that the agricultural economist is a competent statistician in his own right. My experience does not confirm this assumption, especially with respect to the problems of gathering data—in particular those of sampling and measurement. The use of a good economic analyst to assemble data or the use of a good statistician for economic analysis is not efficient.

GERSHON KADDAR, *Tel-Aviv, Israel*

Up to now regional accounting, as proposed by the speaker, has not been done in Israel, although we have an annual nation-wide forecast of agricultural production, split-up according to regions, as part of our procedure for administering production and irrigation water quotas. But obviously such a forecast alone is an insufficient base for comprehensive regionally-based rural planning. We are very much interested in this type of planning because, as in many other countries, we now have the problem of preventing migration from agricultural regions whilst reducing, at least relatively, the number of agricultural workers.

As Dr. Klatzmann and Professor Heady have rightly pointed out, processing methods in agricultural economics are far ahead of the data fed into them. Recently we tried to broaden our base of documentation by recording on punch cards the main book-keeping data of a very large sample of farms. We shall endeavour to obtain regional historic data by means of this sample and so considerably to enlarge our base material on the regional economies and their development trends.

May I raise a second point? As some of you know, Israel's farm economy enjoys a comparatively large coverage by book-keeping data as a result of its peculiar settlement structure. Unlike most countries, we are sometimes in the position to check certain items of the national accounts by comparing them with the sum totals of the corresponding items taken from the accounts of firms. Input-output tables are excellent tools and have the happy characteristic that they always balance. But, in spite of this very convenient property, they are apt to present a rather inaccurate picture even on the national

scale. We realized this recently in Israel. Comparing the data of the above mentioned sample of farms covering, say, 70 per cent. of the population, we found to our amazement that for certain inputs the sum total of the sample was larger than the amount supposed to represent the 100 per cent. in the national input-output tables.

U. SORBI, *Università di Parma, Italy*

The trend of studies on national economies in recent years has turned towards the contribution of the single regions and then towards the ratios of output and exchange existing between the individual regions. It is a necessary evaluation which, however, requires the perfecting of the instruments of research. First, the regions considered in the geographical sense are not always satisfactory regions from the point of view of economic production, especially if we refer to statistical data. It follows that the elements to evaluate in a region are the output, the services, and the exchanges. If we confine ourselves to the agricultural field we realize that the contribution made by each region to the total national output is not limited to these elements or to the quantity and value of the products grown in the region. Another problem is to determine one or more superior situations for each region which also requires the evaluation of the different potentialities of each region.

Obviously, in the present situation the principal aims lie in the calculation of the saleable total output of the region under consideration, of the average yearly income per working unit and per unit of consumption, of the income which the invested capital can bear, both land and working income, and of the amount of the added value both total and per unit of the product dealt in.

But the possibility of accomplishing economic and agrarian analyses of a regional character, which can give a minimum of reliability is very limited in most countries. This is due to the inadequacy of statistical reports referring to individual regions, and to the lack of well-equipped competent offices with adequate data and continuity of method. It follows that, although on a national scale the inevitable errors of statistical research on a regional basis can easily be compensated, on a regional scale this does not happen. All of us remember many examples of so-called regional statistical reports which have been clamorously refuted after a few years by subsequent statistical research. It should be noted, that, in order to draw regional balances, it is necessary to have certain data which are not required for the verification of national reports. The production of fodder and

livestock, for example, are subject to substantial differences between regions.

It is indispensable to arrange within any country for the organization and financing of research to enable the contributions of the individual regions to be evaluated with greater exactitude and reliability than they are at present. In many cases, it is necessary to have a preliminary delimitation of the territory of each single region, so as to overcome more easily not only the statistical but also the technical and economic problems.

T. KEMPINSKI, *Manchester University, U.K.*

I am stimulated to say a few words by noticing the difference between a term used by Dr. Klatzmann and one used by Dr. Horring in the same context. Dr. Klatzmann contrasted the actual contribution of a region with the *desirable* one; in the place of *desirable* Dr. Horring used the word *potential*. Now this, I submit, is not just a question of semantics, I think it is important to distinguish between these two concepts of what is the desirable and what is the potential contribution of any region to the gross national product. What is desirable from the national point of view is not necessarily the maximum possible contribution (i.e. the potential) that any particular region can bring into the total. Certain resources such as capital and labour which at present are situated in, say, region A may give a greater output if transferred to region B. Perhaps these resources are not fully employed at present in region A, and the output of that region could be increased by employing them more fully. But it is quite possible that the additional output would be higher still if those resources were transferred to region B. This might raise very grave social difficulties, but I want only to draw the meeting's attention to this fact, and would be glad to hear Dr. Klatzmann's opinion.

JOSEPH KLATZMANN (*in reply*)

My reply will be brief because I am in agreement with most of the observations and comments on my paper presented here, which have very happily completed what I had to say. I shall just make a few remarks.

Dr. Horring has underlined the very important problems of the utility of research on regional accounts or inter-regional models. This raises the following question: how far must these researches be carried, granted that the actual working out of a policy necessarily takes into account numerous factors left out of models?

I willingly admit that there is a rapidly decreasing marginal return on research as the models become more complex. We must know, then, at what point to stop.

But subject to this, I think that such research can be useful, even in a decentralized economy. Even in such an economy, where there are limited means of orientating economic activities, it is necessary to know where one wishes to go. And this can only be determined by making use of the results of studies similar to those I have mentioned.

Dr. Thornton has very felicitously posed the problem of such studies in the under-developed countries, where evaluation is in some cases very much more difficult, in other cases easier. In under-developed countries decisions in the economic sphere cannot wait until all the necessary statistical data are available. So that regional programmes have to be based on insufficient data. But I have said in my paper, the less adequate the data the greater is the need for highly qualified men to work out the programmes, men capable of passing judgement on conclusions drawn from somewhat uncertain data.

Dr. Thornton has also emphasized the problems of prices. It is true that this problem is particularly important for under-developed countries where variations in prices are considerable. If I did not mention this problem in my paper it was only in order to limit its length. I am perfectly aware of the importance of this question, and will even admit to you that in my present researches in France on inter-regional programming, the problem of prices and price variation constitutes my principal care and the source of my principal difficulties. Dr. Trelogan has justly reproached me for not mentioning the statisticians among the people with whom the researchers should be in contact. This is not due to any ill intent on my part, since I am in fact myself a statistician. Statisticians play an essential part in any research team studying regional economy.

Dr. Kaddar has demonstrated to us that even in a country like Israel, which has for various reasons excellent statistics, the problem of interpretation of the results arises, since different methods can give very different results.

Several speakers have mentioned the problem of defining and delimiting regions. I quite agree that this is an essential question to which an entire paper should have been devoted. Finally, I come to Dr. Kempinski's very pertinent observations on the difference between the potentialities of a region and what is desirable for a region. This is indeed an essential question. This is the sense which I give to these two expressions. When I speak of the potentiality of a region,

I refer to the total of the possibilities of the region according to different hypotheses as regards resources of labour, capital, and other factors of production. These potentialities can be represented by a curve or by a surface. What is 'desirable' is a point on this curve or surface, that is to say, one possibility amongst many others, one that appears to be the most preferable, taking into account various elements. A comparison between the chosen point and the actual situation may show certain factors of production—and particularly labour—must shift, either from one region to another or from agriculture to other sectors of the economy. With this point I am in entire agreement.